

Updated Maclean Flying-fox Management Strategy 2018



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1. Overview

1.1 Introduction

The *Maclean Flying-fox Management Strategy* (the Original Strategy, GeoLINK 2010) was prepared in 2010 with the aim of reducing conflicts between humans and flying-foxes at Maclean. The Strategy was developed by the Maclean Flying-fox Working Group (WG) and involved extensive consultation, input and engagement from a large number of stakeholders including various government agencies, community groups, Maclean High School and local residents. Since completion in December 2010, substantial effort and resources have been put into implementing the preferred actions of the Strategy.

This *Updated Maclean Flying-fox Management Strategy 2018* (the Updated Strategy) is intended to be an extension of the Original Strategy, with the aim of:

- Reviewing the status of the Maclean flying-fox camp and preferred actions detailed in the Original Strategy.
- Updating the Original Strategy in line with the recent NSW Office of Environment and Heritage (OEH) *Flying-fox Camp Management Policy 2015*.
- Providing clear direction for ongoing flying-fox management at Maclean.
- Quantifying vegetation impacts and offsets.
- Providing a platform for grant funding for onground works.
- Providing a platform for obtaining *NSW Biodiversity Conservation Act 2016* approval (licence) from OEH for onground management actions for the next five years.

The Updated Strategy should be read in conjunction with the Original Strategy, particularly for background information relating to the WG, previous consultation, the location of the camp footprint, land tenure, history, flying-fox ecology and issues at Maclean. Clarence Valley Council (CVC) is developing the Updated Strategy, using funding obtained from the NSW government.

1.2 Objectives

The objectives of the Updated Strategy are consistent with the Original Strategy, that is:

- Addressing the concerns of the community (local residents, Maclean High School (MHS)/ Technical and Further Education (TAFE) community and the broader community); whilst
- Conserving and co-existing* with the flying-fox population.

**Co-existence to be: for flying-foxes to remain within the Maclean region in areas that the flying-foxes select, with sufficient separation from the community to avoid conflict.*

2. Context

2.1 Camp Status

The Maclean flying-fox camp has continued to occupy a similar roost footprint to that recorded during development of the Original Strategy (refer to **Illustration 2.1**). It occupies multiple land tenures, including:

- Maclean Rainforest Reserve (MRR - crownland).
- Maclean High School campus.
- TAFE NSW campus.
- Maclean Cemetery.
- Essential Energy (EE, formerly Country Energy) substation.
- Council managed land (road reserves and utility easements).
- Private land.
- Maclean show ground.

There has been minor extensions of the camp footprint in localised areas at the western carpark/ Maclean showground, along Cameron Street and at the gully (refer to **Illustration 2.1**).

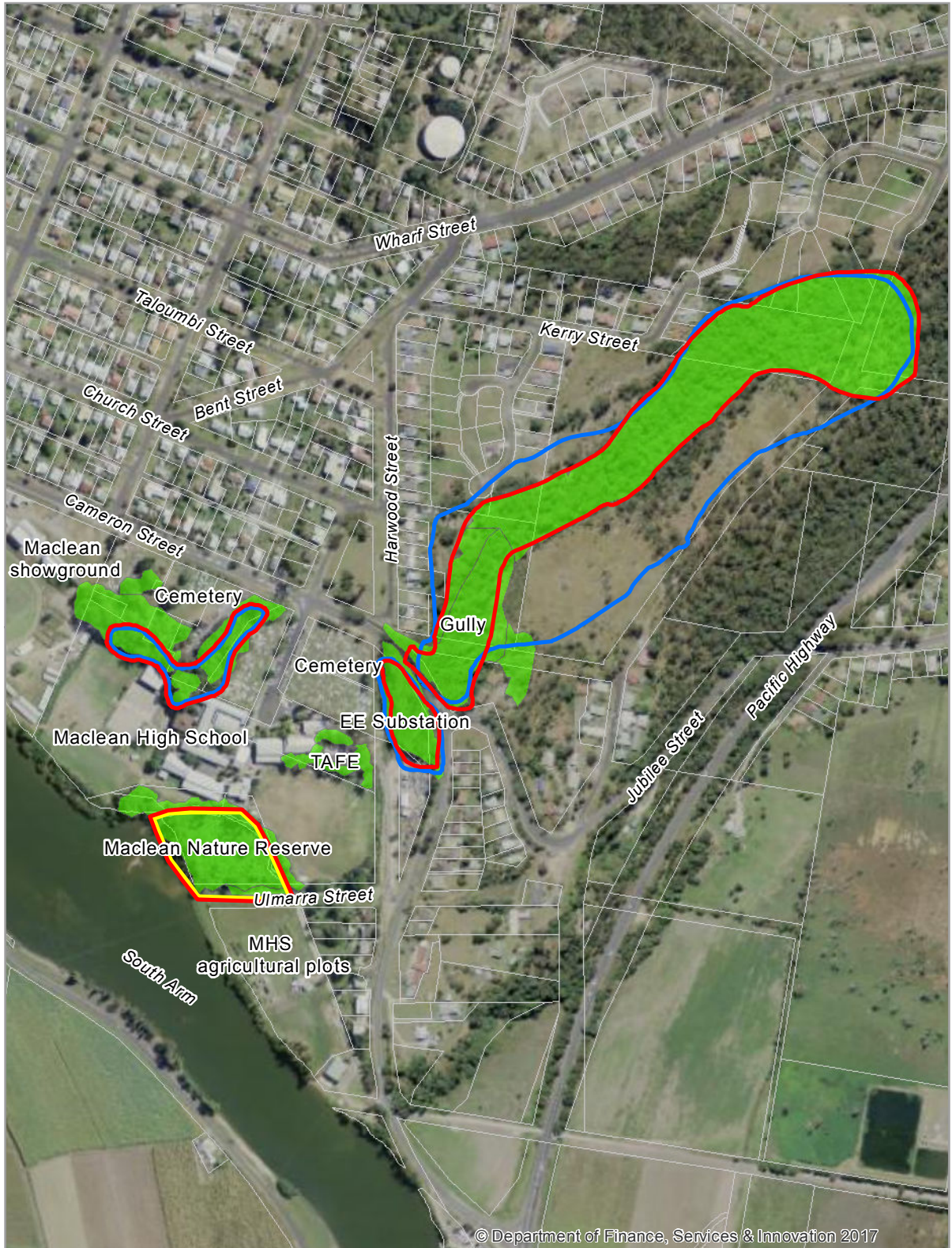
The total camp footprint occupies an area of approximately 11.89 ha (refer to **Illustration 2.2**), which includes:

- 3.95 ha of core roost: This is the main area occupied by flying-foxes during most periods, with localised variations over time. It includes MRR, Maclean High School, TAFE NSW campus, EE substation and the gully (primarily private land; Council managed land in road reserve/ utilities easement).
- 2.06 ha of seasonal roost (common): This area is commonly occupied by flying-foxes on a seasonal or periodic basis, particularly when flying-fox numbers at the camp are high. It includes Maclean High School/ western carpark/ cemetery and the gully.
- 5.83 ha of seasonal roost (uncommon): This area is uncommonly occupied by flying-foxes. When occupied, it is for short periods typically when flying-fox numbers are high and 'spill over' into surrounding vegetation. It includes the western carpark (i.e. Maclean cemetery) and the gully.
- 0.06 ha of extended roost site: This occurs along the Ulmarra Street road reserve, south of MRR. This vegetation was planted as a direct action of the Original Strategy circa 2011, with the intention of providing flying-fox habitat away from sensitive receives to reduce conflicts. It has been occupied by flying-foxes periodically since at least mid-late 2017.






The Maclean flying-fox camp is a permanent camp and meets the criteria of habitat critical to the survival of the Grey-headed Flying-fox (*Pteropus poliocephalus*) as defined in the Draft National Recovery Plan for the species (DECCW 2009). It is identified by the Australian Government Department of the Environment and Energy (DEE) *National Flying-fox monitoring viewer* as a '*Nationally Important Flying-fox Camp*' (DEE 2018). The NSW Northern Rivers region supports eight camps identified as '*Nationally Important Flying-fox Camp*', three of which occur in the CVC Local Government Area (LGA): Maclean, Susan Island at Grafton and Glenreagh. The closest *Nationally Important Flying-fox Camps* to the Maclean camp along the NSW East Coast comprise:

- To the south, the Susan Island camp located 37 km south-west of Maclean.
- To the north, the Rotary Park camp in Lismore located 73 km north of Maclean (DEE 2018).

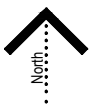
Results from the DEE/ CSIRO Flying-fox monitoring at Maclean from November 2012 to February 2018 shows that the camp is consistently occupied by large numbers of flying-foxes, with a general increasing trend post November 2014.



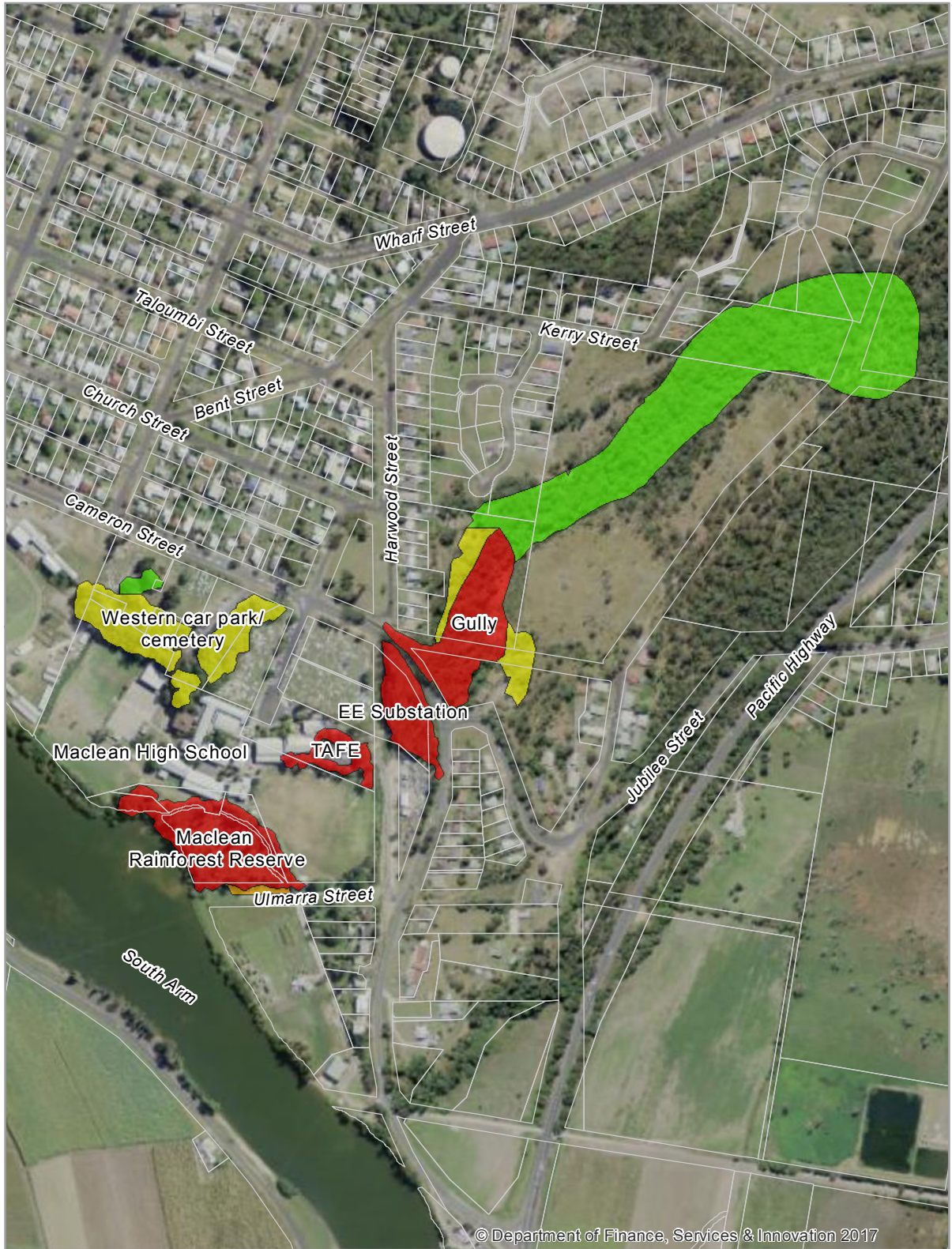
LEGEND

-  Cadastre
-  2010 - 2018 camp footprint
- Historic camp footprint**
-  1960 - 1999
-  2000 - 2007
-  2009 - 2010

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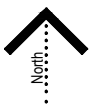
Information shown is for illustrative purposes only



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LEGEND

-  Cadastre
- 2010-2018 camp footprint type**
-  Core roost
-  Extended roost site
-  Seasonal roost (common)
-  Seasonal roost (uncommon)



3. Community Engagement

3.1 Engagement Methods

Community and stakeholder engagement was undertaken during development of the Updated Strategy to:

- Communicate why the Original Strategy is being updated.
- Discuss the aims and objectives of the Updated Strategy.
- Obtain input on the status of implemented actions under the Original Strategy and evaluate their effectiveness.
- Identify ongoing or new issues and conflicts between humans and flying-foxes at Maclean.
- Inform the community of recent relevant State and Commonwealth government policy and legislation.
- Discuss the OEH *Flying-fox Camp Management Policy 2015* and relevant actions.
- Identify relevant management actions for the Updated Strategy.

The following community liaison and consultation was undertaken:

- 3/05/2018: Meeting with Mr and Mrs Ron and Dianne Browning (residents).
- 3/05/2018: Meeting with Mr Greg Court, MHS Principal.
- 14/05/2018: Phone liaison with Ms Tania Williams, Leader of Community and Business Engagement, TAFE NSW.
- 23/05/2018: Presentation and discussions at the Maclean Flying-fox Dispersal Committee (Dispersal Committee) May 2018 meeting.
- 23/05/2018: Presentation and discussions at the Maclean Flying-fox Working Group's May 2018 meeting.
- 28/05/2018: Meeting with Ms Aneika Kapeen, CEO of Nungera Co-operative Society.
- 30/05/2018: Liaison (phone and email) with Ms Sarah Armstrong, President of MHS Parents and Citizens Association (P&C). A formal engagement letter was provided (30/05/2018).
- 31/05/2018: Open door community drop-in information session at Maclean Shire Council office. The workshop was advertised via Council's media release (website and local newspapers). The information session was attended by eight residents of the lower Clarence, including representatives from the New High School For Lower Clarence collective.

Responses and input from the community engagement is discussed in the subsequent sections. Essential Energy was emailed on two occasions (14 and 30 May 2018); however no response has been received to date. TAFE supported a co-existence strategy and have their own conflict minimisation strategies in place.

4. Issues

4.1 Reported Issues Related to the Camps

Community issues and concerns relating to the flying-fox camp obtained during community engagement is summarised below:

- **Noise:** Impacts residents and MHS as flying-foxes depart or return to the camp and/ or from the camp during the day. Noise is also a particular issue at night, during the breeding season, when flightless young are left at the camp.
- **Smell:** Impacts residents and MHS. Reported to varying depending on roost location, rainfall, season and wind direction.
- **Faecal drop:** Impacts MHS and residents (both within the vicinity of the camp and the fly-out path). Faecal drop impacts houses, outdoor areas, cars, washing lines and other personal items. At MHS, faecal drop impacts footpaths, handrails, sporting areas, seats, staff and students (both persons and personal items), buildings and other outdoor areas. Other public places are impacted by faecal drop including the cemetery and the footpath along Cameron Street (though the latter has reportedly improved following previous trimming of overhanging branches). Key reported impacts relate to safety and public health (including slips and falls).
- **Disease:** from droppings and direct contact with animals (the latter mainly at MHS).
- **Education and workplace impacts:** at MHS due to disruptions (noise, smell and distraction), reduced amenity and safety/ health and wellbeing concerns from flying-foxes.
- **Health and/ or wellbeing impacts:** for example, associated with lack of sleep (residents), anxiety (e.g. residents; MHS staff, students and parents).
- **Reduced general amenity:** Impacts both residents and MHS from vegetation damage, faecal drop and smell caused by the flying-foxes.
- **Flying-foxes overhanging facilities:** for example at MHS and residential properties.
- **Property devaluation:** this primarily relates to local residences.
- **Damage to vegetation.**
- **Lack of compensation:** for residents impacted by the camp (e.g. droppings on personal items).
- **Flying-fox welfare and conservation:** loss of habitat, disturbance and stress/ mortality.

These issues are discussed in more detail in the Original Strategy.

4.2 Status of Preferred Management Actions from the Original Strategy

Preferred management actions identified in the Original Strategy and their completion status is provided in **Appendix A**. Of the 16 preferred management actions identified in the Original Strategy:

- Four actions have been implemented and require no further direct action (based on the scope outlined in the Original Strategy). This includes relocation of powerlines underground and three actions associated with land use planning instruments/ studies which relate to future development.
- Six actions have been implemented however require ongoing resources to maintain their effectiveness. This includes trimming vegetation to maintain buffers, distributing educational material, vegetation restoration works, monitoring health and ecotourism.
- Two actions have been partially implemented (modifications to MHS buildings and grounds) or implemented on one occasion (manage special events).
- Two actions have been subject to ongoing investigations, however have not been completed. This includes voluntary buy back of houses and identification of additional/ alternative areas for habitat.

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- Two actions have not been implemented to date, which comprises modification to residential buildings and community areas; and undertaking onground works for 'provision of alternative habitat' outside of the urban area of Maclean. Costs and funding are key limitations inhibiting these actions.

Opinions of the effectiveness of individual actions/ action types and the overall Original Strategy varied during the community engagement. There was a general consensus that the Original Strategy and actions like vegetation trimming to create separation between humans and flying-foxes, and infrastructure measures (excluding at private residences) has improved the situation at Maclean. Issues from flying-foxes directly overhanging residences and facilities at MHS for example had improved, however impacts associated with flying-fox noise, smell and droppings were still present, particularly as flying-foxes move in large numbers over a larger area than just the roosting habitat when disturbed or flying-in or out of the roost. It is generally considered that 300 m buffers are required to mitigate such impacts; however such separation is not available within Maclean.

In contrast, opinions of the situation not improving or worsening revolved around:

- The general increase in numbers of flying-foxes roosting at Maclean (which is supported by DEE/ CSIRO monitoring results).
- Flying-foxes roosting closer to residents in some locations (e.g. southern most house on Harwood Street, next to Cameron Street).
- Flying-foxes roosting within vegetation adjacent to sensitive receivers more frequently (MHS and residents).
- Vegetation removal/ thinning resulting in weed infestation and contributing to the above two points.

There was a general consensus that additional work and resources were required to reduce conflicts between humans and flying-foxes at Maclean.

5. Proposed Management Actions

The OEH *Flying-fox Camp Management Policy 2015* provides advice and guidance to assist the community, land managers and government to work together to manage flying-fox camps. It aims to streamline regulatory approaches through a hierarchy of management options based on a principle of using the lowest form of intervention required. Three levels of action may be undertaken to manage a flying-fox camp, though Level 1 actions should be attempted initially 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 environmental outcomes.
- Flying-fox usage of each section of the camp and key locations of conflict, prioritising most impacted residences and areas of MHS.
- Estimated costs and who would contribute funding.
- Risk associated with potential impacts to sensitive receivers, animal welfare, conservation of threatened species, likely resource requirements, effects on disease, potential to exacerbate impacts at the site or at other locations.

Proposed management actions focus on Level 1 and Level 2 actions as per the OEH *Flying-fox Camp Management Policy 2015*. A key emphasis is on maintaining or creating a minimum 20 m buffer between sensitive receivers (residences and MHS buildings) and the flying-fox camp.

Proposed management actions focus on the short term (\leq 5 years), in line with the OEH licences timeframes issued under the *Biodiversity Conservation Act 2016* (which replaces the repealed *Threatened Species Conservation Act 1995*) for onground works and are provided in **Table 5.1**. Key actions associated with property modifications, buffers and vegetation management are shown in **Illustrations 5.1, 5.2 and 5.3**.

After five years' of implementation of the proposed actions, it is recommended that the Updated Strategy is reviewed, assessing:

- The overall status of the proposed management actions and flying-fox camp, with a focus on the effectiveness of the Strategy in terms of reducing conflicts between humans and flying-foxes.
- Any changes in community attitudes.
- The effectiveness of 'buffers without vegetation removal'.
- Whether the Level 3 action of 'nudging' flying-foxes from sensitive locations merits further investigations, in line with the Original Strategy. This would depend on whether:
 - Rehabilitation (offset) efforts have been sufficient and that the risk of transferring conflicts elsewhere is low.
 - Improvements in the human flying-fox conflict have not been achieved. This would require input from relevant stakeholders, including MHS, CVC and local residents.

Relevant short-term actions would continue to be implemented in the medium (>5-10 years) to long term (>10 years). Likely relevant actions during this period are identified in **Table 5.1**.

Due to previous vegetation removal (including establishment of buffers, vegetation thinning and Camphor Laurel (*Cinnamomum camphora*) management works), key risks moving forward include:

- Flying-foxes occupy a larger area more often due to reduced vegetation carrying capacity (due to less trees).
- Remaining vegetation is occupied by flying-foxes more often, resulting in more vegetation damage and reduced opportunity for trees to recover.
- Ultimately there is a risk of flying-foxes roosting in undesirable locations (e.g. closer to residents near Jubilee Street, splinter/ new camp in an undesirable location, etc.)

Consequently, no additional vegetation removal (other than vegetation within proposed vegetation removal buffers or of hazard trees) is proposed.

While CVC is developing the Updated Strategy, it is intended that the local stakeholder and relevant community groups (e.g. WG, MHS, OEH, Nungera Co-operative Society) will endorse the Updated Strategy and support its implementation.

5.1 Consideration of Dispersal

In line with the Original Strategy and OEH *Flying-fox Camp Management Policy 2015*, CVC's approach for this Updated Strategy 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. Since completion of the Original Strategy, a number of recent studies investigating the effectiveness of dispersal have been undertaken.

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 area¹.
- 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.).

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 findings² 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.

¹ Local area is defined as the area within a 20 km radius of the original site = typical feeding area of a flying-fox.

² This was based on responses to questionnaires sent to councils; some did not respond and some omitted responses to some questions.

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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 this or the Original Strategy, which aims to reduce human/ flying-fox conflicts. In line with the OEH *Flying-fox Camp Management Policy 2015* which requires a hierarchy of management options based on the principle of using the lowest form of intervention; dispersal is not a proposed management action at this stage at Maclean. Preferred management actions would be re-evaluated as part of the review in five years' time (refer to **Section 7.2**).

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Table 5.1 Proposed Management Actions

Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
Level 1 actions						
Appoint a Flying-fox Officer	<ul style="list-style-type: none"> Council appoint a part-time Flying-fox Officer to: <ul style="list-style-type: none"> Organise and facilitate implementation of the Strategy. Seek ongoing external funds and prioritise onground works. Respond and monitor community concerns. Co-ordinate education programs. Obtain OEH licence for onground works. <p>The officer would also manage other flying-fox camps within the CVC LGA.</p>	High	<ul style="list-style-type: none"> Flying-fox Officer appointed. Flying-fox Officer facilitates management actions. Community confidence in Council's ability to management flying-fox camps increased. 	Commence: Year 1 Implementation: Years 1-5	Annual: \$55,000	CVC
Education and awareness programs	<p>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 at MHS and locally, flying-fox ecology and legislative status. This includes:</p> <ul style="list-style-type: none"> Continuing with existing education strategies, including digital and print media formats. Create links on Council and MHS websites with key available information, including: <ul style="list-style-type: none"> OEH Living with Flying-foxes. Department of Health, health information. CSIRO flying-fox monitoring viewer. Include a focused education campaign on 'living with/ near flying-foxes'. Support education strategies for MHS (including current and prospective students). Target information at new residents (e.g. residential developments off Kerry Street). Provide education material to Nungera Co-Operative Society to forward to residents. 	High	<ul style="list-style-type: none"> Community has greater understanding of the adopted strategy for managing flying-foxes. Complaints to Council and at MHS regarding flying-foxes are reduced. Conflicts between humans and flying-foxes are reduced. 	Commence: Year 1 Implementation: Ongoing (including medium to long-term)	<ul style="list-style-type: none"> Use budget from Flying-fox Officer (see above). Contributions from stakeholders including WG, MHS, OEH and NSW Health. 	CVC/ MHS/ OEH/ WG/ NSW Health/ not for profit organisations

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Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
	<ul style="list-style-type: none"> Informing residences and stakeholders (including Essential Energy, MHS, TAFE and Council contractors) on protocols ('Stop Work Triggers' - Appendix B; and 'Standard Management Measures' Appendix C) and OEH licence requirements when working near the camp (including buffer maintenance). 					
<p>Routine camp management: Maintain existing buffers</p>	<ul style="list-style-type: none"> Maintain existing buffers around school buildings at MHS and residence (refer to Illustration 5.2). Extend active buffer maintenance to include Kerry Street residence. Adopt 'Stop Work Triggers' (Appendix B) and 'Standard Management Measures' (Appendix C) to minimise animal welfare impacts during works. <p>No further vegetation thinning or removal beyond buffers is proposed (excluding hazardous trees).</p> <p>Council's role includes:</p> <ul style="list-style-type: none"> Maintaining buffers on Council managed land (i.e. road reserves). Sourcing funding. Educating/ informing residences on buffer maintenance and OEH licence requirements. 	High	<ul style="list-style-type: none"> Existing buffers maintained. Management works undertaken in accordance with 'Standard Management Measures' and 'Stop Work Triggers'. 	Commence: Year 1 Implementation: Ongoing (including medium to long-term)	<ul style="list-style-type: none"> Council costs comprise existing budgets allocations for road reserve maintenance. Flying-fox Officer budget for education. Residents are responsible for maintaining buffers on private land. MHS are responsible for maintaining buffers on their land. 	CVC/ MHS/ OEH/ local residents/ Nungera Co-operative Society
<p>Routine camp management: Bush regeneration at Maclean Rainforest Reserve (MRR)</p>	<ul style="list-style-type: none"> Continue on-ground weed control to assist regeneration of MRR to increasing the flying-fox roosting carrying capacity of the reserve (refer to Illustration 5.3). Secure long-term funding for ongoing weed management (additional resources {funding} required to get on top of vine weed infestation). Adopt 'Stop Work Triggers' (Appendix B) and 'Standard Management Measures' (Appendix C) to minimise animal welfare impacts during works. <p>Vine weeds are particularly prolific, therefore</p>	High	<ul style="list-style-type: none"> Condition of vegetation within MRR improves. Management works undertaken in accordance with 'Standard Management Measures' and 'Stop Work Triggers'. 	Commence: Year 1 Implementation: Ongoing (including medium to long-term)	<p>Crownland managed by NSW Department of Industry – Crown Lands</p> <ul style="list-style-type: none"> Year 1: \$30,000. Subsequent years: \$15,000. 	CVC/ NSW Department of Industry – Crown Lands

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Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
	<p>increased effort is required with the aim of increasing the carrying-capacity (i.e. number of roost trees).</p> <p>Council's role is to liaise with NSW Department of Industry – Crown Lands and assist in sourcing funding.</p>					
<p>Alternative habitat creation: Extend MRR vegetation on adjacent land via revegetation and vegetation regeneration works on 'low' conflict land</p>	<ul style="list-style-type: none"> Continue rehabilitation works at Ulmarra Street road reserve and the foreshore to the south of MRR (refer to Illustration 5.3). Secure long-term funding for ongoing rehabilitation works (additional funding and resources are required to get on top of vine weed infestation). 	High	<ul style="list-style-type: none"> Condition of vegetation improves. Flying-foxes occupy vegetation in 'low' conflict land. Management works undertaken in accordance with 'Standard Management Measures' and 'Stop Work Triggers'. 	<p>Commence: Year 1 Implementation: Ongoing (including medium to long-term)</p>	<ul style="list-style-type: none"> Year 1: \$10,000. Subsequent years: \$8,000. 	CVC/ NSW Department of Industry – Crown Lands
<p>Property modification: Maclean High School</p>	<p>Additional locations where infrastructure would help reduce flying-fox conflicts at MHS include:</p> <ul style="list-style-type: none"> Covering the basketball court. Covering the carpark. Covering the walkway between the carpark and buildings. Air conditioning and double glazed windows at the gymnasium. <p>Refer to Illustration 5.1 for locations of key proposed property modifications. Council's role would include supporting the DA and assist with sourcing funding.</p>	High	<ul style="list-style-type: none"> Building modifications are undertaken. Flying-fox conflicts at MHS are reduced. School community complaints reduced. 	<p>Implement: Short-term (Year 1-3)</p>	<ul style="list-style-type: none"> Council's costs relate to in kind support of Flying-fox officer, DA process, etc. Covered basketball court: \$90,000. Covered walkway (allowing 30 m long x 2 m wide): \$24,000. Air conditioning only within the gymnasium: \$95,000. 	CVC/ MHS

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Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
Property modification: residential buildings	<p>Support residents (in DA process) in property modification options, potentially includes:</p> <ul style="list-style-type: none"> air conditioning (with solar panels/ battery storage); construction of carports, paved areas or cover areas affected by droppings; construct sound barriers; purchase clothes dryers; install acoustic batts; and lamine or double glaze windows. <p>Council's role would include support DAs, and assist with sourcing funding and education. This includes liaise with funding bodies in relation to grant application options. Consideration should be given to funding models similar to noise mitigation on infrastructure projects where actions are targeted at individual residences; however the entire community benefits (e.g. through not trying to shift the problem elsewhere). <i>Note: Approximately 31 residences occur within 100 m of the core camp footprint (refer to Illustration 5.1).</i></p>	High	<ul style="list-style-type: none"> Residents interested in property modifications are identified. Potential funding sources identified and secured for implementing on-ground works. Flying-fox conflicts at residences (including Nungera Cooperative Society) are reduced. 	Implement: Short-term (Year 1-3)	<ul style="list-style-type: none"> At a minimum, Council's costs are covered under Flying-fox officer. Costs would increase depending on identified funding model. Estimated at \$400 for low cost features (e.g. clothes dryers, excluding electricity) to \$15,000 for more complex modifications (eg. combined features of air conditioning unit, solar panels and battery system). 	CVC/ local residents/ Nungera Co-operative Society
Alternative habitat creation: Identification of additional/ alternative areas for flying-fox roosting habitat creation not within the Maclean township or other areas of potential conflict	<p>Identify alternative flying-fox habitat to revegetate that is not located near sensitive receivers. Alternative habitat must meet flying-fox roost site criteria. Site selection should focus on land within 5 km of the Maclean flying-fox camp. Consideration of extending the search further (eg. to 10 km of the Maclean flying-fox camp) would be explored if no options within 5 km are found. Secure funding and land tenure agreements (if required) at identified site/s.</p>	High	<ul style="list-style-type: none"> Alternative habitat creation site/s identified. Tenure agreements secured (if required). Secure funding for onground work. 	Implement: Short-term (Year 1-2)	<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox Officer. 	CVC/ WG/ OEH

Updated Maclean Flying-fox Management Strategy 2018

Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
<p>Alternative habitat creation:</p> <p>Provision of alternative flying-fox roosting habitat creation not within the Maclean township or other areas of potential conflict</p>	<p>Provision of bush regeneration/ revegetation works to create alternative flying-fox habitat identified through the action above.</p>	High	<ul style="list-style-type: none"> Bush regen/ revegetation works undertaken to create alternate habitat. Flying-foxes occupy alternative habitat in the medium to long-term. Conflicts between humans and flying-foxes at Maclean reduced. 	<p>Commence: Short-term. Implementation: Ongoing (including medium to long-term)</p>	<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox officer. TBC – Is Council able to provide a cost estimate for this (based on m² or ha rate) 	CVC/ WG/ OEH
<p>Voluntary buy back of houses</p>	<p>Council to investigate options to purchase properties off willing landholders that are directly affected by flying-foxes and then sell these houses to landholders that wish to live adjacent to flying-foxes or use the land to extend flying-fox habitat (with flying-fox information covenant). Existing voluntary buy back models such as those associated with flood prone land or coastal erosion could be used.</p> <p><i>Note: Even with a covenant, a successful outcome of reduced conflicts cannot be guaranteed.</i></p>	High	<ul style="list-style-type: none"> Voluntary buy back interest or disinterest from land holders confirmed. If perused, funding model for voluntary buy back of houses identified and sourced. Buy back scheme implemented. Complaints from residents reduced. 	<p>Commence and implement: Short-term.</p>	<ul style="list-style-type: none"> Council's costs relate to investigations from flying-fox officer and existing planning and development staff, etc. Buy back cost, resale and net loss to be determined by a property valuer during the investigation process. 	CVC

Updated Maclean Flying-fox Management Strategy 2018

Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
Develop a Clarence Valley Council LGA Flying-fox Management Plan	<ul style="list-style-type: none"> Source funding and develop a CVC LGA Flying-fox Management Plan, capturing all camps within the LGA. The Plan would be in accordance with the OEH Flying-fox Management Plan Policy, and focus on reducing human/ flying-fox conflicts across the CVC LGA. <p>The Maclean Flying-fox Management Strategy provides a platform for developing this plan.</p>	Medium	<ul style="list-style-type: none"> Funding for CVC LGA Flying-fox Management Plan secured. CVC LGA Flying-fox Management Plan developed. 	Commence: Year 1 Implementation: Ongoing (including medium to long-term)	<ul style="list-style-type: none"> Use budget from Flying-fox Officer for grant application. \$25,000 to develop the strategy. 	CVC/ OEH
Access management	<p>Investigate options to redirect the footpath along the utilities easement from Cameron Street to Jubilee Street to avoid camp disturbances and associated impacts to residents (particularly noise). Specifically, the footpath could be redirected to Nungera Way (refer to Illustration 5.1), linking the utilities footpath to the Cameron Street footpath (which currently informally occurs). Consultation with Nungera Co-operative Society would be required.</p> <p>Alternatively consider closing the walkway (at least temporary) when the subject gully area is occupied (particularly during the breeding season).</p>	Medium	<ul style="list-style-type: none"> Options and feasibility of redirecting the subject footpath is evaluated. Funding secured (if footpath re-direction is the preferred outcome). Impacts to footpath users (residents) and flying-foxes from disturbance are reduced. 	Implement: Short-term (Year 1-2)	<ul style="list-style-type: none"> Council's costs relate to support of Flying-fox officer, discussions with existing engineering staff, etc. Cost of footpath construction (approximately 25 m x 1.5, standard concrete design): \$7,500. 	CVC/ Nungera Co-operative Society
Protocols to manage incidents	<p>In consultation with relevant landholders and community groups, Council to identify roles and responsibilities in developing an emergency response procedure for:</p> <ul style="list-style-type: none"> New, splinter and/ or emerging camps. Adverse weather events e.g. bushfire threat, flood or storm, extreme heat events leading to flying-foxes changing their behaviour and/ or dying). Council are familiar with and use http://www.animalecologylab.org/ff-heat-stress-forecaster.html. This is particularly relevant to Maclean High School. Scheduled and/ or emergency response to 	Medium	<ul style="list-style-type: none"> Protocols for managing incidents developed and implemented as appropriate. 	Implementation: Ongoing (including medium to long-term)	<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox officer. 	CVC/ WG / MHS/ OEH

Updated Maclean Flying-fox Management Strategy 2018

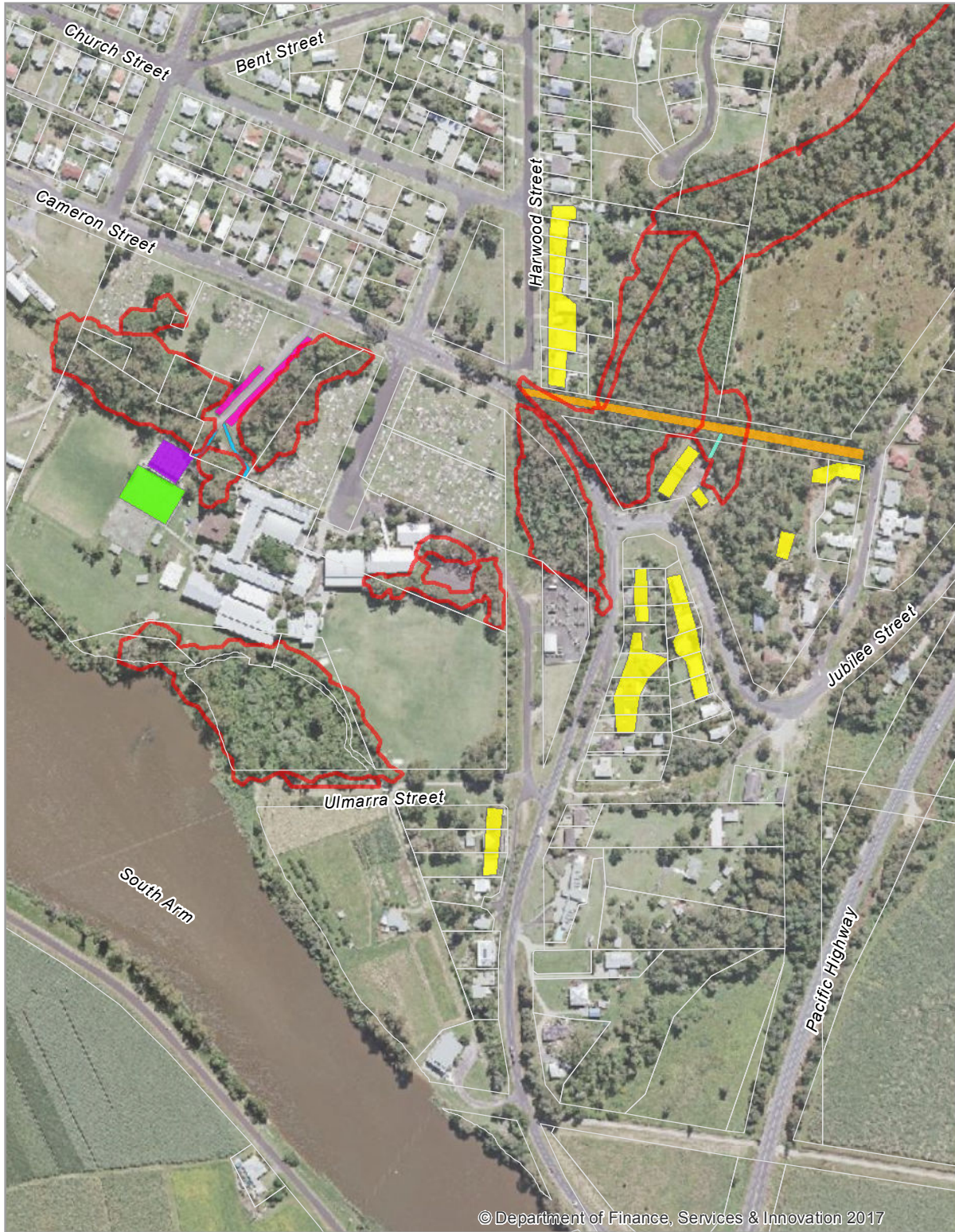
Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
	<p>infrastructure maintenance associated near to or within a flying-fox camp.</p> <p>The procedure would outline possible issues, and how Council and/ or stakeholders would address them e.g. out of hours, who to contact internally and externally to help respond.</p>					
Service subsidies for property cleaning equipment	<ul style="list-style-type: none"> Council to investigate the purchase and management off a high-pressure cleaner to be provided/ rented to affected residents to clean driveways/ verandas etc affected by faecal drop. An initial trial is recommended to gauge community interest. Investigate opportunities to exempt residents affected by flying-fox faecal drop from water restrictions to allow cleaning of essential pathways and structures. 	Medium	<ul style="list-style-type: none"> Complaints to Council regarding flying-foxes are reduced. Pressure cleaner available by Year 3. 	Commence: Short-term. Implementation: Initially short-term as a trial. Continuation would depend on the outcomes of initial trial	<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox officer. Pressure cleaner purchase: \$500. 	CVC
Research and Monitoring	<ul style="list-style-type: none"> Support research and monitoring programs associated with flying-foxes and camp management. This includes CSIRO Monitoring flying-fox populations program. Utilise data collected through research and monitoring programs to assist flying-fox management at Maclean. 	Medium	<ul style="list-style-type: none"> Maclean continues to be included in flying-fox monitoring and research programs. 	Implementation: Ongoing.	<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox officer. 	CVC/ CSIRO/ WG
Ecotourism	<ul style="list-style-type: none"> Continue to promote ecotourism via installation of a viewing platform, undertake guided walks, install interpretive signage and provide information sheets to focus on the positive aspects of the flying-fox camp whilst generating revenue. 	Low	<ul style="list-style-type: none"> Ecotourism actions implemented. Tourism related economic benefits for the community are measurable. Increased flying-fox awareness and education for tourists. 	Implementation: Ongoing (including medium to long-term)	<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox officer and existing tourism team. 	CVC/ OEH/ local tourism providers/ not-for-profit organisations

Updated Maclean Flying-fox Management Strategy 2018

Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
Level 2 actions						
Buffers through vegetation removal	<p>Trim vegetation:</p> <ul style="list-style-type: none"> • Within 5 m of MHS gymnasium and southern block (opposite MRR); and overhanging the western carpark. • Overhanging Cameron Street and associated walkway. • Within 5 m of residences (only one property where this is required was identified – refer to Illustration 5.2). <i>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.</i> • Monitor flying-fox camp distribution and should conflicts occur at the residences off Jubilee Street (Nungera property), establish and maintain buffers around the residences. • Adopt 'Stop Work Triggers' (Appendix B) and 'Standard Management Measures' (Appendix C) to minimise animal welfare impacts during works. • No further 'vegetation thinning' or removal beyond buffers is proposed. • Locations of buffers are shown in Illustration 5.2. 	High	<ul style="list-style-type: none"> • Separation between flying-fox camp and sensitive areas between • Complaints to Council regarding flying-foxes are reduced. • Creation of separation between the flying-fox camp and sensitive areas typically helps reduce conflicts, however broader issues of smell and noise are generally not resolved. 	<p>Implement: Short-term (Year 1) Benefit: Immediate Maintenance: Long term.</p>	<ul style="list-style-type: none"> • Vegetation removal: \$28,000 (including traffic control along Cameron Street). 	CVC/ MHS/ residents/ Nungera Co-operative Society
Buffers without vegetation removal	<p>Implement trial of buffers without vegetation removal, using the sprinklers model adopted by the Sunshine Coast Council.</p> <ul style="list-style-type: none"> • Installation of targeted flying-fox deterrent devices (i.e. sprinklers in vegetation canopy) at targeted sensitive residents and locations at MHS with the aim of maintaining a minimum 15-20 m buffer between buildings and roosting flying-foxes, without pushing the camp into close proximity with other sensitive receivers. Locations of the proposed buffers are shown in Illustration 5.2. • Sprinklers can be placed on automatic timers 	Medium	<ul style="list-style-type: none"> • Flying-foxes move towards vegetation core away from residents. • Complaints to Council or at MHS regarding flying-foxes are reduced. 	<p>Implementation: Initially short-term as a trial. Continuation would depend on the outcomes of initial trial.</p>	<p>At residences:</p> <ul style="list-style-type: none"> • Suggest model of installation cost covered by Council (with grant funding); operation (water) cost covered by residence. • Preliminary estimates of \$15,000. <p>At MHS:</p>	CVC/ MHS/ residents/ Nungera Co-operative Society

Updated Maclean Flying-fox Management Strategy 2018

Management action	Management details	Priority	Performance indicators	Timeframe	Estimated costs	Responsibility
	<p>to activate periodically (e.g. during HSC exams at the MHS gymnasium).</p> <ul style="list-style-type: none"> Adopt 'Stop Work Triggers' (Appendix B) and 'Standard Management Measures' (Appendix C) to minimise animal welfare impacts during works. <p>Lighting deterrent models used in the Sydney Royal Botanic gardens may also be suitable at MHS.</p> <p>Target locations include:</p> <ul style="list-style-type: none"> MHS. Residents near the gully. <p>In association with maintaining existing buffers and/ or buffers through vegetation removal, this action aims to create 20m of separation between sensitive receivers and the flying-fox camp.</p>				<ul style="list-style-type: none"> Council's costs relate to support from Flying-fox officer. Suggest model of installation cost covered by MHS/Council (with grant funding); operation (water/electricity) cost covered by MHS. Preliminary estimates of \$25,000. 	
Level 3 actions						
Implementation of Level 3 actions (dispersal, nudging, etc) are not proposed at this stage (refer to Section 5). Assessment as to whether the Level 3 action of 'nudging' flying-foxes from sensitive locations merits further investigations is proposed at the end of five years' of Updated Strategy implementation. This approach is in line with the OEH <i>Flying-fox Camp Management Policy 2015</i> .						CVC/ OEH/ WG/ MHS



LEGEND

- 2010 - 2018 camp footprint
- Cadastre

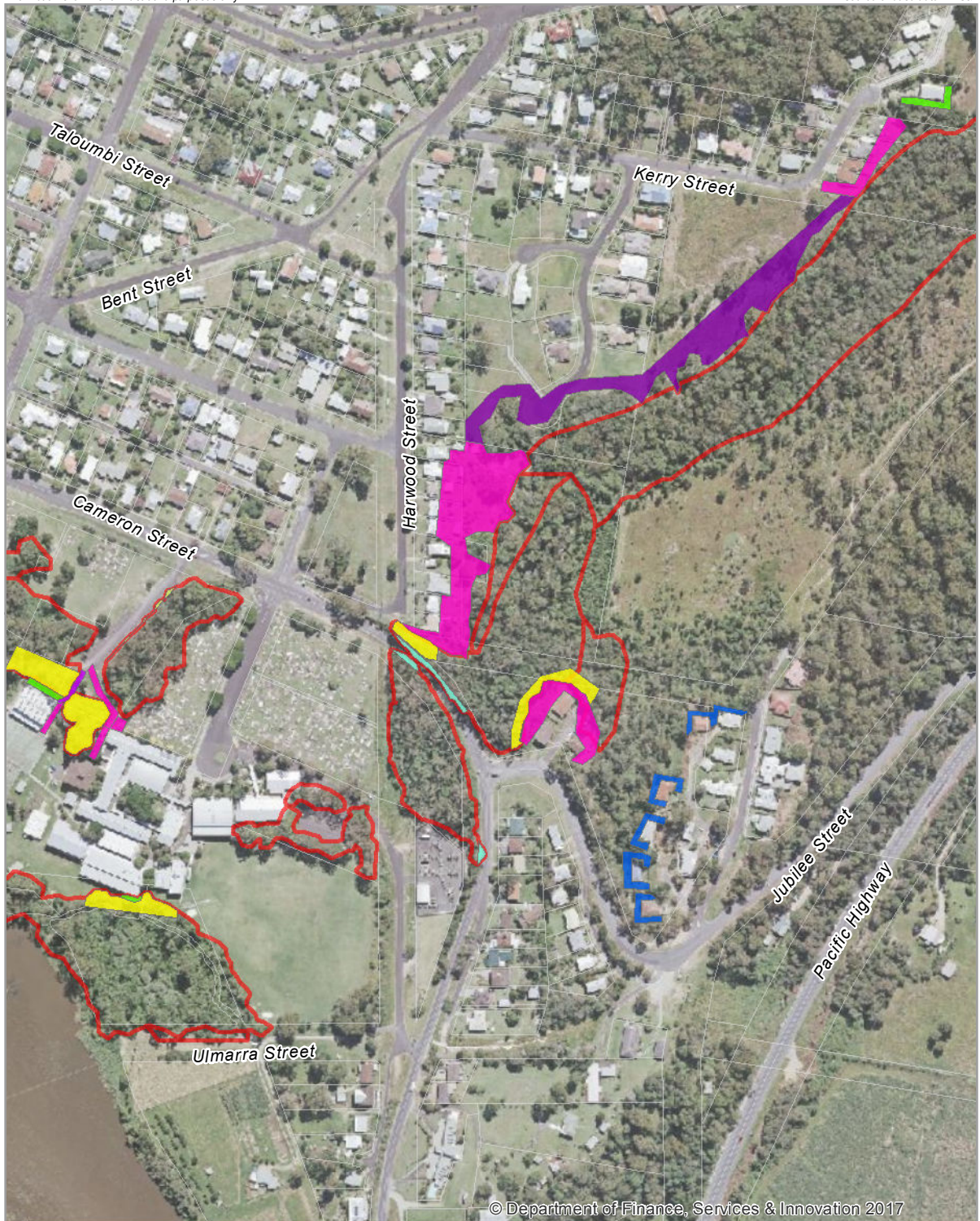
Action

- Property modifications (target residence - within 100m of core camp)
- Property modifications (covered car park)
- Property modifications (covered sports ground)
- Property modifications (covered walkway)
- Property modifications (MHS gymnasium)
- Existing footpath (redirect section within core camp)
- Indicative redirected footpath alignment



0 100





LEGEND

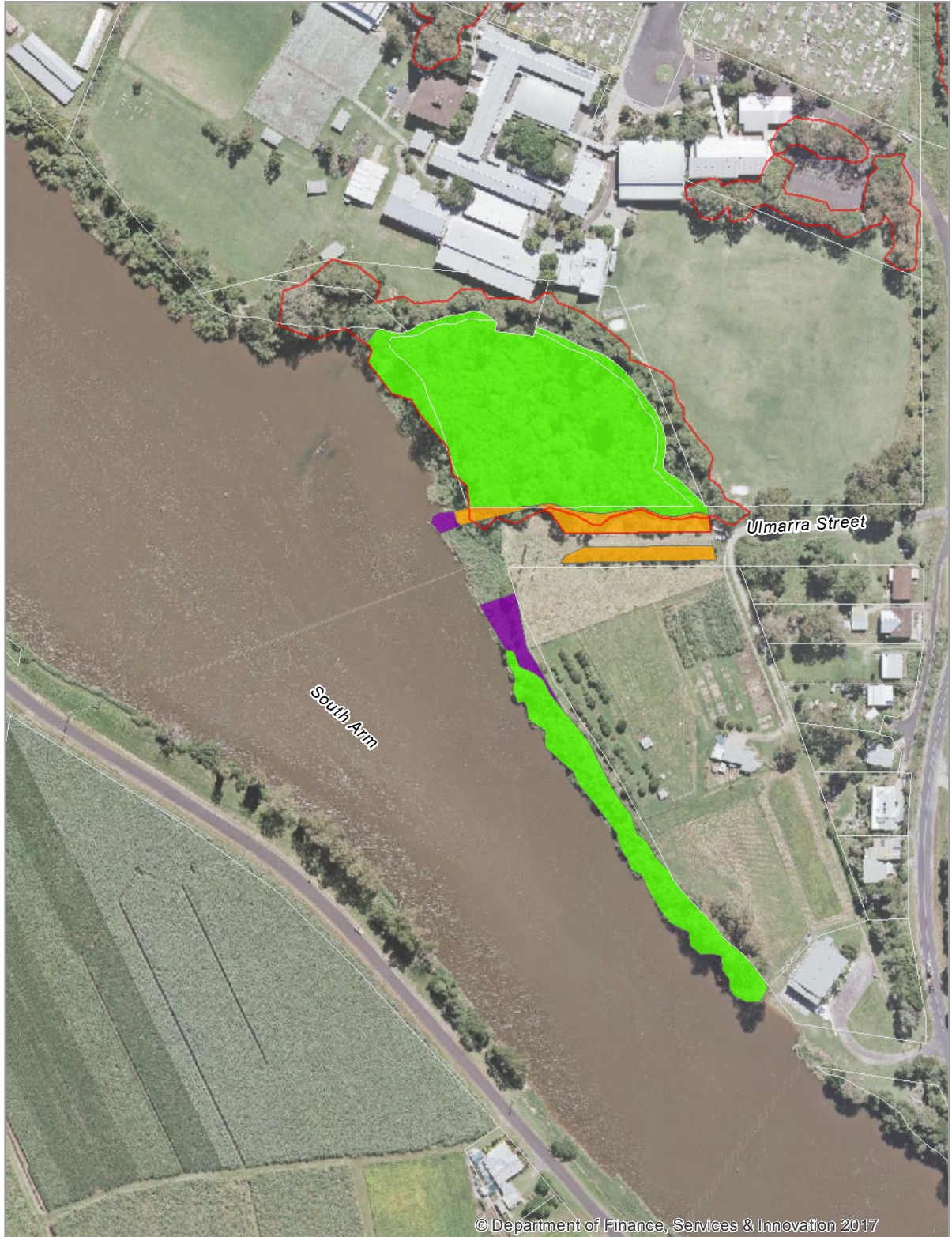
- 2010 - 2018 camp footprint
- Cadastre

Action

- Maintain vegetation buffer
- Maintain vegetation buffer (min. 5m from building)
- Maintain vegetation buffer (over walkway)
- Monitor and establish vegetation buffer if required (min. 5m from building)
- Trim/maintain vegetation buffer (min. 5m from building)
- Trim/maintain vegetation buffer (min. 1m from car park)
- Remove vegetation overhanging Cameron Street/walkway
- Buffers without vegetation removal (20m buffer)







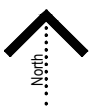
Information shown is for illustrative purposes only



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LEGEND

-  2010 - 2018 camp footprint
- Action**
-  Manage revegetation area
-  Revegetation area
-  Vegetation regeneration area



0 60

6. Assessment of Impacts

Approximately 16.92 ha of forest vegetation occurs within the general vicinity of the camp and encompasses the 11.89 ha camp footprint (including 3.95 ha of core and 2.06 ha of seasonal {common} flying-fox roosting habitat). Vegetation and roosting habitat impacts from implementation of the proposed management actions from the Updated Strategy are provided in **Table 6.1**. The Original Strategy resulted in the removal of approximately 0.4 ha of vegetation comprising core and seasonal (common) flying-fox roosting habitat. This calculation excludes vegetation removal within forested areas as part of thinning or weed management works.

The Updated Strategy would result in:

- The removal of approximately 0.21 ha of vegetation through implementation of 'buffers through vegetation removal'. This affects 0.05 ha of core and 0.13 of seasonal (common) flying-fox roosting habitat.
- Approximately 0.23 ha of roosting habitat made unavailable through 'buffers without vegetation removal'. This affects 0.2 ha of core and 0.03 ha of seasonal (common) roosting habitat.

Approximately 11.45 ha of the habitat within the current roost footprint would remain available, including 3.70 ha of core and 1.90 ha of seasonal (common) roosting habitat.

Offsets proposed as part of the Updated Strategy are provided in **Table 6.2** and include:

- Bush regeneration at MRR: 1.05 ha.
- Manage existing MRR extension planting on Ulmarra Street road reserve: 0.19 ha.
- Revegetation works at Ulmarra Street road reserve and the foreshore to the south of MRR: 0.06 ha.
- Bush regeneration works on crown land within vegetation in foreshore to the south of MRR: 0.29.

Additional proposed offsets include alternative flying-fox roosting habitat creation not within the Maclean township or other areas of potential conflict. The location and area would depend on the extent of land available and land tenure agreements (if required) at identified site/ s.

Table 6.1 Vegetation and Roosting Habitat Impacts From Proposed Management Actions

PCT Vegetation Type	BC Act TEC	EPBC Act TEC	Area of vegetation (2018; ha)	Area of vegetation/roosting habitat removed as part of Original Strategy (ha)*	Area of vegetation/roosting habitat proposed for removal as part of Updated Strategy (ha)^	Available roosting habitat reduced through buffers without vegetation removal (ha)	Remaining vegetation available (ha)
Black Bean - Weeping Lilly Pilly riparian rainforest of the NSW North Coast	Lowland rainforest on floodplain in the NSW North Coast Bioregion	Lowland rainforest of subtropical Australia	1.99	0	0.01	0.09	1.89
Blackbutt-Tallowood dry grassy open forest of the central parts NSW North Coast	N/A	N/A	9.90	0	0.03	0.03	9.84
Blackbutt-Tallowood moist ferny open forest of the coastal ranges of the NSW North Coast	N/A	N/A	3.36	0.40	0.16	0.11	3.09
Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the NSW North Coast	Subtropical coastal floodplain forest of the NSW North Coast Bioregion	N/A	0.35	0	0.00	0	0.35

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PCT Vegetation Type	BC Act TEC	EPBC Act TEC	Area of vegetation (2018; ha)	Area of vegetation/roosting habitat removed as part of Original Strategy (ha)*	Area of vegetation/roosting habitat proposed for removal as part of Updated Strategy (ha)^	Available roosting habitat reduced through buffers without vegetation removal (ha)	Remaining vegetation available (ha)
Forest Red Gum grassy open forest of the coastal ranges of the NSW North Coast	N/A	N/A	0.89	0	0.01	0	0.88
N/A: Pine Plantation	N/A	N/A	0.27	0	0	0	0.27
N/A: MRR extension planting	N/A	N/A	0.16	0	0	0	0.16
TOTAL	N/A	N/A	16.92	0.40	0.21	0.23	16.48

*estimates of vegetation/ roosting habitat removal as part of the Original Strategy is based on review of aerial photographs from 2009 and 2017. Vegetation removal within forested areas as part of thinning or weed management works has not been calculated.

^Excludes vegetation around residents on Jubilee Street which is proposed to be removed only if monitoring records flying-foxes occupy this area. Should this vegetation removal be triggered, a further 0.02 ha of *Blackbutt-Tallowood dry grassy open forest of the central parts NSW North Coast* would require removal.

Table 6.2 Proposed Offset Management Actions

Action	Offset Type	Area (ha)	PCT Vegetation Type	Roosting habitat type
Routine camp management: Bush regeneration at MRR	Bush regeneration at MRR	1.05	Black Bean - Weeping Lilly Pilly riparian rainforest of the NSW North Coast	Core roost
Alternative habitat creation: Extend MRR vegetation on adjacent land via revegetation and vegetation regeneration works on 'low' conflict land	Manage existing MRR extension planting on Ulmarra Street road reserve	0.19	-	Extended roost site adjoining MRR
	Revegetation works at Ulmarra Street road reserve and the foreshore to the south of MRR	0.06	-	Not established
	Bush regeneration works on crown land within vegetation in foreshore to the south of MRR	0.29	Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the NSW North Coast	Not occupied

7. Strategy Administration

7.1 Funding and Approvals

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

- Obtain CVC endorsement.
- Obtain OEH endorsement.
- Obtain funding through available grants.
- Review council biodiversity budgets and funding allocation options.

Due to the occurrence of the camp over multiple land tenures and management regimes, endorsement by key stakeholders will be required for the Updated Strategy to be effectively implemented.

7.2 Evaluation and Review

The Updated Strategy will have a scheduled annual review by Council, which will include evaluation of management actions against measures shown in **Section 5**.

The following will trigger a reactive review of the Proposed Management Actions:

- 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 actions.
- Incidents associated with the camp such as flying-fox deaths or illegal actions.

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

A full review including stakeholder consultation and expert input will be undertaken in the five years' time following Council endorsement, prior to being re-submitted to OEH as part of ongoing licence approval.

7.3 Monitoring of the Camp

Council would support the continued monitoring of the Maclean camp on a quarterly basis as part of the National Flying-fox Monitoring Program. Monitoring should 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 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>

7.4 Reporting

Progress reports will be required annually throughout the life of the Updated Strategy, as part of the evaluation and review process.

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

7.5 Funding Commitment

Estimated costs have been included within the proposed management action tables within **Section 5**. Cost sharing between stakeholders will be investigated during the pre-management consultation and consent period. Council will be seeking a commitment by stakeholders to maintain their land (with Council support), including private landholders to maintain their properties.

Council (with support from relevant stakeholders) will seek to take advantage of the relevant environmental and educational grants program funded by state and federal government. Funding would also be sort through opportunities available to MHS and Nungera Co-operative Society associated with infrastructure, education and other social programs, where relevant.

CVC is aware that funding commitment is required long term for the Updated Strategy to be effective.

8. References

DECCW (2009), *Draft National Recovery Plan for the Grey-headed Flying-fox* *Pteropus poliocephalus*, prepared by Dr Peggy Eby for Department of Environment, Climate Change and Water NSW, Sydney, viewed 12 January 2016,

www.environment.nsw.gov.au/resources/threatenedspecies/08214dnrpflyingfox.pdf.

DEE (2018), *Monitoring Flying-fox Populations*, Australian Government Department of the Environment and Energy, Canberra, viewed 11 June 2018,
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GeoLINK (2010). *Maclean Flying-fox Camp Management Strategy*. GeoLINK, Lennox Head, NSW Australia.

Roberts, B and Eby, P (2013), Review of past flying-fox dispersal actions between 1990–2013, publisher unknown, viewed 12 January 2016, www.environment.nsw.gov.au/resources/animals/flying-fox-2014-sub/flyingfoxsub-jenny-beatson-part2.pdf.

Appendix A Status of Preferred Management Actions from The Maclean Flying-fox Management Strategy (2010)

Table A1 Status of Preferred Management Actions From The Maclean Flying-fox Management Strategy (2010)

Management Action	Management Details	Priority	Performance Indicators	Status	Comment
Trim vegetation	Trim branches of vegetation within backyards adjacent to the gully, of overhanging branches above the Cameron Street footpath and areas within MHS. Follow up with planting of non-roost vegetation to screen/replace habitat removed by trimming. Maintenance of vegetation trimmed would also be required.	High	Initial works within MHS completed in early 2010. Maintain as required.	<p>Implemented/ ongoing:</p> <ul style="list-style-type: none"> Vegetation removal of up to 10 m around impacted residential properties at the gully. Vegetation removal of up to 10 m in several areas of the MHS, including around buildings, footpaths and walkways. Removal of vegetation overhanging Cameron Street and associated footpath at the gully. <p>Vegetation removal works has also included thinning some heavily vegetated areas at MHS and the gully.</p>	<ul style="list-style-type: none"> Ongoing vegetation management is required to maintain buffers. Additional overhanging branches at MHS (including carpark and gymnasium) may be required to increase/maintain separation between humans and flying foxes. Risks with vegetation removal includes: <ul style="list-style-type: none"> Flying-foxes occupy a larger area more often due to reduced carrying capacity. Remaining vegetation is occupied by flying-foxes more often, resulting in more vegetation damage and reduced opportunity for trees to recover.



Management Action	Management Details	Priority	Performance Indicators	Status	Comment
Plate 2.1 Example of established vegetation buffers. MHS footpath from western carpark (left). Harwood Street residences (centre). Jubilee Street residences (right).					
Extend MRR via revegetation	Plant preferred roost trees within the Ulmarra Street road reserve, foreshore along the river and areas distant to sensitive receivers. An additional component of this task may involve changing the status of the Ulmarra Street road reserve to accommodate future habitat.	High	Initial revegetation works completed in June 2010. Road reserve (including encroachment area): end of December 2010. <u>MRR and riparian strip</u> : prepared in October 2010, revegetated by March 2011. <u>Additional areas</u> : investigate adjacent areas mid 2011.	Implemented/ ongoing: <ul style="list-style-type: none"> Revegetation works have been undertaken at Ulmarra Street road reserve and the foreshore to the south of MRR. Ongoing maintenance undertaken. 	<ul style="list-style-type: none"> Rehabilitated vegetation at Ulmarra Street is approximately 5-9 m tall and has been observed supporting roosting flying-foxes. Rehabilitation in the riparian area south of MRR/ west of MHS agricultural plot has been less successful. This vegetation is also somewhat exposed, therefore is less likely to have the ideal micro-climate as flying-fox roosting habitat. Ongoing rehabilitation funding for onground works is required.



Plate 2.2 Tree planting at Ulmarra Road reserve. Flying-foxes are using the vegetation as roosting habitat (right).

Updated Maclean Flying-fox Camp Management Strategy 2018

Management Action	Management Details	Priority	Performance Indicators	Status	Comment
Relocate powerlines underground	The existing overhead powerlines along Ulmarra Street and the road reserve to the west could be relocated underground to minimise electrocution of flying-foxes and facilitate revegetation of the MRR to the south.	Medium	Powerline relocated underground.	Implemented: <ul style="list-style-type: none"> Powerlines adjacent to MRR have been placed underground to reduce power disruption from flying-foxes, improve visual amenity and rehabilitate land adjacent to MRR. 	<ul style="list-style-type: none"> Liaison with EE is required to determine if there is a conflict with the powerlines between the EE substation and cemetery, and flying-foxes. Relocating the powerlines underground may be beneficial to reduce power supply distances from flying-fox interactions and flying-fox electrocution. The land may also provide a future habitat offset site.
Education	Provide clear and accurate information to community members to increase understanding of flying-foxes in Maclean.	High	Participation in public events during exhibition period. Provision and distribution of user-friendly printed material during exhibition period. Determine a timetable for specific educational events within two months of exhibition period. Finalise educational content for client base: within two months of exhibition period. Install onsite	Implemented/ongoing: <ul style="list-style-type: none"> Development of an education kit for new students and parents at MHS about flying-foxes. Over 2000 educational brochures about flying-foxes have been distributed through the lower Clarence. MHS students participated in a study involving capturing and tagging flying-foxes with GPS technology and releasing them to map their movements within the region. This study also contributed to the scientific literature of flying-foxes. Mailouts have been sent to inform the community about the Original 	<ul style="list-style-type: none"> Ongoing education efforts are required, particularly targeting: <ul style="list-style-type: none"> New residents. New and prospective MHS students.

Updated Maclean Flying-fox Camp Management Strategy 2018

Management Action	Management Details	Priority	Performance Indicators	Status	Comment
			educational signage adjacent to the colony by August 2011.	<p>Maclean Flying-fox Management Strategy and the actions that have been undertaken.</p> <ul style="list-style-type: none"> • Development and distribution of educational package about flying-foxes to many primary feeder schools around the region. • Council website has information about the Maclean Flying-fox Management Strategy, WG and Dispersal Group. • See ecotourism. 	
Identification of additional/ alternative areas for habitat	Provision of alternative flying-fox habitat through revegetation of cleared land that is not located near sensitive receivers. Alternative habitat must meet flying-fox roost site criteria.	High	Suitable habitat identified by December 2010.	<p>Ongoing:</p> <ul style="list-style-type: none"> • Active engagement of landholders to identify and negotiate further rehabilitation areas away from the urban area of Maclean has been undertaken. • No resolution has been achieved to date. 	<ul style="list-style-type: none"> • The WG has identified the lack of funding as a limiting factor with implementing works on other land. • Ongoing work is required. • OEH is currently funding research into flying-fox roost locations, with an output proposed in July 2018. Outcomes should be considered.
Provision of alternative habitat	Provision of alternative flying-fox habitat through revegetation of cleared land that is not located near sensitive receivers. Alternative habitat must meet flying-fox roost site criteria.	High	Secure land by end of 2011.	No action to date.	<ul style="list-style-type: none"> • No land for alternative habitat secured.

Updated Maclean Flying-fox Camp Management Strategy 2018

Management Action	Management Details	Priority	Performance Indicators	Status	Comment
Health monitoring	Utilise database to record any notifiable flying-fox related illnesses.	Medium	Distribution of 'health letter' to medical clinics and general practitioners: 2010. Distribution/ circulation of 'health letter' to MHS, TAFE, local community: September 2010. Distribution to MP's, DET and CVC. Circulate results of database annually.	Implemented/ ongoing: <ul style="list-style-type: none"> NSW Department of Health (DEH) continue to monitor human related incidences with flying-foxes (including people bitten or scratched by flying-foxes). Health information relating to flying-foxes are circulated via a number of mediums, including DEH website, involvement with WG, educational material, etc. 	<ul style="list-style-type: none"> Implementation of this action is ongoing.
Manage special events	Consider impacts on flying-foxes when determining the timing, nature and scale of species school events such as sports carnivals.	Low	Compile annual timetable of events by November each year. Identify appropriate adjustments by end of January each year.	Implemented on occasions: <ul style="list-style-type: none"> Flying-fox management considerations implemented on occasions during relevant events at Maclean Show Ground (primarily associated with managing the risk of horses contracting Hendra). Not implemented at MHS. Ongoing status at Maclean Show Ground is unknown. 	-
Planning instruments	Prepare a Development Control Plan (DCP) to guide future development near flying-fox camps within the shire. Include the presence of flying-fox camps on s149 certificates so that purchasers are aware of	High	DCP adopted by 2012. s149 certificates updated by June 2011.	Implemented: <ul style="list-style-type: none"> Council has adopted the Biodiversity DCP which includes provisions for flying-fox camps. 	Objectives of the provisions for flying-fox camps are: <ol style="list-style-type: none"> To retain existing flying-fox camps and their habitats. To provide for the improved management of flying-fox camps and adjacent areas. To mitigate indirect and

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Management Action	Management Details	Priority	Performance Indicators	Status	Comment
	existing camps.				ongoing impacts of development on flying-foxes and their habitats. 4. To conserve and co-exist with the flying-fox population. Primarily relates to new developments.
New development buffer areas	Buffer areas can be implemented to prevent inappropriate future development, include only non-roost vegetation and increase the distance between flying-foxes and sensitive receivers.	Medium	New developments will incorporate appropriate buffers from 2012 in accordance with adoption of DCP.	Implemented: <ul style="list-style-type: none"> The DCP, including appropriate buffers was adopted. 	"Red flag" threshold triggered when development footprint is located within 300 m of an existing camp. Relates to new developments.
Regenerate MRR	Implement a systematic plan of weed control to assist regeneration of MRR to support both flora and fauna conservation values in conjunction with revegetation works.	High	Secure funding January 2011. Engage bush regeneration team: first quarter of 2011.	Implemented/ Ongoing: <ul style="list-style-type: none"> Ongoing rehabilitation of MRR. Rehabilitation of land adjoining MRR to create more habitat opportunities for the flying-foxes. 	<ul style="list-style-type: none"> Rehabilitated vegetation at Ulmarra Street is approximately 7 m tall and has been observed supporting flying-foxes. Rehabilitation in the riparian area south of MRR/ west of the MHS agricultural plot has been less successful. This vegetation is also somewhat exposed, therefore is less likely to have ideal micro-climate as flying-fox roosting habitat. Ongoing rehabilitation funding for onground works are required.

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Management Action	Management Details	Priority	Performance Indicators	Status	Comment
Modifications to residential buildings and community areas	<ul style="list-style-type: none"> • Air conditioning; • Construction of carports, paved areas or cover areas affected by droppings; • Construct sound barriers; • Purchase clothes dryers; • Install acoustic batts; • Laminate or double glaze windows; • Shade structures along Cameron Street footpath. 	High	Undertake assessment of potential modifications in December 2011. Prepare program pending results of earlier actions.	No known actions to date.	<ul style="list-style-type: none"> • Funding is likely to be a key constraint for individuals to implement these actions at private residences.
Modifications to MHS buildings and grounds	<p>Including but not limited to:</p> <ul style="list-style-type: none"> • Air conditioning; • electrical upgrade; • install blinds; • install a tall fence/ screen along the MRR boundary along the edge closest to the school buildings only; • insulation; • shade structures over quadrangle, walkways and basketball court; • rainwater tanks; • filtration for existing rainwater tanks; and/ or 	High	Refine list of possible modifications and determine source of funding by June 2011.	<p>Partially implemented:</p> <ul style="list-style-type: none"> • Air conditioning systems have been installed in all classrooms of MHS to address odour and noise. • Covered walkways have been installed at MHS and TAFE to reduce contact between people and flying-foxes. • Fencing has been installed to reduce inappropriate access to MRR allowing for rehabilitation of the rainforest. 	<ul style="list-style-type: none"> • Additional locations where infrastructure could help reduce flying-fox conflicts include: <ul style="list-style-type: none"> ▪ Covering the basketball court. ▪ Covering the carpark. ▪ Covering the walkway between the carpark and buildings. ▪ Air conditioning and double glazed windows at the gymnasium.

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Management Action	Management Details	Priority	Performance Indicators	Status	Comment
	<ul style="list-style-type: none"> additional cleaning. 				
Voluntary buy back of houses	Purchase properties off willing landholders that are directly affected by flying-foxes and then sell these houses to landholders that wish to live adjacent to flying-foxes or use the land to extend flying-fox habitat.	Medium	CVC investigate funding options to enable management action by 2010. Identify interested parties by June 2012.	Ongoing: <ul style="list-style-type: none"> Council is considering investigating potential buy back of properties. No complete transactions to date. 	-
Maclean regional land use feasibility study	Commission a feasibility study to strategically assess future potential land uses and infrastructure within the Maclean region.	Medium	Feasibility study completed by December 2012.	Implemented: <ul style="list-style-type: none"> Study completed in 2012. 	Maclean Urban Catchment Local Growth Management Strategy adopted by Council in 2011 – the purpose of which is to provide detailed guidance on the future growth of urban and industrial development in the Maclean urban catchment.
Ecotourism	Promote ecotourism via installation of a viewing platform, undertake guided walks, install interpretive signage and provide information sheets to focus on the positive aspects of the flying-fox camp whilst generating revenue.	Low	Develop educational brochures by December 2013. Signage and seating at MRR by December 2013.	Implemented/ ongoing: <ul style="list-style-type: none"> A flyout sign and seating has been installed to identify the best place to view the flying-foxes at dusk. The WG has been looking at increasing the ecotourism possibilities of the flying-foxes which may have a positive economic impact for Maclean and may assist in finding opportunities to implement the strategy actions. 	-

Appendix B 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 A1)
- there is a flying-fox injury or death
- a new camp/ camps appear to be establishing
- impacts are created or exacerbated at other locations
- there appears to be potential for conservation impacts (e.g. reduction in breeding success identified through independent monitoring)
- standard measures to avoid impacts (detailed in **Appendix C**) 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 B1 Planned Action for Potential Impacts During Management

Welfare trigger	Signs	Action
Unacceptable levels of stress	If any individual is observed: <ul style="list-style-type: none"> • panting; • saliva spreading; or • located on or within 2 m of the ground. 	Works to cease for the day.
Adverse weather	<ul style="list-style-type: none"> • >35°C or within two days of >35°C is recorded. • Winds of >40 km/ hr (as per Beaufort Scale). • Sustained heavy rains. 	Works to cease for the day.
Fatigue	In-situ management: <ul style="list-style-type: none"> • more than 30% of the camp takes flight; • individuals are in flight for more than 5 minutes; • flying-foxes appear to be leaving the camp. 	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	<ul style="list-style-type: none"> • A flying-fox appears to have been injured/ killed on site (including aborted foetuses). • Any flying-fox death is reported within 1 km of the dispersal site that appears to be related to the dispersal. • Females in final trimester. • Dependent/ crèching young present. • Loss of condition evident. 	Works to cease immediately and OEH notified AND rescheduled OR adapted sufficiently so that significant impacts (e.g. death/ injury) are highly unlikely to occur, as confirmed by an independent expert# 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.

Appendix C Standard Measures to Avoid Impacts

Standard Measures to Avoid Impacts

The following mitigation measures will be complied with at all times during onground works implementation. Further background information on management activities is provided in the following OEH factsheets:

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

All Management Activities

1. All personnel will be appropriately experienced, trained and inducted. Induction will include each person's responsibilities under this Plan.
2. All personnel will be briefed prior to the action commencing each day, and debriefed at the end of the day.
3. Works will cease and OEH consulted in accordance with the 'stop work triggers' section of the Plan.
4. Large crews will be avoided where possible.
5. 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.
6. 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.
7. Any activity likely to disturb flying-foxes so that they take flight will be avoided during the day during the sensitive GHFF/BFF birthing period (i.e. when females are in final trimester or the majority are carrying pups, generally August – December) and avoided altogether during crèching (generally November/December to February). Where works cannot be done at night after fly-out during these periods, it is preferable they are undertaken in the late afternoon close to or at fly-out. If this is also not possible, a person experienced in flying-fox behaviour will monitor the camp for at least the first two scheduled actions (or as otherwise deemed to be required by that person) to ensure impacts are not excessive and advise on the most appropriate methods (e.g. required buffer distances, approach, etc.).
8. OEH will be immediately contacted if LRFF are present between March and October, or are identified as being in final trimester / with dependent young.
9. 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).
10. Works will not take place in periods of adverse weather including strong winds, sustained heavy rains, in very cold temperatures or during periods of likely population stress (e.g. food bottlenecks). Wildlife carers will be consulted to determine whether the population appears to be under stress.
11. 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](#).
12. 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.

13. 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.
14. Any proposed variations to works detailed in the Plan will be approved, in writing, by OEH before any new works occur.
15. OEH may require changes to methods or cessation of management activities at any time.
16. Ensure management actions and results are recorded to inform future planning. See the OEH fact sheet on [Monitoring, evaluating and reporting](#).

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

Human Safety

1. 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.
2. All personnel who may come into contact with flying-foxes will be vaccinated against Australian bat lyssavirus with current titre.
3. 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.
4. Details of the nearest hospital or doctor who can provide post-exposure prophylaxis will be kept on site.

Post-Works

1. 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:
 - o results of pre- and post-work population monitoring
 - o any information on new camps that have formed in the area
 - o impacts at other locations that may have resulted from management, and suggested amelioration measures
 - o 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
 - o further management actions planned including a schedule of works
 - o an assessment³ of how the community responded to the works, including details on the number and nature of complaints before and after the works
 - o detail on any compensatory plantings undertaken or required
 - o expenditure (financial and in-kind costs)
 - o Plan evaluation and review (see Section 7).

8.1.2 All Level 2

Prior to Works

1. 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.

³ 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.

Program Coordinator). Resident requests for retention of vegetation and other concerns relating to the program will be taken into consideration.

2. Where the Action is being implemented by Council, information will be placed on Council's website along with contact information.
3. OEH will be notified at least 48 hours before works commence.
4. 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 C** for an example protocol.
5. A licensed wildlife carer will be notified prior to beginning works in the event that rescue/care is required.

Monitoring

1. A flying-fox expert (identified in section 13.3) will undertake an on-site population assessment prior to, during works and after works have been completed, including:
 - o number of each species
 - o ratio of females in final trimester
 - o approximate age of any pups present including whether they are attached or likely to be crèched
 - o visual health assessment
 - o mortalities.
2. Counts will be done at least:
 - o once immediately prior to works
 - o daily during works
 - o immediately following completion
 - o one month following completion
 - o 12 months following completion.

During Works

1. 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.
2. 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.
3. 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.

8.1.3 Vegetation Trimming/ Removal

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

8.1.4 Canopy Vegetation Trimming/ Removal

Prior to Works

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

During Works

1. 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).

2. 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.
3. No tree in which a flying-fox is roosting will be trimmed or removed. Works may continue in trees adjacent to roost trees only where a person experienced in flying-fox behaviour assesses that no flying-foxes are at risk of being harmed. A person experienced in flying-fox behaviour is to remain on site to monitor, when canopy trimming/removal is required within 50 metres of roosting flying-foxes.
4. 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.
5. 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.

8.1.5 Bush Regeneration

1. 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.
2. 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.
3. Weed removal should follow a mosaic pattern, maintaining refuges in the mid- and lower storeys at all times.
4. 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).
5. 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.

Appendix D Flying-fox Rescue Protocol (example)

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.

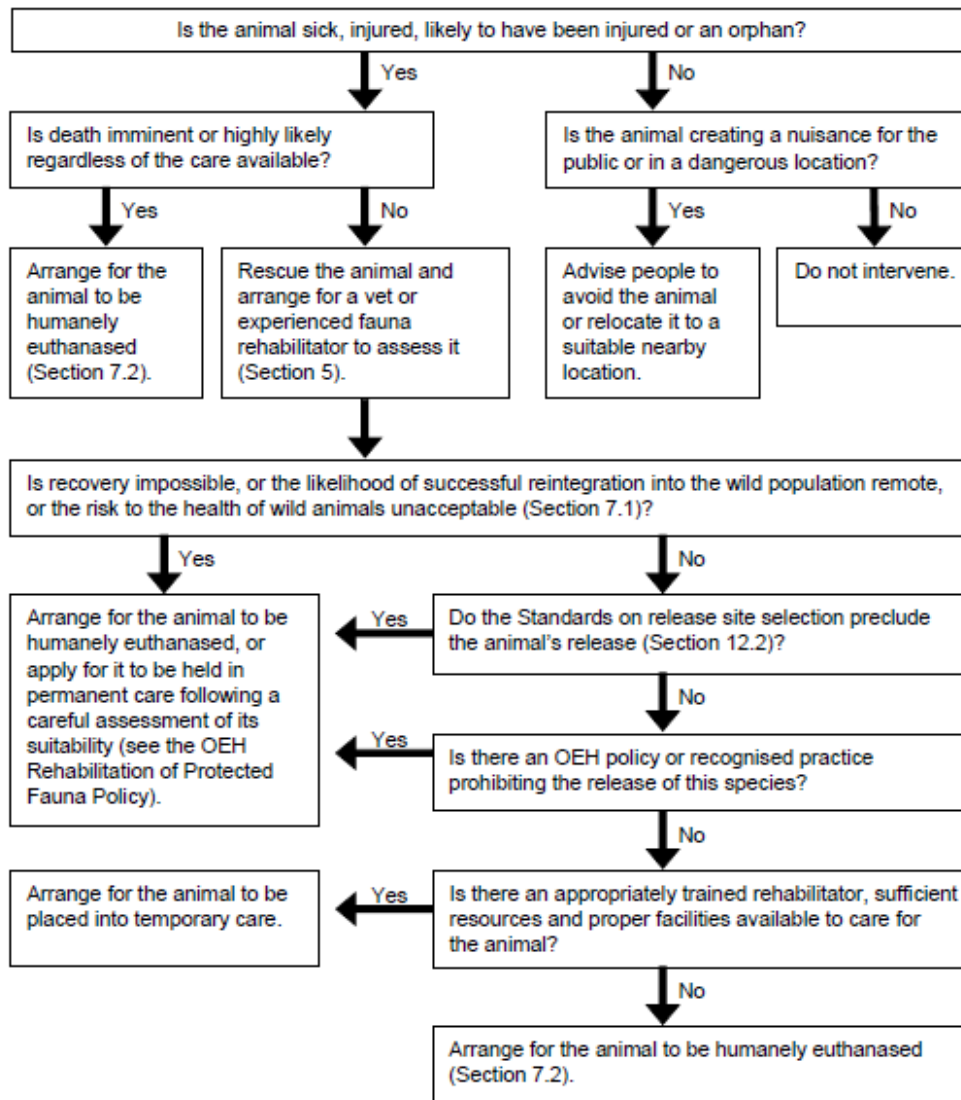
Equipment

- 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.

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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.

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- 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.