



# Ku-ring-gai Flying-fox Reserve Management Plan

2013



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## Acronyms and Abbreviations

<b>BGT</b>	Botanic Gardens Trust (OEH)
<b>OEH</b>	NSW Office of Environment and Heritage (Formerly DECCW)
<b>SEWPAC</b>	Department of Sustainability, Environment, Water, Population and Communities (Australian Government)
<b>EEC</b>	Endangered Ecological Community
<b>EP&amp;A ACT</b>	<i>Environment Planning &amp; Assessment Act 1979 (NSW)</i>
<b>EPBC ACT</b>	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
<b>ESL</b>	Ecologically Sensitive Lands
<b>FM ACT</b>	<i>Fisheries Management Act 1994 (NSW)</i>
<b>GIS</b>	Geographic Information System
<b>KBCS</b>	Ku-ring-gai Bat Conservation Society Inc.
<b>KC</b>	Ku-ring-gai Council
<b>KFFR</b>	Ku-ring-gai Flying-fox Reserve
<b>KTP</b>	Key threatening processes (listed under the TSC Act or EPBC Act)
<b>LG ACT</b>	<i>Local Government Act 1993 (NSW)</i>
<b>LGA</b>	Local Government Area
<b>LHPA</b>	Livestock Health and Pest Authorities
<b>NPWS</b>	National Parks and Wildlife Service
<b>PAS</b>	Priority Action Statements (required under the TSC Act)
<b>POM</b>	Plan of Management
<b>RF ACT</b>	<i>Rural Fires Act 1997 (NSW)</i>
<b>RBG</b>	Royal Botanic Gardens (Sydney)
<b>RFS NSW</b>	Rural Fire Service
<b>SEPP</b>	State Environmental Planning Policy
<b>TAP</b>	Threat Abatement Plan (required TSC Act or EPBC Act)
<b>TSC ACT</b>	<i>Threatened Species Conservation Act 1995 (NSW)</i>

# 1 Introduction

## 1.1. Background

This Management Plan has been prepared in accordance with the Ku-ring-gai Flying-fox Reserve Conservation Agreement (see Appendix 1), entered into between Ku-ring-gai Council and the NSW Government in February 1991, to ensure the continuing protection and preservation of native flora and fauna, in particular the Grey-headed Flying-fox colony and all elements of its habitat, within the Ku-ring-gai Flying-fox Reserve.

This Plan is considered as a plan of management in relation to clause 3.7 of the Conservation Agreement (the "Agreement") and under section 72 (1) (e) of the *National Parks and Wildlife Act 1974*, and is considered a specific reserve management plan under Council's Bushland Reserves Plan of Management (PoM), prepared under the *Local Government Act 1993 (NSW)*.

Preparation of this plan has included a review of the previous plan adopted by Ku-ring-gai Council in 1999 and incorporates changes in legislation, recent research on Flying-foxes and current best practice in bush regeneration and habitat management. It provides a focus for working with the local community to effectively manage the Reserve and provides actions to reduce the impacts of the Flying-foxes on residents, particularly those adjacent to the Reserve.

## 1.2. Overview of the Ku-ring-gai Flying-fox Reserve

The Ku-ring-gai Flying-fox Reserve (KFFR) includes a variety of wildlife habitats and contains an important maternal colony of the Grey-headed Flying-fox, listed as Vulnerable under both the *Federal Environment Protection and Biodiversity Conservation Act 1999* and the *NSW Threatened Species Conservation Act 1995*. The Reserve also contains Sydney Turpentine Ironbark Forest (STIF), an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995*, and other vulnerable species such as the Powerful Owl (see Appendix 3 for further information on Reserve Flora and Fauna). The KFFR is Council's only bushland reserve specifically managed for the conservation of a threatened fauna species.

The KFFR is adjacent to Stoney Creek in Gordon (see Figure 1), covering a total area of approximately 15.34 hectares, which incorporates an additional 0.44 hectares of land added to the Reserve in 2007 (see Figure 2).





Figure 1: Location of the Ku-ring-gai Flying-fox Reserve

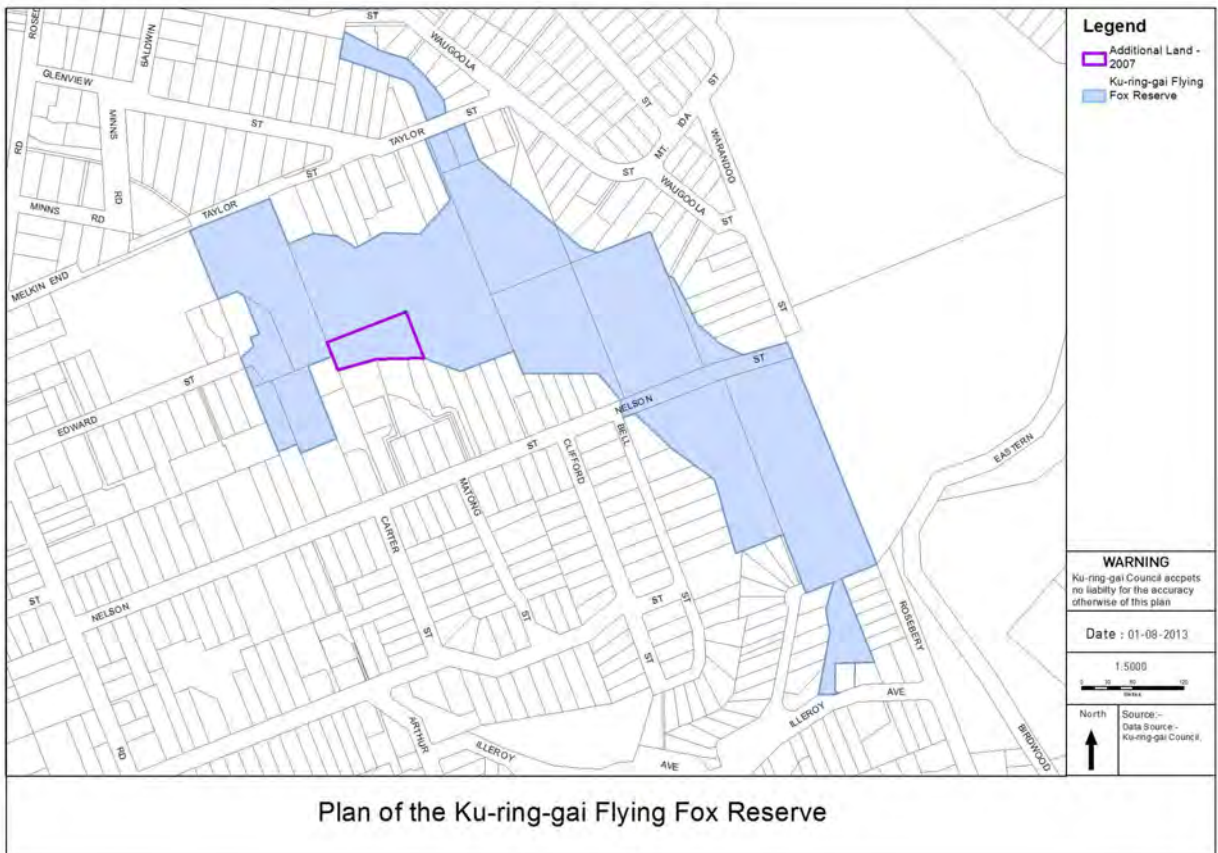


Figure 2: Plan of the Ku-ring-gai Flying-fox Reserve

Statistical data from Grey-headed Flying-fox counts (see Appendix 6) show annual and seasonal variations in camp population size from zero to around 80,000 animals. During winter the camp is often only a few hundred but may be zero (recorded 8 times). Numbers are generally around 20,000 - 40,000 during summer peaks in the breeding season (around March). Numbers of 70,000 or more animals have been recorded only twice - in 2000 and 2009. The data indicates a trend of decreasing average numbers in Grey-headed Flying-fox numbers between 1998 and 2012. This trend is consistent with the increase in the number of camps in the Sydney Basin from 7 in 1989 to 22 in 2013. Total population estimates of Grey-headed Flying-foxes in camps in eastern Sydney did not change between 1995 and 2011 (personal comment: Dr Peggy Eby - Flying-fox consultant).

Research was undertaken in the KFFR by Rhys Puddicombe in 1980 - 1981. As well as studying the Grey-headed Flying-fox camp, he reported on the Little Red Flying-foxes which joined the camp that summer for about 6 weeks.

The location of the Flying-fox camp within the KFFR varies annually and seasonally and in response to weather conditions. The periodic shifting of the camp over several years is possibly in response to roost tree damage. Records show the camp was originally in the eastern end of the KFFR and has slowly shifted to the lower slopes at the centre of the Reserve, near Stoney Creek. In February 2009 Flying-fox numbers peaked at around 70,000 and the camp expanded over a large area of the Reserve, extending to the boundary near Taylor Street. It is expected the camp will shift again in the future (see Appendix 6 for maps of camp locations from 1971 to 2013).

Community involvement in the management of the Reserve has been ongoing, with members of the Ku-ring-gai Bat Conservation Society (KBCS) providing Council with valuable advice and assistance with on-ground works since 1985 (see Appendix 2 – site history of the KFFR).

In recent years, there have been an increasing number of issues associated with the management of the Reserve, including the impact on local residents caused by the noise, smell and droppings when Flying-foxes are in the Reserve.

### **1.3. Significance of Ku-ring-gai Flying-fox Reserve to the Grey-headed Flying-fox**

From both a National and a State perspective, the Ku-ring-gai Flying-fox Reserve is significant for providing roosting and maternity habitat for the Grey-headed Flying-fox (*Pteropus poliocephalus*).

The Ku-ring-gai Flying-fox Reserve is important to the Grey-headed Flying-fox by providing:

- a resting site
- a breeding site
- access to food in both urban landscapes and extensive native forests
- stopover habitat for migrating animals
- supports for a resident population (group)
- a site for long-term research, including the longest population monitoring of any Flying-fox camp in Australia



## About Grey-headed Flying-foxes

(*Pteropus poliocephalus*)

Grey-headed flying-foxes are large mammals with light grey fur on the head and a russet collar encircling the neck. They are migratory bats that occupy forests and woodlands in the coastal lowlands, tablelands and slopes of southeast Australia from Bundaberg to Geelong. The females give birth to only one live young each year, which is one of the reasons their population is very fragile.

The Grey-headed Flying-fox is listed as Vulnerable under both State and Commonwealth legislation. This legislation protects the animals and therefore it is not permitted to harm them or try to move them.

### Ecological significance

Flying-foxes are beneficial for our ecosystems as they play an important role in pollination and seed dispersal of flowering and fruiting trees. The majority of animals feed on nectar and pollen from eucalypts, melaleucas and banksias. During their foraging trips they disperse pollen and seeds of diet plants across habitats including fragmented, degraded and urban landscapes. This process benefits many plants and vegetation communities listed as threatened Commonwealth and State legislation.

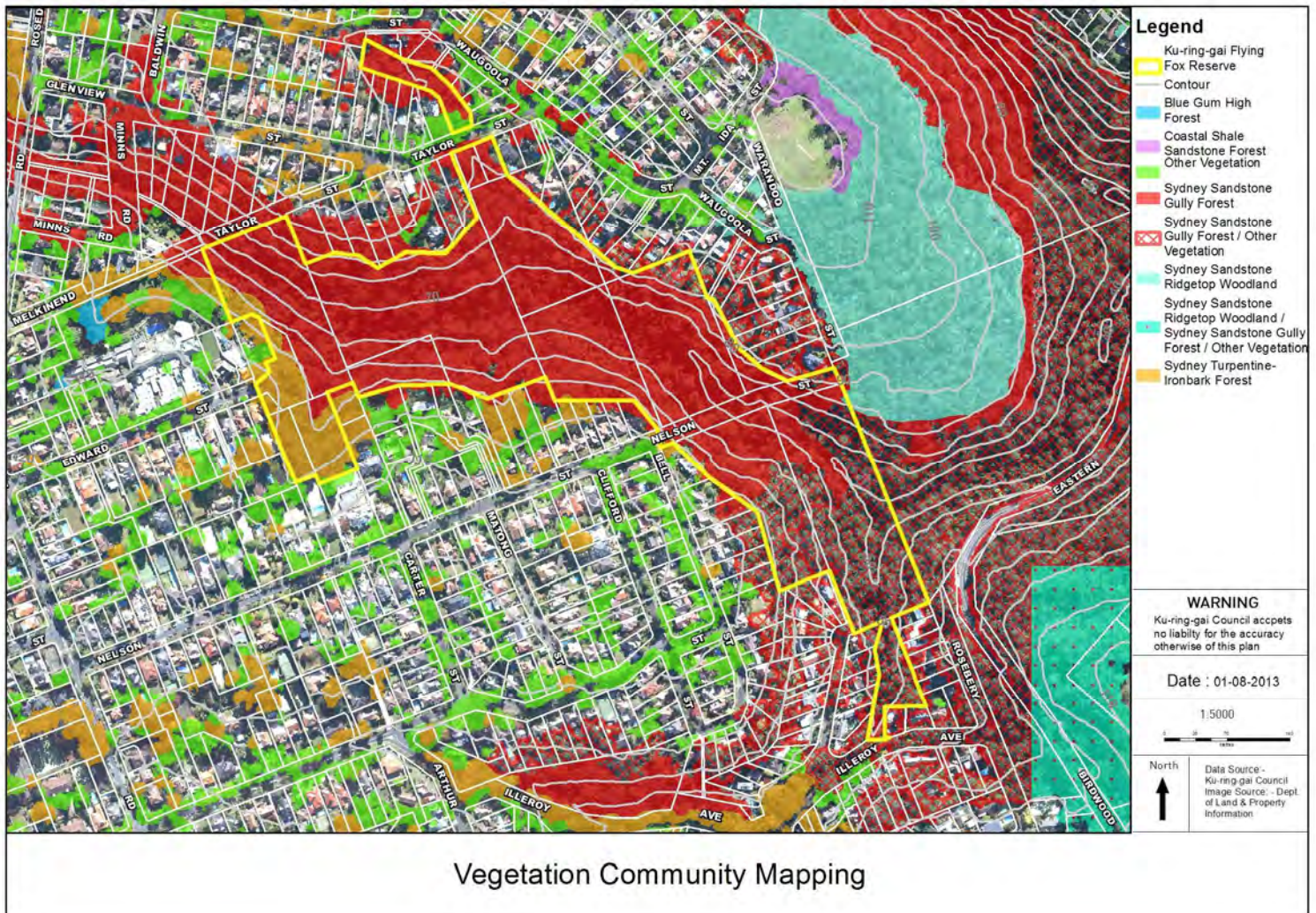
Further detailed information on the Grey-headed Flying-fox is available in educational resources available on the Ku-ring-gai Council website and the Ku-ring-gai Bat Conservation Society website [www.sydneybats.org.au](http://www.sydneybats.org.au).





## The Natural Environment

The KFFR contains several plant communities and associations which vary with topography, aspects and soil type. The majority of the site is dominated by sandstone flora associations within Sydney Sandstone Gully communities. Riparian vegetation dominates along the banks of the creek in sheltered areas. The upper and more exposed slopes contain more sclerophyll dominated vegetation and where the soils are clay influenced on the upper southwest slopes Sydney Turpentine Ironbark Forest occurs. The map below indicates two broad categories of clay and sandstone based plant communities but does not show the minor variations in plant associations.



**Figure 3: Vegetation Community Mapping of KFFR**

### 1.5. Key management issues

Key management issues for the KFFR have been identified as:

- **Protecting the Flying-foxes**
  - feral and companion animals
  - public access
  - heat stress impacts

- injured Flying-foxes
- **Maintaining habitat quality**
  - declining trees / habitat
  - weeds
  - stormwater pollutants and nutrient levels
- **Managing bushfire risks**
- **Managing community interaction**
  - impacts on residents - noise, smell, droppings
  - potential health issues
  - education programs
  - research

These issues are addressed by a series of management actions detailed in Section 3 of this report and discussed in further detail in Appendix 4.

## **1.6. Stakeholder consultation**

This Management Plan has been prepared in consultation with The Ku-ring-gai Flying-fox Reserve Advisory Group, consisting of four residents, two Ku-ring-gai Bat Conservation Society members, a representative from the Rural Fire Service, the Botanic Gardens Trust, the Office of Environment and Heritage, an independent Flying-fox expert and staff from the Environment and Sustainability and Open Space Services sections of Council.

## **1.7. Stakeholder roles and responsibilities**

Ku-ring-gai Municipal Council is the owner of the KFFR and has legal responsibility for the overall management of the Reserve. Implementation of this Plan and management of the reserve will be a joint responsibility of Ku-ring-gai Council and the KBCS. Council will take a lead role, with the KBCS providing support, offering advice and helping with on-ground works, through the Bushcare Program, and educational events, such as bat nights and Flying-fox fly-out viewings.

## **1.8. Review of this plan**

This Management Plan will be reviewed by Ku-ring-gai Municipal Council in consultation with key stakeholders. This Plan shall remain in force until it is revised and then adopted by Ku-ring-gai Council.

# 2 Management Framework

## 2.1. Local Government Act 1993 (NSW)

The *Local Government Act 1993* requires a specific Plan of Management for community land that comprises habitat for a threatened species listed under the *Threatened Species Conservation Act 1995 (NSW)*. This requirement is addressed through Council's Bushland PoM however this management plan provides additional site specific information and guidance specific to the KFFR.

The Management Plan for the Ku-ring Flying-fox Reserve will not always be consistent with Council's current Bushland Reserves PoM. Where there are inconsistencies the KFFR Management Plan will override the Bushland Reserves PoM. For example, some species of non-local native plants or weeds that are brought in by the Flying-foxes may be beneficial as roosting habitat so may be left on site.

## 2.2. Conservation Agreement

This Management Plan is consistent with the purpose, terms and conditions of the Ku-ring-gai Flying-fox Reserve Conservation Agreement, in accordance with the provisions of s. 72 (1) of the *National Parks and Wildlife Act 1974 (NSW)*.

## 2.3. Other legislation

The major pieces of legislation related to the management of the KFFR are:

Federal:

- *Environment Protection & Biodiversity Conservation (EPBC) Act 1999*

New South Wales:

- *Threatened Species Conservation Act 1995*
- *Rural Fires Act 1997*
- *Noxious Weeds Act 1993*
- *Protection of the Operation of the Environment Act 1997*
- *National Parks and Wildlife Act 1974*
- *Environmental Planning and Assessment Act 1979*

Further details of legislation are provided in Council's Bushland Reserves Plan of Management at <http://www.kmc.nsw.gov.au/>.



## 2.4. Key Threatening Processes (Federal and NSW)

The following Key Threatening Processes (KTP) may apply to the KFFR:

### *Threatened Species Conservation Act 1995 (NSW)*

- Clearing of native vegetation
- Removal of dead wood and dead trees
- Loss of hollow-bearing trees
- Bush rock removal
- Invasion of native plant communities by exotic perennial grasses
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition
- Infection of native plants by *Phytophthora cinnamomi*
- Invasion and Establishment of Exotic vines and Scramblers
- Invasion, establishment and spread of Lantana (*Lantana camara*)
- Predation by the feral cat (*Felis catus*)
- Predation by the European fox (*Vulpes vulpes*)
- Infection of frogs by amphibian *chytrid* causing the disease *chytridiomycosis*

### *Environment Protection & Biodiversity Conservation (EPBC) Act 1999*

- Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases
- Dieback caused by the root-rot fungus *Phytophthora cinnamomi*
- Invasion of native plant communities by exotic perennial grasses
- Predation by the European red fox (*Vulpes vulpes*)
- Predation by the feral cat (*Felis catus*)
- Novel biota and their impact on biodiversity
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

## 2.5. Recovery and Threat Abatement Plans (Federal and NSW)

The following Recovery Plans apply to the management of the KFFR:

Federal:

- Draft National Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*)
- National Recovery Plan for the Swift Parrot (*Lathamus discolor*)

New South Wales:

- Recovery Plan for the Large Forest Owls: Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*)
- National Recovery Plan for the Swift Parrot (*Lathamus discolor*)



The following Action Plan applies to the management of the KFFR:

Environment Australia:

- Action Plan for Australian Bats, relevant excerpts:
  1. Increase the extent and viability of foraging habitat for Grey-headed Flying-foxes that is productive during winter and spring (generally times of food shortage); including habitat restoration/rehabilitation works. (high priority)
  2. Enhance and sustain the vegetation of camps critical to the survival of Grey-headed Flying-foxes. (low priority)
  3. Protect and enhance priority foraging habitat for Grey-headed Flying-foxes; for example through management plans; local environmental plans and development assessments; and through volunteer conservation programs for privately owned land. (low priority)

The following Threat Abatement Plan applies to the management of the KFFR:

New South Wales:

- Threat Abatement Plan for predation by the European Fox (*Vulpes vulpes*)

## 2.6. Codes and guidelines

The Bushfire Environmental Assessment Code for NSW (*Rural Fires Act 1997 NSW*) applies to the management of the KFFR, specifically the guidelines for hazard reduction work on land that contains a threatened species or populations and / or an EEC (see Table 1 and Table 2 below):

Scientific Name	Common Name	Species specific conditions relating to the use of Fire	Conditions relating to mechanical forms of hazard reduction
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Avoid known roost sites	Avoid known roost sites
<i>Mixophyes iteratus</i>	Giant Barred Frog	No burning within 100 metres of streams	No slashing, trittering or tree removal
<i>Pseudophryne australis</i>	Red-crowned Toadlet	No burning adjacent to streams, and no burning in and around ephemeral drainage lines at the headwaters of creeks	No slashing, trittering or tree removal
<i>Ninox strenua</i>	Powerful Owl	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites
<i>Ninox connivens</i>	Barking Owl	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites

**Table 1: Threatened Species Hazard Reduction List - Part 2 - Animals**

Please note: This list is to be applied with reference to the "Rules and Notes for the Implementation of the Threatened Species Hazard Reduction List for the Bush Fire Environmental Assessment Code".

Name as per the Threatened Species Conservation Act NSW	Conditions relating to the use of Fire	Conditions relating to mechanical forms of hazard reduction
Sydney Turpentine-Ironbark Forest	No fire more than once every 10 years	No slashing, trittering or tree removal

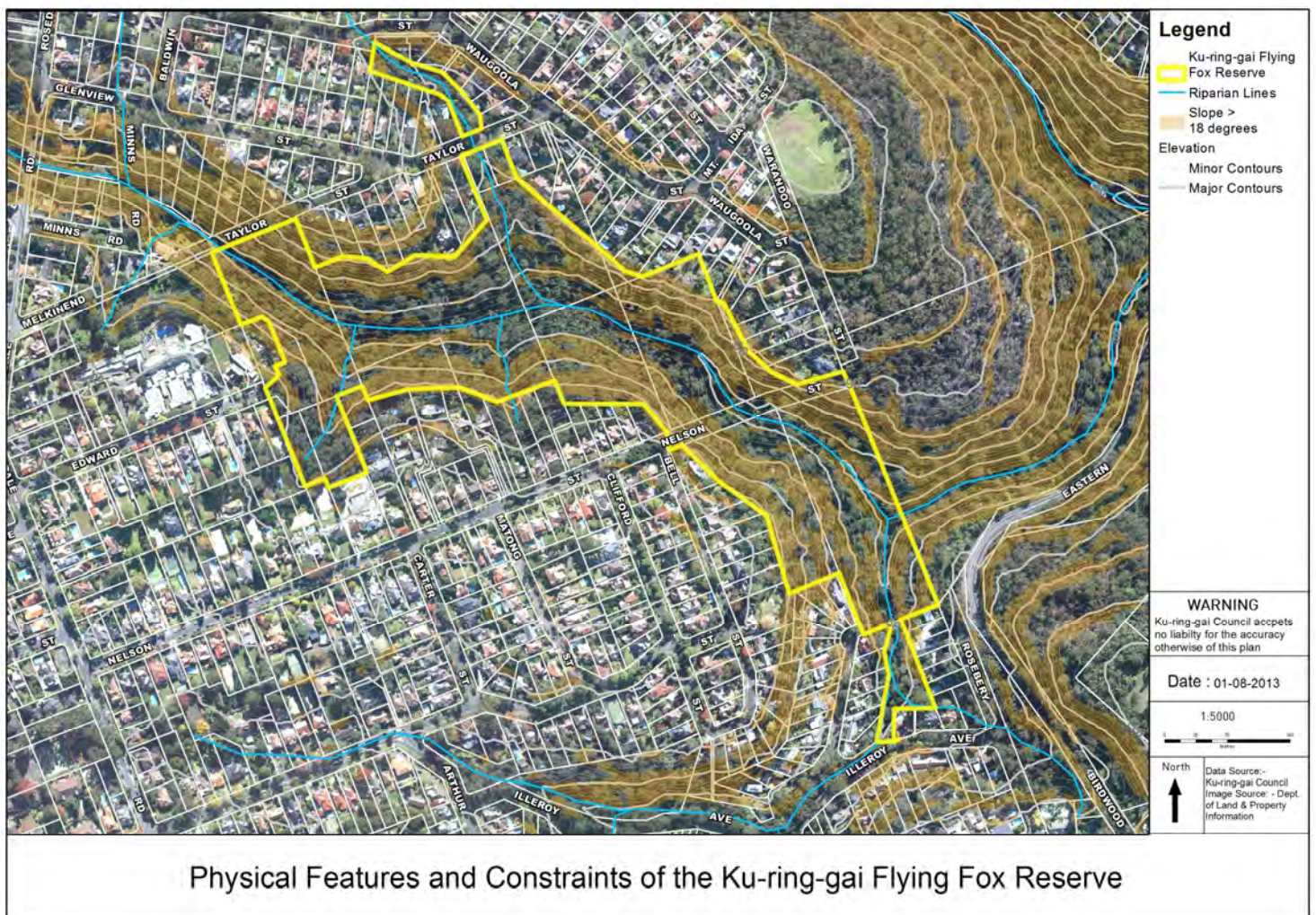
**Table 2: Threatened Species Hazard Reduction List - Part 3 - Endangered Ecological Communities**

Please note: These list is to be applied with reference to the "Rules and Notes for the Implementation of the Threatened Species Hazard Reduction List for the Bush Fire Environmental Assessment Code"; and if using fire at least 50% of the Endangered Ecological Community within each Local Government Area (LGA) must exist in a state that has been burnt less frequently than the minimum fire interval.

## 2.7. Physical characteristics and constraints

Most of the KFFR has steep slopes (over 18 degrees) which are potentially susceptible to erosion and slip. There are also several rock scarps / cliff lines onsite. These areas have implications for site access, work health and safety and reserve management, including hazard reduction and regeneration practices (see Figure 4).

The small size and narrow shape of the KFFR, its proximity to houses and its urban location pose challenges for some management actions or works. For example, control of feral animals by baiting is severely restricted and other control methods may be illegal or undesirable in urban areas.



**Figure 4: Physical features and constraints of the KFFR**

*Please note: potential areas for firebreaks are those with land slopes less than 18 degree. These slopes, however, may be inaccessible for works, may be rock outcrops or may have already been cleared.*



# 3 Management Actions

## 3.1. Background

In consultation with the Advisory Group, Council considered the scope of issues relevant to the KFFR and a range of potential solutions to address these issues. Potential solutions were critiqued based on the considerations listed below, to create a set of priority management actions:

- Terms and conditions of the Conservation Agreement
- Relevant legislation, plans and Council policies
- Physical constraints of the KFFR
- Funding and staff resources
- Community support and volunteer capacity

In addition, a set of performance measures were developed to measure Council's success in achieving the management actions over time, against a set of management objectives.

## 3.2. Objectives, management actions and performance measures

The management objectives are listed below and relevant actions and performance measures are detailed over in Table 3.

1. Manage the KFFR to ensure the protection of threatened species and endangered ecological communities, and the maintenance or improvement of habitat quality within the KFFR.
2. Investigate and implement strategies to reduce the impacts of the Flying-foxes on residents and their properties, especially those adjacent to the KFFR
3. Support the implementation of educational events to assist in the management of the KFFR
4. Minimise disturbance to the Flying-foxes and their habitat by restricting access and educating residents and/or visitors
5. Minimise the impacts from feral animals on the KFFR
6. Effectively manage the KFFR for bushfire risk
7. Contribute to and utilise research on Flying-fox biology, behaviour and camp / habitat management
8. Manage the release of injured or orphaned Flying-foxes into the KFFR
9. Reduce the potential impacts from more extreme and frequent heat events and drought, as a result of climate change, on the Flying-foxes
10. Manage the potential health risks associated with Flying-foxes roosting in the KFF



Objective	Actions	Performance measures	Responsibility
<p>1. Manage the KFFR to ensure the protection of threatened species and endangered ecological communities, and the maintenance or improvement of habitat quality within the KFFR.</p>	<ul style="list-style-type: none"> <li>• Develop and implement a 10 year roosting habitat / tree canopy replacement plan that identifies replacement areas and suitable methods and species and established and maintains understorey vegetation where Flying-foxes can escape extreme heat, that is, temperatures above 40° (see Figure 5). This plan is to inform actions within the Bush Regeneration Site Management Plan</li> <li>• Develop and implement a 3 year Bush Regeneration Site Management Plan, including site monitoring and a bush regeneration, habitat restoration and weed control works program</li> <li>• Annually assess and report on program outcomes of the 3 year Bush Regeneration Site Management Plan</li> <li>• Investigate feasible solutions to address pollution, nutrient and stormwater issues within the Reserve</li> <li>• Encourage and support Council's volunteer Bushcare program and align works to support the 3 year Bush Regeneration Site Management Plan</li> <li>• Refine Council's existing vegetation mapping of the KFFR</li> <li>• Refine and continue to monitor Council's tree canopy decline areas (see Figure 5)</li> </ul>	<ul style="list-style-type: none"> <li>• Plan developed and implemented by June 2014</li> <li>• Bush Regeneration Site Management Plan developed and implemented by September 2013</li> <li>• Annual review and reporting of Bush Regeneration Site Management Plan works undertaken</li> <li>• On-ground works or education programs implemented (funds dependant)</li> <li>• Bushcare volunteer support delivered and on-ground works support Bush Regeneration Site Management Plan program</li> <li>• Mapping of vegetation communities and tree canopy decline within the Reserve refined by September 2013</li> <li>• Tree canopy decline areas monitored annually</li> </ul>	<ul style="list-style-type: none"> <li>• Environment and Sustainability, Open Space Services, KBCS</li> <li>• Environment and Sustainability, Open Space Services, KBCS</li> <li>• Open Space Services</li> <li>• Environment and Sustainability</li> <li>• Environment and Sustainability</li> <li>• Environment and Sustainability</li> <li>• Environment and Sustainability</li> </ul>

Objective	Actions	Performance measures	Responsibility
	<ul style="list-style-type: none"> <li>Survey the Reserve for the presence of potential Powerful Owl nesting trees and Powerful Owls. If present, ensure protection of nesting trees during tree maintenance works</li> </ul>	<ul style="list-style-type: none"> <li>Annual review of the location of any nesting trees implemented</li> </ul>	<ul style="list-style-type: none"> <li>Environment and Sustainability</li> </ul>
<p>2. Investigate and implement strategies to reduce the impacts of the Flying-foxes on residents and their properties, especially those adjacent to the KFFR</p>	<ul style="list-style-type: none"> <li>Collaborate with relevant agencies, organisations, councils and Flying-fox experts on best practice Flying-fox management for implementation within the KFFR</li> <li>Prepare and submit licence and referral applications to initiate strategic tree removal and vegetation modification works in the KFFR close to residential housing on Taylor Street and Waugoola Street</li> <li>Conduct approved strategic tree removal and vegetation modification works in the KFFR close to residential housing on Taylor Street and Waugoola Street</li> <li>Formalise community engagement processes to ensure that local community groups and residents are consulted and updated on management activities within the KFFR.</li> <li>Elevate community engagement efforts during periods of greatest community concern, for example, when Flying-foxes numbers are at their highest during the breeding season</li> <li>Review and determine the feasibility of potential Flying-fox management options on an annual basis, for implementation within the KFFR before the breeding season commences, including, but not limited to: <ul style="list-style-type: none"> <li>Providing information and / or securing funding</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Quarterly collaborative processes are maintained with key stakeholders</li> <li>Licence and referral applications submitted by September 2013, or as advised by the Office of Environment and Heritage (OEH)</li> <li>Approved strategic tree removal and vegetation modification undertaken by November 2013, or as advised by the Office of Environment and Heritage (OEH)</li> <li>Community engagement processes are formalised and maintained</li> <li>Resident satisfaction with community engagement efforts during periods of greatest community concern</li> <li>Current management options reviewed in September each year</li> </ul>	<ul style="list-style-type: none"> <li>Environment and Sustainability, KBCS</li> <li>Environment and Sustainability, Open Space Services</li> <li>Open Space Services</li> <li>Environment and Sustainability</li> <li>Environment and Sustainability</li> <li>Environment and Sustainability</li> </ul>

Objective	Actions	Performance measures	Responsibility
	<p>for sound insulation in dwellings adjacent to the KFFR</p> <ul style="list-style-type: none"> <li>○ Strategic tree removal and vegetation modification works at the boundary between the KFFR and private property where there is a risk to life or property or where there is significant noise disturbance to residents over prolonged periods (that is, over a number of breeding seasons)</li> <li>○ Effective, humane and legal methods to nudge the Flying-fox camp away from the Reserve edges (where Flying-foxes are less than 50m from habitable dwellings and causing significant noise disturbance to residents over prolonged periods).</li> </ul> <ul style="list-style-type: none"> <li>● Implement feasible Flying-fox management options within the KFFR on an annual basis, before the breeding season commences</li> <li>● Investigate ways to incorporate Flying-fox information or guidelines into 149 certificates</li> <li>● Engage with proponents of any activities which may impact the KFFR (such as planned dispersals)</li> </ul>	<ul style="list-style-type: none"> <li>● Feasible Flying-fox management options are implemented on an annual basis during non-critical periods in the Flying-fox breeding cycle</li> <li>● Relevant information is incorporated into 149 certificates if feasible by December 2013</li> <li>● Council is engaged with proponents of activities which may impact the KFFR and participates in consultation opportunities</li> </ul>	<ul style="list-style-type: none"> <li>● Environment and Sustainability, Open Space Services</li> <li>● Environment and Sustainability</li> <li>● Environment and Sustainability</li> </ul>
<p>3. Support the implementation of educational events to assist in the management of the KFFR</p>	<ul style="list-style-type: none"> <li>● Support the delivery of educational events to increase awareness and understanding of: <ul style="list-style-type: none"> <li>○ Flying-fox population fluctuations and trends</li> <li>○ The value of Flying-foxes and the KFFR</li> <li>○ Managing the impacts of Flying-foxes in urban areas</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Delivery of educational events supported by Council</li> </ul>	<ul style="list-style-type: none"> <li>● KBCS, Environment and Sustainability</li> </ul>

Objective	Actions	Performance measures	Responsibility
<p>4. Minimise disturbance to the Flying-foxes and their habitat by restricting access and educating residents and/or visitors</p>	<ul style="list-style-type: none"> <li>• Review content of regulatory signs at the KFFR access points</li> <li>• Install new, or replace existing signs as necessary (funds dependant)</li> <li>• Identify and close inappropriate access points</li> <li>• Investigate and deal with incidents of unnecessary habitat disturbance to the camp, through educational material and regulatory action if required</li> <li>• Ensure that KBCS and authorised animal care groups keep registers of visits / visitors to the KFFR for the release of rehabilitated Flying-foxes and / or research</li> <li>• Include conditions to minimise the disturbance to Flying-foxes when granting entry into the KFFR for external parties, in consultation with the KBCS</li> </ul>	<ul style="list-style-type: none"> <li>• Review of existing signs completed by December 2013</li> <li>• New signs installed or replaced as necessary</li> <li>• Inappropriate entry points identified and closed by December 2013</li> <li>• Incidents are investigated and dealt with according to Council's policies and processes</li> <li>• Records are maintained and collated by KBCS</li> <li>• Conditions are included when granting entry permission to the KFFR</li> </ul>	<ul style="list-style-type: none"> <li>• Environment and Sustainability, Open Space Services</li> <li>• Environment and Sustainability, Open Space Services</li> <li>• Environment and Sustainability, Open Space Services</li> <li>• Environment and Sustainability, KBCS</li> <li>• KBCS</li> <li>• Environment and Sustainability</li> </ul>
<p>5. Minimise the impacts from feral animals on the KFFR</p>	<ul style="list-style-type: none"> <li>• In consultation with relevant stakeholders, investigate appropriate and feasible feral animal control measures to implement within the KFFR</li> <li>• Incorporate appropriate and feasible feral animal control measures into Council's annual feral animal control program</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate and feasible feral animal control measures are identified in consultation with stakeholders</li> <li>• Appropriate and feasible feral animal control measures are implemented through Council's annual feral animal control program</li> </ul>	<ul style="list-style-type: none"> <li>• Environment and Sustainability, Open Space Services</li> <li>• Environment and Sustainability, Open Space Services</li> </ul>



Objective	Actions	Performance measures	Responsibility
6. Effectively manage the KFFR for bushfire risk	<ul style="list-style-type: none"> <li>Investigate the bushfire hazard potential of the KFFR on an ongoing basis and respond to any hazard complaints</li> <li>Conduct approved hazard reduction works in a way that minimises negative impacts on the Flying-foxes and other known threatened species, through Council's hazard reduction works program (as per the Hornsby Ku-ring-gai Bushfire Risk Management Plan)</li> </ul>	<ul style="list-style-type: none"> <li>Bushfire hazard potentials are investigated and all hazard complaints are responded to, in accordance with Council's Customer Service Standards</li> <li>Approved hazard reduction works are completed through Council's hazard reduction works program</li> </ul>	<ul style="list-style-type: none"> <li>Environment and Sustainability, Open Space Services</li> <li>Environment and Sustainability, Open Space Services</li> </ul>
7. Contribute to and utilise research on Flying-fox biology, behaviour and camp / habitat management	<ul style="list-style-type: none"> <li>Provide potential topics and support for research related to Flying-foxes or their habitat to local universities and TAFE, in consultation with the KBCS</li> <li>Encourage and support residents, tertiary students and researchers to assist the KBCS with monthly Flying-fox counts</li> <li>Utilise current research conducted and data collected on Flying-foxes to inform current and future management actions in the KFFR</li> </ul>	<ul style="list-style-type: none"> <li>Research topics provided to tertiary institutions on an annual basis</li> <li>Research opportunities are promoted through Council's promotional channels</li> <li>Current Flying-fox research and data is monitored and reviewed by Council and reported to the community</li> </ul>	<ul style="list-style-type: none"> <li>Environment and Sustainability, KBCS</li> <li>Environment and Sustainability, KBCS</li> <li>Environment and Sustainability</li> </ul>
8. Manage the release of injured or orphaned Flying-foxes into the KFFR	<ul style="list-style-type: none"> <li>Investigate and secure an alternative location for the Flying-fox release cage (away from residential housing), as part of the KFFR rehabilitation and release program.</li> <li>Supervise the collection, rehabilitation and release of injured or orphaned Flying-foxes into the KFFR</li> </ul>	<ul style="list-style-type: none"> <li>Alternative location secured and new Flying-fox release cage constructed, as part of the KFFR rehabilitation and release program.</li> <li>Flying-fox rehabilitation and release program implemented</li> </ul>	<ul style="list-style-type: none"> <li>KBCS, Environment and Sustainability, Open Space Services</li> <li>WIRES, Sydney Wildlife, KBCS, Environment and Sustainability</li> </ul>

Objective	Actions	Performance measures	Responsibility
	<ul style="list-style-type: none"> <li>• Provide residents with information on the rehabilitation and release program at the start of the program each year</li> <li>• Review the “Draft Protocol for the Release of Flying-foxes into the KFFR” (see Appendix 5) and continue to review and update the Protocol as required</li> <li>• Ensure that rehabilitated Flying-foxes are housed and released as per Protocol for the Release of Flying-foxes into the KFFR”.</li> </ul>	<ul style="list-style-type: none"> <li>• Residents are provided with information on the Flying-fox rehabilitation program through formal stakeholder engagement processes at the start of the program each year</li> <li>• Draft protocol is reviewed and updated by October 2013</li> <li>• Periodic checks are completed to ensure compliance with Release</li> </ul>	<ul style="list-style-type: none"> <li>• Environment and Sustainability</li> <li>• KBCS, Environment and Sustainability</li> <li>• Environment and Sustainability</li> </ul>
9. Reduce the potential impacts from more extreme and frequent heat events and drought, as a result of climate change, on the Flying-foxes	<ul style="list-style-type: none"> <li>• Develop a heat stress event protocol for the Flying-foxes</li> </ul>	<ul style="list-style-type: none"> <li>• Heat stress protocol developed by June 2014</li> </ul>	<ul style="list-style-type: none"> <li>• KBCS, Flying-fox experts, Environment and Sustainability</li> </ul>
10. Manage the potential health risks associated with Flying-foxes roosting in the KFFR	<ul style="list-style-type: none"> <li>• Utilise current research on the potential health risks associated with Flying-foxes roosting in the KFFR to inform the information provided to the community</li> <li>• Provide information on the potential health risks associated with Flying-foxes via Council's website and educational activities</li> </ul>	<ul style="list-style-type: none"> <li>• Current research on the potential health risks associated with Flying-foxes is monitored and reviewed by Council, for provision to the community</li> <li>• Information on the potential health risks associated with Flying-foxes is provided via Council's website and educational activities and updated as necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Environment and Sustainability, KBCS, OEH and Flying-fox experts</li> <li>• Environment and Sustainability</li> </ul>

**Table 3: Management Actions**



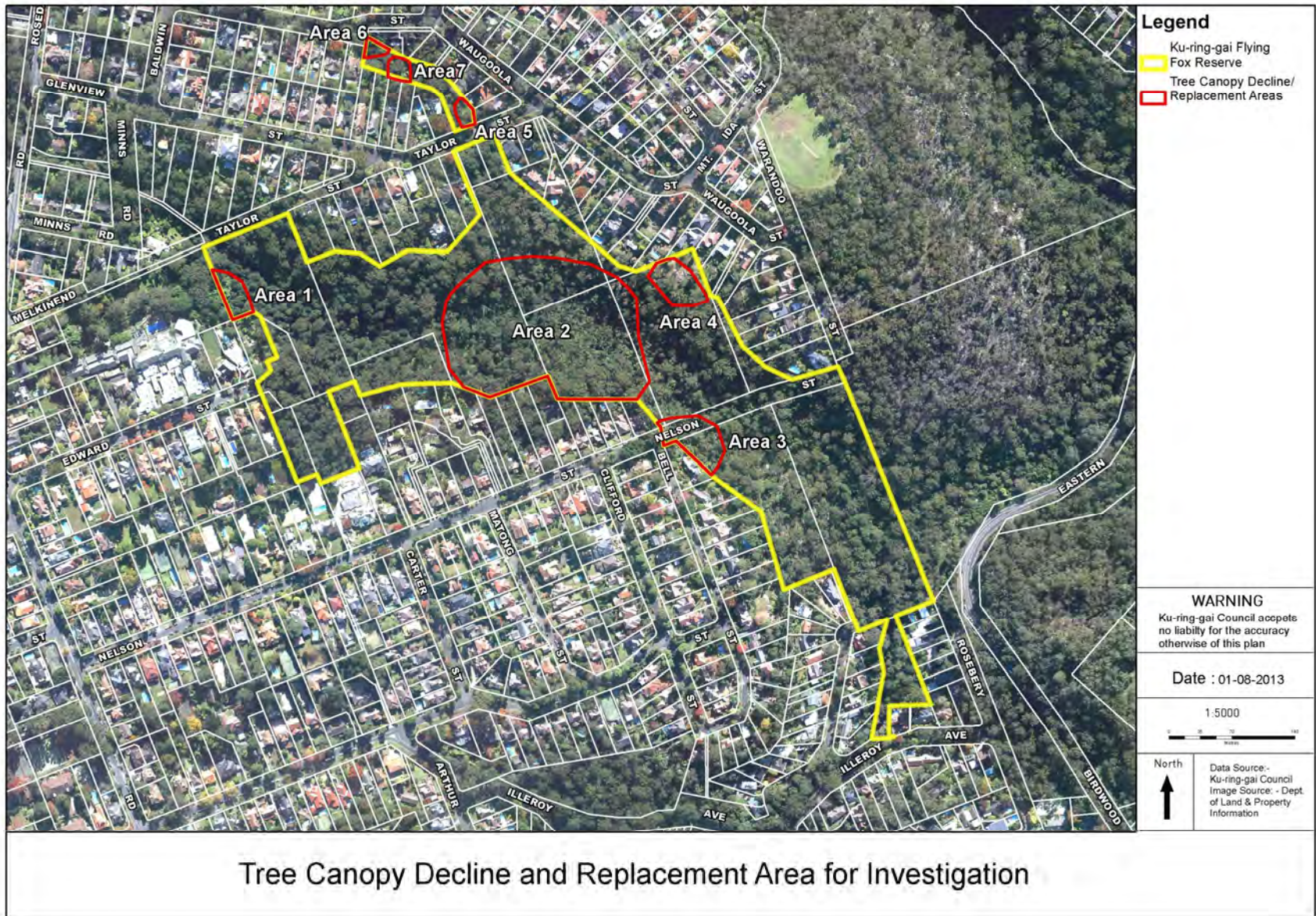


Figure 5: Tree Canopy Decline and Replacement Areas for Investigation



# Appendices

## Appendix 1: Conservation Agreement

The original Conservation Agreement was adopted and signed by the Minister and Council in February 1991. In 2011, the additional land added to the Ku-ring-gai Flying-fox Reserve in 2007 was included under this Conservation Agreement, to be managed as per the original Agreement.

### CONSERVATION AGREEMENT

Between

TIMOTHY JOHN MOORE

Minister for the Environment

And

THE COUNCIL OF THE MUNICIPALITY OF  
KU-RING-GAI

The Owner

of Ku-ring-gai Flying Fox Reserve

Lots 1 and 3 in DP 578212; Lot 101 in DP 714935; Lots 154A, 156 and 158 in DP 17131; Lots 1 and 2 in DP 38541; Lot 10 in DP 23994; Lot A in DP 212698; Lot 35 in DP 16006; Lot 2 in DP 200605; Lot 2 in DP 204102; Lot 1 in DP 179532; Lot Part 7 Section 2 in DP 979271; Lot 103 in DP 17647, Lot 5 Section 1 DP 979271; and the section of unmade road off the eastern end of Nelson Street north of Lot 35 DP 16006 and Lot 7 Section 2 DP 979271. Parish of Gordon, County of Cumberland and Municipality of Ku-ring-gai, as shown on diagram annexed hereto.

Dated: 7th February, 1991 ~~1990~~

This is a true and accurate copy of the original document held by Council.



TOWN CLERK

Director

NSW National Parks  
and Wildlife Service

43 Bridge Street

HURSTVILLE NSW



THIS AGREEMENT made the Seventh day of February  
One thousand nine hundred and ninety one  
BETWEEN THE HONOURABLE TIMOTHY JOHN MOORE,  
the Minister for the Environment  
of the State of New South Wales being  
the Minister for the time being administering the  
National Parks and Wildlife Act 1974 ("the Minister"  
which expression shall where the context admits be deemed  
to include his successors in office) of the one part  
AND THE COUNCIL OF THE MUNICIPALITY  
OF KU-RING-GAI  
("The Owner")  
of Council Chambers  
818 Pacific Highway Gordon NSW 2072  
of the other part the parties agree as follows

1. INTERPRETATION

In this Agreement unless the contrary intention appears:-

"the Act" means the National Parks and Wildlife Act 1974 and any regulations from time to time in force thereunder.

"the Minister" means the Minister for the time being administering the Act and where not repugnant to the context includes the servants and agents of the Minister.

"the Owner" includes the Owner and successors in title as defined by the Act.

"the Director" means the Director of National Parks and Wildlife appointed under the Act and includes any person for the time being acting as such.

"the subject land" means the land hereinbefore described and where the context so admits any part of the land.

"development" has the same meaning as the definition in Section 69A of the Act.

"plan of management" means a written document/plan prepared by the Owner within a period of 12 months from the date of this Agreement containing details of proposed management of the subject land for a period of five years, to give effect to the purpose of the agreement.

Words importing the singular number shall include the plural and masculine gender the feminine or neuter and vice versa.

Any reference to a person shall be deemed to include a corporate body and vice versa.

Any covenant or agreement on the part of two or more persons shall be deemed to bind them jointly and severally.

- 2 A. The Owner is registered as the holder of that parcel of land known as Ku-ring-gai Flying-Fox Reserve which includes Lots 1 and 3 in DP 578212; Lot 101 in DP 714935; Lots 154A, 156 and 158 in DP 17131; Lots 1 and 2 in DP 38541; Lot 10 in DP 23994; Lot A in DP 212698; Lot 35 in DP 16006; Lot 2 in DP 200605; Lot 2 in DP 204102; Lot 1 in DP 179532; Lot Part 7 Section 2 in DP 979271; Lot 103 in DP 17647; Lot 5 Section 1 DP 979271 and the section of unmade road off the eastern end of Nelson Street north of Lot 35 DP 16006 and Lot 7 Section 2 DP 979271. Parish of Gordon, County of Cumberland and Municipality of Ku-ring-gai in the State of New South Wales comprising 14.589 hectares plus unmade road.
- B. The subject land forms a major part of the catchment of Stoney Creek, from off the eastern end of Edward Street to the boundary with Governor Phillip Reserve and straddles Taylor Street in the north and extends south to Illeroy Avenue, Gordon. It is in a relatively natural condition so far as native plant species are concerned and is described as urban bushland. It includes a variety of wildlife habitats and contains the only Sydney colony of the Grey-headed Flying-fox (*Pteropus poliocephalus*) which is the largest and most important maternity colony of this species in southern New South Wales.
- C. The Minister wishes steps to be taken to ensure the protection and preservation of native flora and fauna, in particular the Grey-headed Flying-fox colony and all elements of its habitat, on the subject land.
- D. The Owner has agreed with the Minister to enter into these presents pursuant to section 69B of the Act for the purpose of protecting and preserving the natural scenery and the native flora and fauna on the subject land upon the terms and conditions hereinafter appearing.

3. USE OF THE SUBJECT LAND

The Owner covenants with the Minister as follows:-

3.1 Unless the prior written consent of the Director is obtained, no development shall be carried out on the subject land which is inconsistent with the preservation of native flora and fauna according to the intent of this agreement other than is necessary for essential services.

3.2 The Owner shall retain the soils, water courses, native flora and fauna as far as possible in an undisturbed condition.

3.3 The Owner shall take such action as is necessary to restore and maintain the habitat of the Grey-headed Flying-fox Colony as consistent with the purpose of this agreement.

3.4 The Owner shall not permit domestic animals or pets on the subject land.

3.5 Unless the prior written consent of the Director is obtained, the Owner shall not undertake or permit controlled burning for bushfire hazard reduction purposes.

3.6 The Owner shall not construct or permit any recreation facilities on any part of the land or formalise access other than those required for the provision of education opportunities and interpretation for the public regarding the Grey-headed Flying-fox colony.

3.7 The Owner will manage the subject land in accordance with an adopted plan of management.

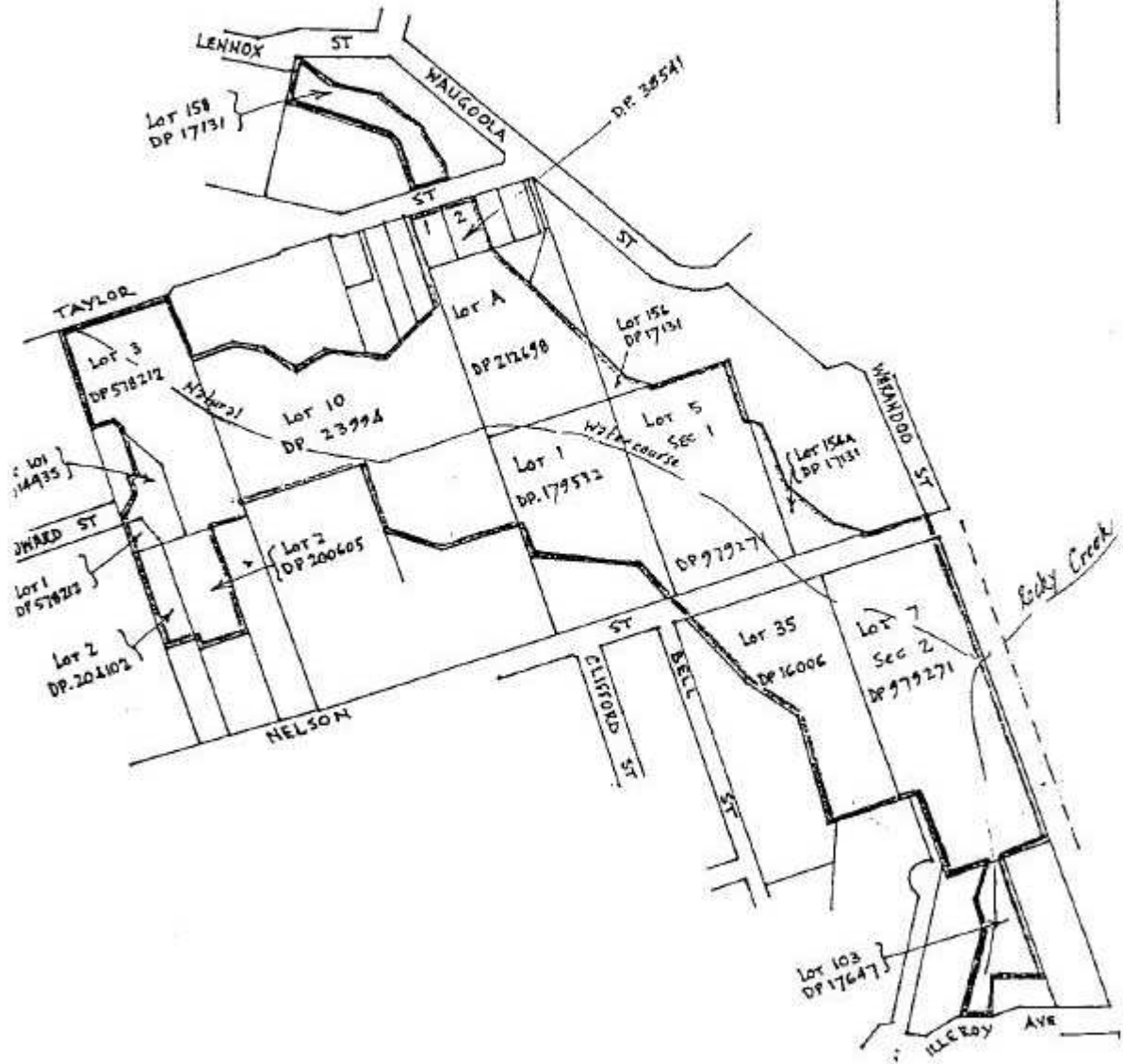
4. RIGHT TO INSPECT

The Minister, the Director and their servants and agents may at all times enter upon the subject land to ensure due compliance with this Agreement.



DIAGRAM  
PART LANDS OWNED BY KU-RING-GAI MUNICIPAL COUNCIL  
AT GORDON

PARISH OF GORDON: COUNTY OF CUMBERLAND





5. OBLIGATIONS TO THE MINISTER

The Minister covenants with the Owner as follows:-

5.1 The Minister will arrange for the provision of such technical and scientific advice and assistance to the Owner as the Minister deems necessary to ensure the protection and preservation of the native flora and fauna, in particular, the Grey-headed Flying-fox colony and all elements of its habitat, on the subject land.

5.2 The Minister will arrange for the provision of technical advice and financial assistance to the Owner as the Minister deems necessary to ensure the provision of education opportunities and interpretation for the public regarding the Grey-headed Flying-fox colony on the subject land.

**VARIATION OF  
CONSERVATION AGREEMENT**

**BETWEEN**

**THE MINISTER FOR THE ENVIRONMENT OF  
THE STATE OF NEW SOUTH WALES**

**AND**

**Ku-ring-gai Council**

**For the**

**Ku-ring-gai Flying Fox Reserve**

May 2011



**John McKee**  
General Manager  
Ku-ring-gai Council

  
Minister

**VARIATION TO CONSERVATION AGREEMENT UNDER PART 4 DIVISION 12 OF THE NATIONAL PARKS AND WILDLIFE ACT 1974**

**THIS AGREEMENT** made the 5th day of July, Two thousand and Eleven, **BETWEEN** the Minister for the time being administering the *National Parks and Wildlife Act, 1974* ("the Minister" which expressions shall where the context admits, be deemed to include his successors in office) of the one part and Ku-ring-gai Council ("the Owner") of Ku-ring-gai Flying Fox Reserve, Gordon of the other part.

**BACKGROUND**

- A An agreement dated 7 February 1991, Registered Dealing Number Z915953 was duly executed between the Minister and the Owner ("the Principal Agreement") relating to Lots 1 and 3 in DP578212; Lot 101 in DP 714935; Lots 154A, 156 and 158 in DP17131; Lots 1 and 2 in DP38541; Lot 10 in DP 23994; Lot A in DP 212698; Lot 35 in DP 16006; Lot 2 in DP 200605; Lot 2 in DP 204102; Lot 1 in DP 179532; Lot Part 7 Section 2 in DP 979271 (now known as Lot 7 in DP 1132073), Lot 103 in DP 17647; Lot 5 Section 1 in DP 979271 (now known as Lot 5 in DP 1099395), and the section of unmade road of the eastern end of Nelson Street north of Lot 35 in DP 16006 and Lot 7, Section 2, in DP 979271, Parish of Gordon, County of Cumberland ("the Land").
- B The Owner is the registered proprietor of the Land.
- C The Owner and the Minister agree that the Principal Agreement be varied to include Lot 34 DP 1079802.
- D Accordingly, the Owner and the Minister have agreed to vary the Principal Agreement in accordance with this agreement ("Variation Agreement").
- E This Variation Agreement will have effect from the day of execution and will continue until terminated by the parties in accordance with the *National Parks and Wildlife Act, 1974*.

**VARIATION**

- I The Minister and the Owner agree to vary the Principal Agreement as follows:
- In the description of the lots comprising Ku-ring-gai Flying Fox Reserve on page one of the Principal Agreement, replace the words "Lot Part 7 Section 2 in DP 979271", with the words "Lot 7 in DP 1132073 (formerly known as Lot Part 7 Section 2 in DP 979271)".
  - In the description of the lots comprising Ku-ring-gai Flying Fox Reserve on page one of the Principal Agreement, replace the words Lot 5 Section 1 in DP 979271, with the words "Lot 5 in DP 1099395 (formerly known as Lot 5 Section 1 in DP 979271) and Lot 34 in DP 1079802."
  - In clause 2A of the Principal Agreement, replace the words "and Lot Part 7 Section 2 DP 979271", with the words "Lot 7 in DP 1132073 (formerly Lot 7 Section 2 DP 979271)".
  - In clause 2A of the Principal Agreement, replace the words Lot 5 Section 1 in DP 979271, with the words "Lot 5 in DP 1099395 (formerly known as Lot 5 Section 1 in DP 979271) and Lot 34 in DP 1079802."
  - In clause 2A, of the Principal Agreement, replace "14.589" with "15.025".
  - Replace the Diagram attached to the Principal Agreement entitled, "Diagram Part Lands Owned by Ku-ring-gai Municipal Council at Gordon Parish of Gordon: County of Cumberland," with the Diagram at page 4 of this Variation Agreement marked "Diagram A" and entitled "Ku-ring-gai Flying Fox Reserve Conservation Agreement Area".

IN WITNESS WHEREOF the parties hereto have executed this Agreement the day and year first above written.

SIGNED by )  
The Honourable )  
NAME OF MINISTER )  
as such Minister )  
for the Environment and for the )  
purpose of rendering liable the )  
Government of the State of New )  
South Wales (but not so as to incur )  
any personal liability) hereunder in )  
the presence of: )

*Robert Parker*  
MINISTER

5/7/11  
Date

*KO'Reg*  
Witness  
5/7/11  
Date

SIGNED by the OWNERS  
KU-RING-GAI COUNCIL

*[Signature]*  
John McKee  
General Manager, Ku-ring-gai Council  
24/5/2011  
Date

in the presence of  
*Carmel Hughes*  
Witness signature  
CARMEL HUGHES  
Witness Name and address  
818 PACIFIC HIGHWAY, GORDON  
24/5/2011  
Date

Landowners Name and address for service of notices:  
Ku-ring-gai Council  
Locked Bag 1056, Pymble NSW 2073



DIAGRAM A.



Ku-ring-gai Council

Minister

## Appendix 2: Site history of the KFFR

### Historical background of the Ku-ring-gai Flying-fox Reserve

- Early 1900s Oral history indicates that there was a flying-fox camp near Browns Waterhole or further upstream in the upper Lane Cover River valley.
- 1950s - 1965 Flying-fox camp located near Browns Waterhole, in Lane Cove River Valley (approximately 6 kilometres west of its current position). Flying-foxes used Stony Creek valley seasonally.
- 1960s Grey-headed flying-foxes established permanent camp in Stony Creek valley due to disturbance of Lane Cove River valley habitat by bush fire and urban development.
- 1983 Municipality of Ku-ring-gai Bushland Management Survey Report" issued. Stony Creek Reserve listed as a Reserve of Highest Ecological Value.  
Following public opposition to a Council subdivision approval in Edward St, an Interim Conservation Order was issued on the site to permit an investigation.
- 1984 Report by Dr A.N. Williams regarding the Gordon Bat Colony issued to NSW National Parks and Wildlife Service.
- 1985 Ku-ring-gai Council and the NSW Government purchased two lots of the subdivision at 18 Edward Street to protect the flying-fox camp.  
Ku-ring-gai Bat Colony Committee (now Ku-ring-gai Bat Conservation Society Inc.) established at the behest of the Mayor and a formal relationship between the Committee and Council was defined.  
Site Assessment of the Gordon Bat Colony - Weed Control and Restoration of Native commissioned by the Ku-ring-gai Bat Colony Committee and completed.
- 1996 Grey-headed Flying-fox *Pteropus poliocephalus* became a protected species under the *National Parks and Wildlife Act 1974* (NSW).
- 1987 Habitat Restoration Project commenced with volunteer labour by the Ku-ring-gai Bat Colony Committee Inc. Grant funding later in the year allowed for the preparation of a simple plan of management based on the Site Assessment Report and employment of a bush regeneration team to work one day per week.
- 1991 Voluntary Conservation Agreement for Ku-ring-gai Flying-fox Reserve was signed by the Mayor of Ku-ring-gai and the NSW Minister for Environment in accordance with provisions of the *National Parks and Wildlife Act 1974* (NSW).  
The name "Ku-ring-gai Flying-fox Reserve" adopted by Geographical Names Board.
- 1992 - 7 Ku-ring-gai Bat Colony Committee Inc. received grants from the NSW Environmental Rehabilitation and Restoration Trust to employ a contract team, one day per week, to continue the Habitat Restoration Project
- 1992 A Fruit Crop Protection Seminar held in Hornsby. NSW National Parks and Wildlife Service and Ku-ring-gai Bat Colony Committee Inc. jointly arranged this seminar.

- 1995 Plan of Management for Ku-ring-gai Flying-fox Reserve was adopted by Council.  
Interpretive signs erected on Rosedale Road Bridge.  
Grant funding received by Council for the implementation of research, interpretation and catchment management actions in Ku-ring-gai Flying-fox Reserve.
- 1996 Ku-ring-gai Municipal Council adopted the Bushland Plan of Management under the provisions of the *Local Government Act 1993* covering the Flying-Fox Reserve.
- 1998 Ku-ring-gai Bat Conservation Society Inc. received funding for habitat restoration from the Natural Heritage Trust.
- 1999 The 1995 Management Plan was reviewed and updated as a result of changes to legislation, local government policy and scientific research developments.
- 2006 Ku-ring-gai Municipal Council adopted the Bushland Reserves Plan of Management under the provisions of the *Local Government Act 1993* covering the Ku-ring-gai Flying-Fox Reserve. 2007 An additional 0.44 hectares of land (previously Department of Planning) was added to the Reserve (see Figure 2).
- 2009 Ku-ring-gai Municipal Council adopted the Bushland Reserves Plan of Management under the provisions of the *Local Government Act 1993* covering the Flying-Fox Reserve.
- 2011 Council received \$12, 000 funding from the Office of Environment and Heritage for bush regeneration for KFFR Conservation Agreement land.
- 2012 Council allocates \$40,000 from Environmental Levy 2 funds (until 2019) a year, for bush regeneration at KFFR.
- 2011 Voluntary Conservation Agreement for Ku-ring-gai Flying-fox Reserve updated to include additional land. Agreement signed by the Mayor of Ku-ring-gai and the NSW Minister for Environment in accordance with provisions of the *National Parks and Wildlife Act 1974 (NSW)*.
- 2013 Ku-ring-gai Flying Fox Reserve Management Plan reviewed and updated.

## Appendix 3: Detailed lists of fauna and flora in KFFR

Table 4: Fauna recorded in the Ku-ring-gai Flying-fox Reserve

<b>Scientific Name</b>	<b>Common Name</b>
<b>Mammals</b>	
<i>Antechinus stuartii</i>	Brown Antechinus
<i>Trichosurus vulpecula</i>	Common Brushtail Possum
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox
<i>Pteropus scapulatus</i>	Little Red Flying-fox
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna
<b>Birds</b>	
<i>Pelecanus conspicillatus</i>	Australian Pelican
<i>Phalacrocorax varius</i>	Pied Cormorant
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant
<i>Ardea novaehollandiae</i>	White-faced Heron
<i>Anas superciliosa</i>	Pacific Black Duck
<i>Anas castanea</i>	Chestnut Teal
<i>Elanus notatus</i>	Black-shouldered Kite
<i>Accipiter fasciatus</i>	Brown Goshawk
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle
<i>Vanellus miles</i>	Masked Lapwing
<i>Columba leucomela</i>	White-headed Pigeon
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo
<i>Cacatua roseicapilla</i>	Galah
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
<i>Trichoglossus haematodus</i>	Rainbow Lorrieket
<i>Alisterus scapularis</i>	Australian King Parrot
<i>Platyercus eximius</i>	Eastern Rosella
<i>Platyercus elegans</i>	Crimson Rosella
<i>Cuculus pallidus</i>	Pallid Cuckoo



<b>Scientific Name</b>	<b>Common Name</b>
<i>Cuculus pyrrhophanus</i>	Fan-tailed Cuckoo
<i>Eudynamis scolopacea</i>	Common Koel
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo
<i>Ninox strenua</i>	Powerfull Owl
<i>Ninox novaeseelandiae</i>	Southern Boobook Owl
<i>Podargus strigoides</i>	Tawny Frogmouth
<i>Dacelo Novaeguinae</i>	Laughing Kookaburra
<i>Hacyon sancta</i>	Sacred Kingfisher
<i>Eurystomus orientalis</i>	Dollar Bird
<i>Menura novaehollandiae</i>	Superb Lyrebird
<i>Hirundo neoxena</i>	Welcome Swallow
<i>Cecropis ariel</i>	Fairy Martin
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
<i>Zoothera lunulata</i>	White's (Ground)Thrush
<i>Eopsaltria australis</i>	Eastern Yellow Robin
<i>Pachycephala pectoralis</i>	Golden Whistler
<i>Pachycephala rufiventris</i>	Rufous Whistler
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Rhipidura rufifrons</i>	Rufous Fantail
<i>Rhipidura fuliginosa</i>	Grey Fantail
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Psophodes olivaceus</i>	Eastern Whipbird
<i>Malurus cyaneus</i>	Superb Fairywren
<i>Malurus lamberti</i>	Variiegated Fairywren
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Gerygone mouki</i>	Brown Gerygone (Warbler)
<i>Acanthiza sp</i>	Thornbill
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Anthochaera chrysoptera</i>	Brush (Little) Wattlebird
<i>Philimon corniculatus</i>	Noisy Friarbird
<i>Manorina melanocephala</i>	Noisy Miner
<i>Meliphaga lewinii</i>	Lewin's Honeyeater
<i>Lichenostomus chrysops</i>	Yellow-face Honeyeater

<b>Scientific Name</b>	<b>Common Name</b>
<i>Lichenostomus penicillatus</i>	White-plume Honeyeater
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater <sup>1</sup>
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Zosterops lateralis</i>	Silveryeye
<i>Emblema temporalis</i>	Red-browed Firetail
<i>Oriolus sagittatus</i>	Olive-backed Oriole
<i>Dicrurus hottentottus</i>	Spangled Drongo
<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird
<i>Grallina cyanoleuca</i>	Magpie Lark (Pee
<i>Strepera graculina</i>	Pied Currawong
<i>Cracticus torquatus</i>	Grey Butcherbird
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Corvus coronoides</i>	Australian Raven
<b>Reptiles</b>	
<i>Morelia spilota</i>	spilota Diamond Python
<i>Varanus varius</i>	Lace Monitor (Goanna)
<i>Pogona barbata</i>	Bearded Dragon
<i>Physignathus leseurii</i>	Eastern Water Dragon
<i>Phyllurus platurus</i>	Southern Leaf-tail Gecko
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink
<i>Tiliqua scincoides</i>	Eastern Blue-tongue Lizard
<i>Spehomorphus quoyii</i>	Eastern Water Skink
<i>Saiphos equalis</i>	Three-toed Skink
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake
<i>Rhinoplocephalus nigrescens</i>	Eastern Small-eyed Snake
<b>Amphibians</b>	
<i>Mixophyes iteratus</i>	Great Barred Frog
<i>Pseudophryne australis</i>	Red-crowned Toadlet
<i>Litoria phyllochroa</i>	Leaf- Green Tree Frog

<b>Scientific Name</b>	<b>Common Name</b>
<i>Crinia signifera</i>	Common Eastern Toadlet
<i>Limnodynastes peroni</i>	Brown-striped Marsh Frog
<i>Anguilla reinhardtii</i>	Long finned Eel
<b>Invertebrates</b>	
<i>Cherax destructor</i>	Yabby
<i>Euastacus spinifer</i>	Sydney Spiny Cray
<i>Triboniophorus graessei</i>	Red Triangle Slug
<i>Helicarion sp.</i>	
<i>Missulena bradleyi</i>	Eastern Mouse Spider
<i>Arigiope aetheria</i>	St Andrews Cross Spider
<i>Nephila spp.</i>	Golden Orbweaving Spider
<i>Phonognatha graeffei</i>	Leafcurling Spider
<i>Dinopis subrufa</i>	Common Netcasting spider
<i>Isopoda sp.</i>	Large huntsman Spider
<i>Atrax robustus</i>	Sydney Funnelweb Spider
<i>Misgolas rapax</i>	Sydney Brown Trapdoor Spider
<i>Pholcus phalangioides</i>	Daddy-longlegs Spider
<i>Ixodes holocyclus</i>	Paralysis Tick
<i>Scolopendra morsitans</i>	Common Centipede
<i>Aeshna brvistyla</i>	Dragonfly
<i>Orthodera mimistralis</i>	Green Mantid
<i>Gryllotalpa australis</i>	Mole Cricket
<i>Caedicia major</i>	Katydid
<i>Idiopterus nephrolepidis</i>	Maidenhair Fern Aphid
<i>Abricta curvicosta</i>	Floury Baker Cicada
<i>Cyclochila australasiae</i>	Greengrocer, Yellow Monday
<i>Macrotristria anularis</i>	Cherrynose Cicada
<i>Psaltoda moerens</i>	Redeye Cicada
<i>Psaltoda plaga</i>	Black Prince cicada
<i>Thopha saccata</i>	Double Drummer Cicada
<i>Lestonia haustorifera</i>	Shield Bug
<i>Lestonia grossi</i>	Shield Bug

<b>Scientific Name</b>	<b>Common Name</b>
<i>Ctenarytaina thysanura</i>	Bluegum Psyllid
<i>Pristhesancus papuensis</i>	Assassin Bug,
<i>Havinthus rufovarius</i>	Assassin Bug
<i>Myrmeleon acer</i>	Common Antlion
<i>Anoplognathus viriditarsis</i>	Christmas Beetle
<i>Cephalodesmius armiger</i>	Scarab Beetle
<i>Boreoides subulatus</i>	Stratiomyid fly
<i>Syrphus viridiceps</i>	Macq. Hover Fly
<i>Lamprolonchaea brouniana</i>	Metallic-green Tomato Fly
<i>Dacus tryoni</i>	Queensland Fruit Fly
<i>Dirioxa pornia</i>	
<i>Procecidochares utilis</i>	Crofton Gall "Wasp"
<i>Phytobia pittosporphylli</i>	Pittosporum leafminer
<i>Euschemon rafflesia</i>	Regent Skipper
<i>Doratifera casta</i>	Black Slug Cup
<i>Doratifera vulnerans</i>	Mottled Cup Moth
<i>Leptocneria reducta</i>	White Cedar Moth
<i>Graphium sarpedon</i>	choredon Blue Fanny Butterfly
<i>Papilio aegus</i>	Orchard Butterfly
<i>Anaphaeis java</i>	teutonia Caper White Butterfly
<i>Pieris rapae</i>	Cabbage white butterfly
<i>Danaus plexippus</i>	Wanderer Butterfly
<i>Euploea core</i>	Common Crow
<i>Heteronympha merope</i>	Common Brown Butterfly
<i>Tisiphone abeona</i>	Sword-grass Brown Butterfly
<i>Phaedyma shepherdii</i>	Common Aeroplane Butterfly
<i>Vanessa kershawi</i>	Painted Lady
<i>Aenetus lignivorens</i>	Splendid Ghost Moth
<i>Psilogramma menephron</i>	Australian privet Hawk Moth
<i>Coequosa trangularis</i>	Geebung Hawk Moth
<i>Apis mellifera</i>	Honey Bee
<i>Trigona carbonifera</i>	Native Stingless Bee
<i>Nasutitermes walkeri</i>	Nigger Head Termite



<b>Scientific Name</b>	<b>Common Name</b>
<i>Camonotus consobrinus</i>	Sugar Ant
<i>Anonychomyrma nitidiceps</i> ,	(Syn <i>iridomyrmex nitidiceps</i> )
<i>Myrmecia nigrocincta</i>	Jumping Ant
<i>Myrmecia forficata</i>	Bull Ant
<i>Rhytidoponera "metallica"</i>	Greenhead Ant
<i>Leptomymex erythrocephalus</i>	Spider Ant
<i>Netelia producta</i>	Orange Caterpillar parasite
<i>Echthromorpha intricatoria</i>	Cream Spotted Ichneumon
<i>Perga affinis</i>	affinis Steelblue Sawfly
<i>Cryptocheilus sp.</i>	Spider-killing Wasp
<i>Exeirus lateritius</i>	Cicada-killer Wasp
<i>Sphecius pectoralis</i>	Cicada-killer Wasp
<i>Diamma bicolor</i>	Metallic Blue Wasp

Source: Initially compiled by Gordon Limburg in 1993, including information from Martyn Robinson. Win Filewood provided a bird list in 1989. A small mammal survey with live traps was conducted for 4 nights in January 1989 by Ray and Anne Williams of the Royal Zoological Society of NSW. Additional records contributed by Madeleine Schofield, Nancy Pallin and other bush regenerators.

**Table 5: Flora recorded in the Ku-ring-gai Flying-fox Reserve**

<b>Scientific name</b>	<b>Family</b>	<b>Common name</b>
<b>Trees and tall shrubs</b>		
<i>Acacia irrorata</i>	Fabaceae	Green Wattle
<i>Acacia parramattensis</i>	Fabaceae	Parramatta Green Wattle
<i>Acacia schinoides</i>	Fabaceae	
<i>Acacia decurrens</i>	Fabaceae	Sydney Green Wattle
<i>Acmena smithii</i>	Myrtaceae	Lilly Pilly
<i>Allocasuarina littoralis</i>	Casuarinaceae	Black she-oak
<i>Allocasuarina torulosa</i>	Casuarinaceae	Forest Oak
<i>Alphitonia excelsa</i>	Rhamnaceae	Red Ash
<i>Angophora costata</i>	Myrtaceae	Sydney Red Gum
<i>Backhousia myrtifolia</i>	Myrtaceae	Grey Myrtle
<i>Banksia serrata</i>	Proteaceae	Old Man Banksia
<i>Callicoma serratifolia</i>	Cunoniaceae	Black Wattle

<b>Scientific name</b>	<b>Family</b>	<b>Common name</b>
<i>Callitris rhomboidea</i>	Cupressaceae	Port Jackson Cypress
<i>Ceratopetalum apetalum</i>	Cunoniaceae	Coachwood
<i>Ceratopetalum gummiferum</i>	Cunoniaceae	Christmas Bush
<i>Corymbia gummifera</i>	Myrtaceae	Red Bloodwood
<i>Cyathea australis</i>	Cyatheaceae	Rough Tree Fern
<i>Dendrocnide excelsa</i>	Urticaceae	Giant Stinging Tree
<i>Eleocharpus reticulatus</i>	Elaeocarpaceae	Blueberry Ash
<i>Eleocharpus kirtonii</i>	Elaeocarpaceae	Pigeonberry Ash
<i>Eucalyptus globoidea</i>	Myrtaceae	White Stringybark
<i>Eucalyptus pilularis</i>	Myrtaceae	Blackbutt
<i>Eucalyptus resinifera</i>	Myrtaceae	Red Mahogany
<i>Eucalyptus saligna</i>	Myrtaceae	Blue Gum
<i>Eucalyptus haemastoma</i>	Myrtaceae	Scribbly Gum
<i>Ficus coronata</i>	Moraceae	Creek Sandpaper Fig
<i>Ficus fraseri</i>	Moraceae	Sandpaper Fig
<i>Ficus macrophylla</i>	Moraceae	Moreton Bay Fig
<i>Ficus rubiginosa</i>	Moraceae	Port Jackson or
<i>Glochidion ferdinandi</i>	Euphorbiaceae	Cheese Tree
<i>Livistona australis</i>	Arecaceae	Cabbage Palm
<i>Melia azedarach</i>	Meliaceae	White Cedar
<i>Pittosporum undulatum</i>	Pittosporaceae	Sweet Pittosporum
<i>Podocarpus elatus</i>	Podocarpaceae	Plum Pine
<i>Polyscias elegans</i>	Araliaceae	Celery Wood
<i>Rapanea variabilis</i>	Myrsinaceae	Variable Muttonwood
<i>Syncarpia glomulifera</i>	Myrtaceae	Turpentine
<i>Syzygium oleosum</i>	Myrtaceae	Blue Lilly Pilly
<i>Syzygium paniculatum</i>	Myrtaceae	Magenta Lilly Pilly
<i>Trema aspera</i>	Ulmaceae	Poison or Native
<i>Tristaniopsis laurina</i>	Myrtaceae	Water Gum
<b>Shrubs</b>		
<i>Acacia linifolia</i>	Fabaceae	Flax-leaf Wattle
<i>Acacia longissima</i>	Fabaceae	Narrow-leaf Wattle

<b>Scientific name</b>	<b>Family</b>	<b>Common name</b>
<i>Acacia longifolia</i>	Fabaceae	Sydney Golden Wattle
<i>Acacia terminalis</i>	Fabaceae	Sunshine Wattle
<i>Acacia floribunda</i>	Fabaceae	Sally Wattle
<i>Acrotriche divaricata</i>	Epacridaceae	Ground-berry
<i>Astrotricha floccosa</i>	Araliaceae	Native Tobacco
<i>Austromyrtus tenuifolia</i>	Myrtaceae	Narrow Leaf Myrtle
<i>Banksia spinulosa</i>	Proteaceae	Hairpin Banksia
<i>Banksia ericifolia</i>	Proteaceae	Heath-leaf Banksia
<i>Bauera rubioides</i>	Baueraceae	Dog Rose,
<i>Boronia pinnata</i>	Rutaceae	Pinnate Boronia
<i>Breynia oblongifolia</i>	Euphorbiaceae	Breynia
<i>Comesperma volubile</i>	Polygalaceae	
<i>Conospermum taxifolium</i>	Proteaceae	Small-leaf Smoke Bush
<i>Crowea saligna</i>	Rutaceae	Crowea
<i>Dampiera stricta</i>	Goodeniaceae	Blue Dampiera
<i>Dillwynia retorta</i>	Fabaceae	Eggs and Bacon
<i>Dodonaea triquetra</i>	Sapindaceae	Hop Bush
<i>Epacris longiflora</i>	Epacridaceae	Native Fushia
<i>Gompholobium latifolium</i>	Fabaceae	Golden Glory Pea
<i>Grevillea buxifolia</i>	Proteaceae	Grey Spider Flower
<i>Grevillea linearifolia</i>	Proteaceae	White Spider Flower
<i>Grevillea sericea</i>	Proteaceae	Pink Spider Flower
<i>Grevillea speciosa</i>	Proteaceae	Red Spider Flower
<i>Hakea salicifolia</i>	Proteaceae	Willow-leaf Hakea
<i>Hakea sericea</i>	Proteaceae	Needle Bush, Silky
<i>Hakea teretifolia</i>	Proteaceae	Dagger Hakea
<i>Hibbertia aspera</i>	Dilleniaceae	Rough Guinea Flower
<i>Hibbertia empetrifolia</i>	Dilleniaceae	Trailing Guinea Flower
<i>Kunzea ambigua</i>	Myrtaceae	Tick Bush
<i>Lambertia formosa</i>	Proteaceae	Mountain Devil
<i>Lasiopetalum ferrugineum</i> var. <i>ferrugineum</i>	Rutaceae	Rusty Petals
<i>Leptospermum polygalifolium</i>	Myrtaceae	Lemon Scented Tea
<i>Leptospermum trinervium</i>	Myrtaceae	Flaky-barked Tea Tree

<b>Scientific name</b>	<b>Family</b>	<b>Common name</b>
<i>Leucopogon juniperinus</i>	Epacridaceae	Prickly Beard-heath
<i>Lomatia myricoides</i>	Proteaceae	Long-leaf Lomatia
<i>Lomatia silaifolia</i>	Proteaceae	Crinkle Bush
<i>Micrantheum ericoides</i>	Euphorbiaceae	
<i>Mirbelia rubiifolia</i>	Fabaceae	Red Mirbelia
<i>Notelaea longifolia</i>	Oleaceae	Large Mock Olive
<i>Notelaea venosa</i>	Oleaceae	Native Olive
<i>Olearia microphylla</i>	Asteraceae	Bridal Daisy Bush
<i>Omalanthus nutans</i>	Euphorbiaceae	Bleeding Heart
<i>Opercularia aspera</i>	Rubiaceae	Stinkwort
<i>Ozothamnus diosmifolius</i>	Asteraceae	Dogwood
<i>Persoonia linearis</i>	Proteaceae	Narrow-leaf Geebung
<i>Persoonia pinifolia</i>	Proteaceae	Pine-leaf Geebung
<i>Persoonia levis</i>	Proteaceae	Broad-leaf Geebung
<i>Petrophile pulchella</i>	Proteaceae	Conesticks
<i>Phebalium dentatum</i>	Rutaceae	
<i>Phyllanthus gasstroemii</i>	Euphorbiaceae	
<i>Phyllanthus hirtellus</i>	Euphorbiaceae	
<i>Pimelia linifolia</i>	Thymelaeaceae	Slender Rice Flower
<i>Pittosporum revolutum</i>	Pittosporaceae	Yellow Pittosporum
<i>Platylobium formosum</i>	Fabeaceae	Handsome Flat Pea
<i>Platysace linearifolia</i>	Apiaceae	Narrow-leaf Platysace
<i>Platysace lanceolata</i>	Apiaceae	Lance-leaf Platysace
<i>Polyscias sambucifolius</i>	Araliaceae	Elderberry Panax
<i>Pomaderris elliptica</i>	Rhamnaceae	Smooth Pomaderris
<i>Pultenaea daphnoides</i>	Fabaceae	Large-leaf Bush Pea
<i>Pultenaea flexilis</i>	Fabaceae	Graceful Bush Pea
<i>Solanum laciniatum</i>	Solanaceae	Kangaroo Apple
<i>Solanum prinophyllum</i>	Solanaceae	Forest Night Shade
<i>Stenocarpus salignus</i>	Proteaceae	Scrub Beefwood
<i>Tetradlea thymifolia</i>	Tremandraceae	Black-eyed Susan
<i>Zieria smithii</i>	Rutaceae	Sandfly Zieria
<i>Zieria pilosa</i>	Rutaceae	



<b>Scientific name</b>	<b>Family</b>	<b>Common name</b>
<b>Ferns</b>		
<i>Adiantum hispidulum</i>	Adiantaceae	Rough Maiden Hair
<i>Adiantum aethiopicum</i>	Adiantaceae	Common Maiden Hair
<i>Blechnum cartilagineum</i>	Blechnaceae	Gristle Fern
<i>Calochlaena dubia</i>	Dicksoniaceae	Soft Bracken
<i>Christella dentata</i>	Thelypteridaceae	Binung
<i>Davallia pyxidata</i>	Davalliaceae	Hare's Foot Fern
<i>Doodia aspera</i>	Blechnaceae	Rough Rasp Fern
<i>Doodia caudata</i>	Blechnaceae	Small Rasp Fern
<i>Gleichenia dicarpa</i>	Gleicheniaceae	Pouched Coral Fern
<i>Histiopteris incisa</i>	Dennstaedtiaceae	Bat's Wing Fern
<i>Hypolepis muelleri</i>	Dennstaedtiaceae	Harsh Ground Fern
<i>Lindsaea linearis</i>	Lindsaeaceae	Screw Fern
<i>Lindsaea microphylla</i>	Lindsaeaceae	Lacy Wedge Fern
<i>Pellaea falcata</i>	Sinopteridaceae	Sickle Fern
<i>Pteridium esculentum</i>	Dennstaedtiaceae	Bracken Fern
<i>Pteris tremula</i>	Pteridaceae	Jungle Brake
<i>Pteris umbrosa</i>	Pteridaceae	Tender Brake
<i>Schizaea dichotoma</i>	Schizaeaceae	Branched Comb Fern
<i>Schizaea rupestris</i>	Schizaeaceae	
<i>Sticherus flabellatus</i>	Gleicheniaceae	Umbrella Fern
<b>Understorey Species</b>		
<i>Acianthus exsertus</i>	Orchidaceae	Gnat Orchid
<i>Acianthus fornicatus</i>	Orchidaceae	Pixie Orchid
<i>Alocasia brisbanensis</i>	Arecaceae	Cunjevoi, Spoon Lily
<i>Alternanthera denticulata</i>	Amaranthaceae	Lesser Joyweed
<i>Agrostis avenacea</i>	avenacea	Poaceae Blown Grass
<i>Blandfordia nobilis</i>	Blandfordiaceae	Christmas Bell
<i>Burchardia umbellata</i>	Colchicaceae	Milkmaids
<i>Caladenia catenata</i>	Orchidaceae	White Fingers
<i>Carex breviculmis</i>	Cyperaceae	