Casino Flying-fox Camp Management Plan

Prepared for: Richmond Valley Council NSW

Date: September 2015

Prepared By: Michael Hallinan

Bachelor of Applied Science - Environmental Resource Management
Diploma in Arboriculture
Associate Diploma in Horticulture – Arboriculture

Arbor Ecological - *Professional Ecologist & Consulting Arborist Services*
www.arborecological.com.au

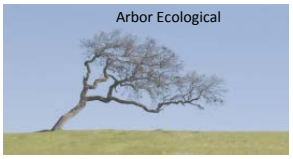


Table of Contents

1. Overview

Flying-foxes increasingly camp in urban parks, reserves and waterways that are popular recreational settings and often close to homes. Virtually all coastal northern NSW councils are dealing with somewhat problematic urban camps, each with their own set of issues.

Flying-foxes are a keystone species vital for the health of native forests. Their feeding habits are crucial for pollination and seed dispersal in rainforests, hardwood forests and wetland communities. They contribute to genetic diversity, resilience and long-term survival of native plant communities. Like other native wildlife, flying-foxes are protected in NSW. The NSW State and Commonwealth threatened species listing of the Grey-headed Flying-fox give the species an elevated protection status. Additionally, the Casino camp is listed as a nationally important flying-fox camp.

Flying-foxes roost permanently along the Casino Richmond River banks due to suitable riverine roosting habitat and dependable pollen and nectar food supplies within nightly foraging range. Large scale flowering of forest trees and wetlands occur, particularly from west to south-east of casino and including large areas of state forests and national parks. Little red flying-foxes roost annually in large numbers from around mid-summer to early autumn in response to mass forest tree flowering and nectar supplies. As well as forests and wetlands, the diet of grey headed and black flying-foxes is supplemented by a diverse array of backyard fruit trees, street plantings and weed trees and palms in and around Casino.

The camp is located predominantly on Crown Land under the care, control and management of Richmond Valley Council. Adjacent to the camp are private residences, a business, Casino Public School and public recreational park areas. Various lifestyle impacts have been reported from residents living in close proximity to the flying-fox camp, particularly relating to human health, foul smells, excessive noise, sleep loss, faecal mess, damage to painted surfaces, cleaning requirements, and damage to the Richmond River riparian vegetation where flying-foxes roost. Complaints to Council escalate when large numbers of little red flying-foxes roost annually in large numbers for up to eight weeks from around mid-summer to early autumn.

Significant health risks are associated with people handling sick, injured and dead animals. This risk escalates following summer heat related mass mortality of bats. Human fatalities in Australia from Hendra Virus and Australian Bat Lyssavirus (ABL) have heightened community concerns over disease transmission.

Richmond Valley Council is Crown land trustee and principle land manager and therefore is charged with this plan's implementation in partnership with stakeholders following its endorsement and adoption. Council has a duty of care for community health and welfare, as well as environmental protection, including that of flying-foxes. Complaints continue to be received by Council, and conflict and hostility are evident with some residents using noise and hose water to disturb flying-foxes and move them away from homes during the day. Community concerns and complaints led to Council resolving to prepare this camp management plan.

The location of the camp appears to have settled in recent years between the Irving Bridge and the footbridge in Casino. However, flying-foxes are highly mobile and their camp has a history of shifting through Richmond River riverbank vegetation, particularly from west to east. The strong affinity flying-foxes have for established camps will likely see them continuing to roost along the river bank at Casino for some time. However, conditions and circumstances may change and management planning needs to be adaptive and able to respond effectively.

Camp management planning is based on current conditions and best practice camp management practices. Management actions are prioritised based on their likelihood to cost effectively address impacts over a five year period and beyond.

Priority management actions include continued vegetation removal in separation buffer areas between residents and bats to reduce conflict and hostility towards bats. A medium to long term strategy is roost tree planting and rehabilitation of the preferred alternative roost location in the riparian area of Queen Elizabeth Park. This area is relatively remote from residential areas and makes up a large part of the existing camp area. It is hoped that recommencement of a tree planting and weed control program at this site will attract flying-foxes to less problematic areas.

Other planned management actions centre on community education; use of a complaints register; continued public health assessments; participation in flying-fox communication networks; and continued consultation with those most affected by the camp. Community consultation has helped guide management actions to date and will continue to do so. In partnership with stakeholders, Council is well placed to source external grant funds for priority management actions under this plan.

Best practice management dictates that nudging flying-foxes away from human settlement and dispersal of flying-foxes should be considered as last resorts, and following implementation, monitoring and review of other actions, and cost-benefit feasibility assessments.

This plan is intended as a dynamic document to be integrated with other Council plans and policies. Implementation progress will be reported in Council's annual

State of Environment report, and the plan priorities will be reviewed annually in response to new information or technologies, and with changing circumstances or priorities.

1.1. Purpose and Intention

The principle purpose of this management plan is to guide management actions that will reduce community impacts and conflict between landholders and flying-foxes, and minimise impacts to flying-foxes and other natural values over the next five years and beyond.

Council is committed to lessening the impact of flying-foxes on the Casino community and intends to continue to advocate on behalf of the community to the NSW State Government to assist with flying-fox management

This plan is consistent with the NSW Flying-fox Camp Management Policy (OEH 2015a) and prepared in accordance with the associated Camp Management Plan Template.

1.2. Objectives

- To address community concerns and impacts associated with the flying-fox camp;
- to minimise health risks associated with flying foxes roosting in close proximity to human settlement;
- to identify practical, best practice management activities to separate human settlement from roosting flying-foxes and minimise conflict;
- to comply with the relevant local, NSW State and Commonwealth legislation;
- to minimise the risk of significantly adverse impacts to flying-foxes and natural values; and
- to maintain a flexible and adaptive camp management approach.

2. Flying-fox Camp Description

2.1. Camp Size & Location

The flying-fox camp is located at Casino in the Richmond Valley Local Government Area in northern NSW. Flying-foxes roost along the riverbanks of the Richmond River generally between the Irving Bridge and the Richmond River footbridge. The camp extent is generally limited by available riparian riverbank and riverbed trees which extend between McAuliffe Park and Webb Park on the northern bank and the length of Queen Elizabeth Park to Coronation Park on the southern bank, refer to **Figure 1**.

The exact camp location shifts over time as flying-foxes move between roost trees upstream and downstream in the larger camp area and in response to numbers of flying-foxes occupying the camp and environmental conditions such as suitable roost tree availability, river height, temperature and humidity. The annual arrival of little

red flying-foxes en-masse for generally eight to ten weeks from around mid-summer to early autumn causes the camp to swell and expand in all directions, refer to **Figure 1**.

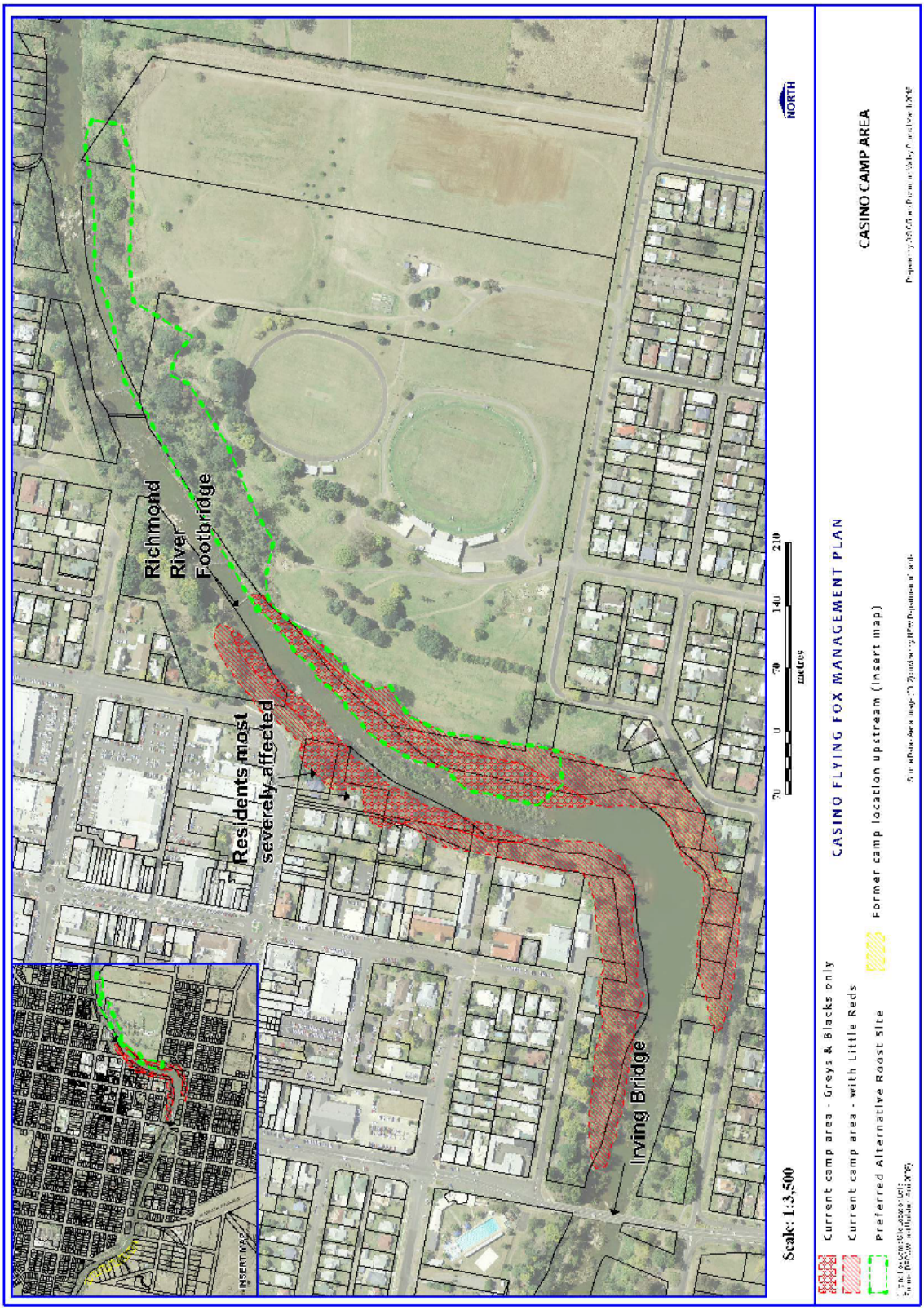


Figure 1. **Casino flying-fox camp location and area.**

2.1. Land Tenure

The camp is located predominantly on Crown Land under the care, control and management of Richmond Valley Council. Small portions of the camp also occur on Council owned land and freehold land to the south and north-west. Flying-foxes generally roost continuously in the north-west and only periodically when little red flying-foxes occupy the camp near residences in the south, refer to **Figure 2**.

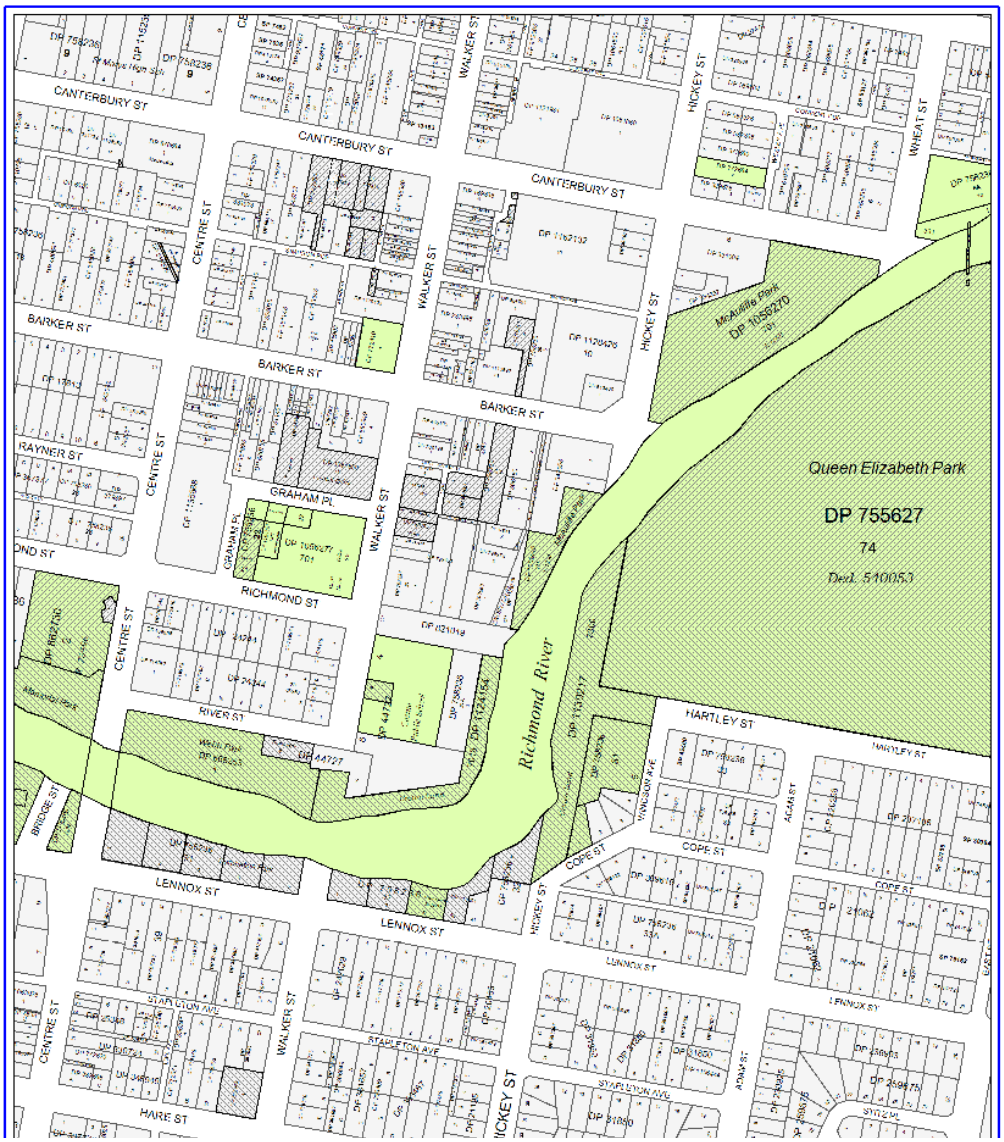


Figure 2. Land tenure at the Casino flying-fox camp.

2.2. Geology, Soils & Topography

The site occurs on the Richmond River floodplain. Quaternary (Pleistocene) alluvium is the parent material of earthy sand soils which line the banks of the river channel which cuts through the flat landscape. A high erosion hazard is associated with periodic flooding, sandy soils and generally steep to very steep riverbanks (Morand 1994). Vegetation retention and riverbank revegetation represents best practice to minimise soil erosion and sedimentation.

2.3. Vegetation

2.3.1. Vegetation Communities

Vegetation communities in the camp area consists of the following two distinct types (OEH 2015b), both of which are favoured by roosting flying-foxes:

1. Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast. This is a tall to very tall open forest type with canopy cover of 30 – 70%. Dominant canopy species are Forest Red Gum (*Eucalyptus tereticornis*) and Swamp Box (*Lophostemon suaveolens*), and the main associated species are Pink Bloodwood (*Corymbia intermedia*) and Grey Ironbark (*Eucalyptus siderophloia*). This community generally occurs on the middle to upper riverbank.
2. River Oak riparian woodland of the North Coast. This is a tall to very tall woodland and open forest type occurring along permanent freshwater streams. The dominant canopy species is River Oak (*Casuarina cunninghamiana*) and main associated species are Silky Oak (*Grevillea robusta*), Weeping Lilly Pilly (*Syzygium floribunda*), Rough-barked Apple (*Angophora floribunda*) and Broad-leaved Apple (*Angophora subvelutina*). The ground stratum is prone to high levels of disturbance by floodwaters and often supports a mixture of natives and exotics (OEH 2015b). This community occurs on the lower riverbank, particularly in the north-east of the camp area.

Figure 3. River Oak riparian woodland of the North Coast on the north-eastern riverbank.

Figure 4. Subtropical Coastal Floodplain Forest EEC dominated by Forest Red Gum (*Eucalyptus tereticornis*) on the northern riverbank.

2.3.1.1. Endangered Ecological Communities

The Forest Red Gum - Swamp Box vegetation community consists of a degraded and modified form of the Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion Endangered Ecological Community (EEC) listed under Schedule 1 of the TSC Act. The EEC occurs along the mid to upper riverbank of the camp area, particularly in the north-west portion of the camp area.

2.3.2. Weeds

A range of noxious and environmental weeds thrive in the disturbed riverbank camp area. Roosting flying-foxes promote weed proliferation in the camp through fruiting weed seed dispersal and canopy damage. Exotic environmental weed species include Cocus Palm (*Syagrus romanzoffiana*), Jacaranda (*Jacaranda mimosifolia*) and threatening vine weeds including Balloon Vine (*Cardiospermum grandiflorum*), Madeira Vine (*Anredera cordifolia*) and *Ipomoea* species.

Noxious weeds include Class 3[1] noxious weeds Chinese Celtis (*Celtis sinensis*) and Green Cestrum (*Cestrum parqui*); and Class 4[2] noxious weeds Camphor Laurel

1 Class 3 noxious weeds are plants that must be fully and continuously suppressed and destroyed as they pose a potentially serious threat to primary production or the environment, are not widely distributed in the area and are likely to spread in the area or to another area.

(*Cinnamomum camphora*), Broad-leaved Privet (*Ligustrum lucidum*) and Crofton Weed (*Ageratina adenophora*).

Figure 5. Rank exotic grasses and vines dominating understory vegetation on the southern bank.

Figure 6. Predominantly steep to very steep riverbanks and dense understory vegetation throughout the camp area.

2.4. Threatened Species

A search of the OEH Atlas of NSW Wildlife (BioNet) revealed records of six threatened flora species and eighteen threatened fauna species listed under the NSW TSC Act within a five kilometre radius of the site, refer to **Appendix 4**.

The Australian Government Protected Matters Search tool identified seven threatened flora species, fourteen threatened fauna species and twelve migratory species listed under the Commonwealth EPBC Act as species or species habitat that may occur, is likely to occur, or is known to occur within a five kilometre radius of the site, refer to **Appendix 5**. Eight of the threatened flora and fauna species are also noted in the above-mentioned OEH Atlas of NSW Wildlife (BioNet) search results.

A single Rough-shelled Bush Nut (*Macadamia tetraphylla*) listed as Vulnerable under both the TSC Act and EPBC Act occurs on site and is considered likely to have been planted and have low conservation significance (Geolink 2014). The small tree occurs on the edge of the vegetated gully accessed via Little Walker Street where no further

2 Class 4 noxious weeds are plants that must be managed to reduce its numbers, spread and incidence, and continuously inhibit its reproduction as they pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area and are likely to spread in the area or to another area.

works are proposed (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/09/15). As a consequence, the tree is not expected to be impacted. Therefore, no further impact assessment is provided in relation to the Rough-shelled Bush Nut (*Macadamia tetraphylla*)

The camp area is not identified as Primary or Secondary Koala habitat (RVC & AKF 2008), nor is it part of any Critical Habitat listed under S.53-55 of the TSC Act. No key fauna habitats or corridors (Regional or Subregional) are mapped in the camp area (Scotts 2003). However the Richmond River and associated riparian vegetation are likely to support a range of fauna species which occur commonly in the locality.

2.4.1. Grey-headed Flying-fox

The Grey-headed Flying-fox (GHFF) is listed as Vulnerable under both the NSW Threatened Species Conservation Act 1995 (TSC Act) and Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This is primarily due to a significant decline in their numbers as a result of loss of feeding habitats and suitable campsites combined with a low reproductive rate and the high rate of infant mortality (DECCW 2009). GHFFs roosts permanently at the Casino camp in response to available food resources within nightly foraging range, and suitable roosting habitat.

The Casino camp is listed as a nationally important flying-fox camp, i.e. it has been occupied by more than 2,500 GHFFs permanently or seasonally every year for the last 10 years (DoE 2014).

DECCW (2009) identifies roosting habitat critical to survival of the GHFF as meeting at least one of the following criteria:

- Is used as a camp either continuously or seasonally in > 50% of years;
- has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 10 000 individuals, unless such habitat has been used only as a temporary refuge, and the use has been of limited duration (i.e. in the order of days rather than weeks or months); and
- has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 2 500 individuals, including reproductive females during the final stages of pregnancy, during lactation, or during the period of conception (i.e. September to May).

DECCW (2009) identifies foraging habitat critical to survival of the GHFF as meeting at least one of the following criteria:

- Productive during winter and spring, when food bottlenecks have been identified (ParryJones and Augee 1991, Eby et al. 1999);

- known to support populations of > 30 000 individuals within an area of 50 km radius (the maximum foraging distance of an adult) Draft National Recovery Plan Grey-headed Flying-fox;
- productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May);
- productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions); and
- known to support a continuously occupied camp.

There are no separate or distinct populations of GHFFs. The entire Australian population is considered to be one with interchange and movement between camps throughout their range (Webb and Tidemann 1996).

Much of the GHFF population concentrates in northern NSW and Queensland in May and June where animals exploit winter-flowering trees such as Swamp Mahogany (*Eucalyptus robusta*), Forest Red Gum (*E. tereticornis*) and Paperbark (*Melaleuca quinquenervia*) (Eby et al. 1999).

2.5. History of the camp

Newspaper reports (Trove 2015) indicate that flying-foxes have camped in the Casino area from time to time since at least 1909 including:

- 1907 – A camp at North Casino;
- 1909 – A camp one mile from Casino;
- 1932 – A flying-fox camp near Casino;
- 1947 - An 'invasion' & reports that it had been several years since the 'pest' had been seen in Casino;

In more recent years, anecdotal evidence indicates that flying-foxes have been roosting in the Casino township area since at least the 1980s. A camp existed along the Richmond River to the west of the current camp location for over twenty years. In 2004, the first known official census of flying-foxes in Casino estimated a total of 9,400 animals (ie 4,600 GHFF and 4,800 blacks) west of the Irving Bridge (Adam McKeown, Research officer, The National Flying-fox Monitoring Program, CSIRO, pers. comm. 05/03/15).

The size and location of the camp is believed to have shifted in an easterly direction since 2004 possibly in response to numbers of flying-foxes, environmental conditions and tree removal by landholders. Geolink (2014) note that in January and February 2014 the camp swelled to the western side of the Irving Bridge when little red flying-

foxes occupied the camp. Since at least 2009 the camp has been predominantly located east of the Irving bridge, refer to **Figure 1**.

Figure 7 shows quarterly count estimates of the three flying-fox species at Casino since November 2012 when the National Flying-fox Monitoring Programme commenced (Australian Department of the Environment 2015). Seasonal fluctuations in numbers of flying-foxes in the camp are likely due to changing environmental conditions locally and elsewhere throughout the range of the three highly mobile flying-fox species, particularly food availability.

In the past 12 months, recorded numbers of black flying-foxes have been regularly lower than previous years. The annual arrival of little red flying-foxes was first highlighted by the local media when large numbers arrived at the current camp location joining greys and blacks in 2009 (Sam Elley, Editor, Richmond River Express Examiner pers. comm. 05/03/15). Since that time, little reds have joined greys and blacks annually for generally eight to ten weeks from around mid-summer to early autumn in the existing camp location. **Figure 7** shows little reds only once at the Casino camp in February 2014 due to the relatively recent commencement of the census, quarterly timing of census counts, and the relatively brief period that little reds occupy the camp.

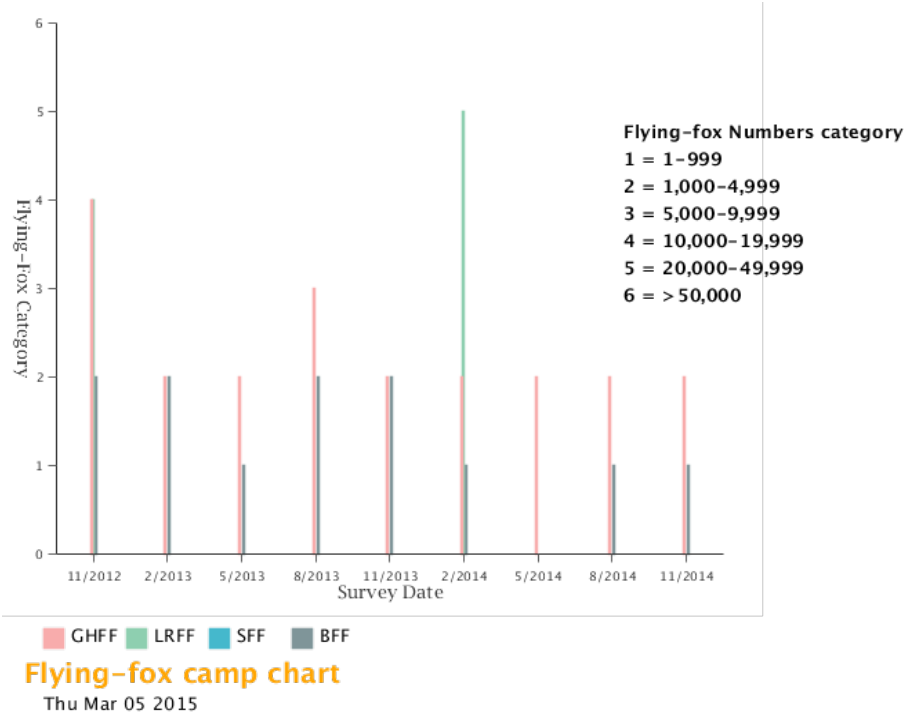


Figure 7. Casino Flying-fox Camp Census Data (Australian Department of the Environment 2015).

3. Background Legislation

Management of flying-fox camps is governed by a range of government authorities and regulated by Commonwealth and State legislation and Local Government plans and policies as follows:

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Approval from the Commonwealth Minister for the Environment is required under the EPBC Act if an activity will, or is likely to, have a significant impact on declared Matters of National Environmental Significance (MNES).

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act and is therefore part of MNES considerations to assist in determining whether a proposal should be referred to the Australian Government.

Proposals to clear GHFF habitat vegetation, or disturb or disperse the GHFF at nationally important flying-fox camps would require assessment of the proposal details for its potential to significantly impact the GHFF, and any need for referral to the Commonwealth under the EPBC Act prior to the activity taking place.

In accordance with the current Draft EPBC Act policy statement (DoE 2014), 'Actions in or near camps of Grey-headed or Spectacled Flying-fox that are unlikely to require approval under the EBPC Act as they are unlikely to have a significant impact include:

- Minor, routine camp management at any camp;
- Clearing vegetation, dispersal of animals, in situ flying-fox management or other impacts on flying-fox camps, that are not nationally important flying-fox camps, that is carried out in accordance with state or territory regulatory requirements;
- Clearing, dispersal or other impacts on nationally important flying-fox camps that are carried out in accordance with best practice mitigation standards'.

Best practice mitigation standards listed by DoE (2014) are as follows:

i. The action must not occur if the camp contains females that are heavily pregnant and until the young can fly independently.

ii. The action must not occur during or immediately after climatic extremes (heat stress event ; cyclone event), or during a period of significant food stress.

iii. Disturbance must be carried out using non-lethal means, such as acoustic, visual and/or physical disturbance or use of smoke.

iv. Disturbance activities must be limited to a maximum of 2.5 hours in any 12 hour period, preferably at or before sunrise or at sunset.

v. Trees are not felled when flying-foxes are in or near to a tree and likely to be harmed.

vi. The action must be supervised by a person with knowledge and experience relevant to the management of flying-foxes and their habitat, who can identify dependent young and is aware of climatic extremes and food stress events. This person must make an assessment of the relevant conditions and advise the supervisor/proponent whether the activity can go ahead consistent with these standards.

No EPBC approval would be required because the actions will have minimal impact of GHFF and are not determined to be significant.

NSW National Parks and Wildlife Act 1974 (NPW Act)

Like other native wildlife in NSW, flying-foxes are protected under the NPW Act. It is an offence under the NPW Act to harm protected fauna or harm threatened fauna or their habitat without appropriate licences or approvals. The NSW Office of Environment and Heritage (OEH) are responsible under the NPW Act for protecting and caring for flying-foxes on public land.

Similarly, it is an offence under the NPW Act to harm or desecrate Aboriginal objects or places. Planned vegetation works are considered unlikely to impact on any Aboriginal objects or places, refer to Section 8.1 and Appendix 6.

A Scientific Licence under s132(C) of the Act is likely to be required to carry out planting and rehabilitation works at the preferred alternative site in threatened Grey-headed Flying-fox habitat.

NSW Threatened Species Conservation Act 1995 (TSC Act)

The TSC Act lists and deals extensively with threatened species, populations and ecological communities; and threatening processes, licensing and recovery planning. It also aims to reduce threats to NSW biodiversity by listing and abatement of Key Threatening Processes.

The GHFF is listed as vulnerable under the TSC Act. Councils and others have obligations to consider threatened species, populations, ecological communities and their habitats in fulfilling their statutory responsibilities in the development approvals process under the TSC Act and EP&A Act.

An assessment of significance for the Grey-Headed Flying-fox and Subtropical Coastal Floodplain Forest EEC is included as **Appendix 3**, in accordance with S.94 of the TSC Act *Significant effect on threatened species, populations or ecological communities, or their habitats*. The assessment forms part of a S.91 licence application to OEH for activities that may *harm threatened species, populations or ecological communities or damage habitat.* Inclusion of a S.91 licence application is precautionary and recommended by OEH (2015a).

Where there is likely to be a significant effect, preparation of a Species Impact Statement (SIS) and approval from the NSW Minister for the Environment is required.

Native Vegetation Act 2003

The granting of a licence by OEH under Division 1 Part 6 of the Threatened Species Conservation Act 1995 provides for an exclusion under Division 4 Clause 25 (e) of the Native Vegetation Act 2003 for clearing of vegetation. Therefore, the Native Vegetation Act 2003 does not apply.

NSW Environmental Planning and Assessment Act 1979 (EP&A Act)

Planned vegetation works are an activity the purposes of Part 5 of the EP&A Act and are therefore subject to an environmental impact assessment by Richmond Valley Council, the approval authority. Section 111 of the EP&A Act requires that Council *examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity*.

An assessment of significance for the Grey-Headed Flying-fox and Subtropical Coastal Floodplain Forest EEC is included in **Appendix 3**, in accordance with S.5A of the EP&A Act *Significant effect on threatened species, populations or ecological communities, or their habitats*. The assessment forms part of a S.91 licence application to OEH for activities that may *harm threatened species, populations or ecological communities or damage habitat*.

Richmond Valley Local Environment Plan 2012 & State Environmental Planning Policy (Infrastructure) 2007

The flying-fox camp is located within the Richmond Valley Council Local Government Area on land affected by the Richmond Valley Local Environmental Plan (LEP) 2012 which is in force under the EP&A Act. Land use zonings and relevant permissions for works to proceed under the LEP are as follows:

- McAuliffe Park, Webb Park, Coronation Park and Queen Elizabeth Park are zoned RE1, Public Recreation, environmental protection works permitted with consent;
- Residential houses adjoining the camp and the Crowe Howath accountancy is zoned R1, General Residential, environmental protection works permitted without consent;
- The Richmond River is zoned W1 Natural Waterways, environmental protection works permitted with consent; and

- The adjoining Richmond River banks are zoned E2, Environmental Conservation, environmental protection works permitted with consent;

Not withstanding consent requirements of the LEP, SEPP (Infrastructure) 2007 Division 12 Clause 65 (3) states that no consent is required if work is carried out by Council on a public reserve controlled by Council.

A Review of Environmental Factors (REF) has been prepared and Council has considered the environmental impacts of the proposed works under Part 5 of the EP&A Act (Geolink 2014 & Arbor Ecological 2014). Consent has been granted for vegetation works to proceed in zones RE1, W1 and E2 (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/03/15). There are no legislative consent requirements for works to proceed in areas zoned R1.

Fisheries Management Act 1994 (FM Act)

One of the objectives of the FM Act is to conserve fish stocks and key fish habitats, and the Richmond River at Casino represents key fish habitat as mapped by NSW Fisheries.

Planned vegetation clearing on the Richmond River banks have potential to significantly impact key fish habitat, threatened species, population, ecological community or the habitats of fish and marine vegetation listed under the NSW Fisheries Management Act 1994 (FM Act) and contribute to listed Key Threatening Processes (KTP).

NSW Water Management Act 2000 (WM Act)

Vegetation removal on waterfront land constitutes a controlled activity under the WM Act. Although the banks of the Richmond River represent waterfront land under the Act, as a public authority, Council does not need to obtain a controlled activity approval for any controlled activities that it carries out on waterfront land provided that they have been assessed under Part 5 of the EP&A Act.

4. Community Considerations

4.1. Consultation

A range of views exist in the community over flying-foxes and appropriate management responses to the Casino flying-fox camp. Consultation as part of this management plan aims to inform and guide management actions. To this end a number of steps were taken to consult and invite input from stakeholders including:

- Council continues to request advice and assistance from the NSW Office of Environment and Heritage (OEH) over management options for the problematic camp. In February 2014 OEH staff gave a presentation on flying-fox camp management to Councillors and Council staff.
- Council continues to respond to a range of community concerns and complaints regarding the camp.
- Council continues to liaise with landholders adjoining the camp. A Flying-fox Impacts & Mitigation Questionnaire, refer to **Appendix 1**, was used to gather information specific to these properties. The questionnaire aimed to gauge the nature and extent of flying-fox impacts and practical ways to mitigate impacts.
- Written correspondence was drafted and sent to stakeholder organisations and interest groups listed below. This aimed to notify stakeholders of the draft plan, where it may be viewed, and invite comment to the draft plan.
- A Facebook page relating to flying-fox management at the Casino camp was established and linked to Council's webpage.

4.2. Stakeholders

Table 1. Stakeholders and their camp management significance.

Stakeholder	Stakeholder Significance
Residents adjoining the camp	Most affected by the camp
Residents in close proximity to the camp	Directly or indirectly affected by the camp
Parks and river recreational users	Site users affected by the camp
Crowe Horwath Accountancy	Adjoining the camp & directly affected
Casino Public School children and staff	Adjoining the camp & directly affected
Richmond Valley Council	Statutory responsibilities for site management & community health & welfare. Principal site manager
NSW Trade & Investment, Crown Lands	Statutory responsibilities for management of Crown lands
NSW Office of Environment & Heritage (OEH)	Statutory responsibilities for environmental protection including NSW listed threatened species
NSW Health	Statutory responsibilities for public health
NSW Fisheries & Aquaculture (DPI)	Statutory responsibilities for protection of NSW fisheries
Commonwealth Department of the	Statutory responsibilities for protection

Environment	of Commonwealth listed threatened species
Casino Boolangle Local Aboriginal Land Council	Represents traditional landowners and former role in riverbank rehabilitation of the Richmond River at Casino.
The Northern Rivers Wildlife Information, Rescue and Education Service (WIRES)	Rescue, rehabilitation and preservation of Australian wildlife
Northern Rivers Wildlife Carers	Rescue & rehabilitation of Australian wildlife for release back into the wild

4.3. Flying-fox Impacts

The camp is located adjacent to private residences, a business, Casino Public School and public recreational park areas. Community complaints and concerns continue to be reported directly to Council and in responses to the Flying-fox Impacts & Mitigation Questionnaire from residents living in close proximity to the flying-fox camp as follows:

- High noise levels and associated sleep deprivation, particularly when little reds are present and from 4.30am;
- unpleasant odours and unable to open house windows, particularly following rain, when little reds are present, and following heat-related mass bat mortality events;
- physical and psychological health and wellbeing, and disease risk;
- faecal mess staining surfaces and increased cleaning requirements for surfaces such as motorcars, outdoor furniture, paths and clothes washing;
- reduced outdoor amenity;
- damage to Richmond River riparian vegetation from roosting bats, particularly when little reds are present;
- rainwater tank and other water quality impacts; and
- reduced property values.

Impacts, complaints and conflict escalates annually for up to ten weeks from around mid-summer to early autumn in response to little red flying-foxes roosting en-masse with GHFFs and blacks (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/03/15). Casino camp numbers swelled from around 3,000 or 4,000 animals to 100,000 or more animals in February 2015 (Adam McKeown, Research officer, The National Flying-fox Monitoring Program, CSIRO, pers. comm. 05/03/15).

Conflict and hostility are evident with some residents using noise and hoses to disturb flying-foxes and move them away from homes during the day. Council has no record of exact numbers and types of community complaints and concerns since they have not been registered.

Significant health risks are associated with people handling sick, injured and dead animals. This risk escalates following summer heat related mass mortality of bats. Human fatalities in Australia from Hendra Virus and Australian Bat Lyssavirus (ABL) have heightened community concerns over disease transmission.

Figure 8. Two large Small-fruited Fig (Ficus microcarpa) leaning over the heritage listed Crowe Horwath Accountancy building.

Figure 9. Medium to large Forest Red Gum used by roosting bats near residences in the north west of the site.

4.3.1. Responses to Flying-fox Impacts & Mitigation Questionnaire

Fifteen residents and property owners directly adjoining the campsite provided responses to the Flying-fox Impacts & Mitigation Questionnaire (**Appendix 1**). Variation was evident in degrees of impact, attitudes to roosting flying-foxes, and suggested management responses. General responses indicated the following:

- Residents adjoining the camp along the north east riverbank have the closest and most constant contact with roosting flying-foxes and the highest reported impacts. Continued exotic tree removal is requested and removal of one medium-sized Forest Red Gum (*Eucalyptus tereticornis*) to continue works noted by Geolink (2014) in work areas 2 to 5 to create a separation buffer. Some

residents report that property modifications have potential to reduce impacts, refer to **Section 6.4**.

- Residents adjoining McAuliffe Park were most impacted in January and February 2015 when little red flying-foxes roosted for the first time within McAuliffe Park near property boundaries. Further consultation with residents is required to identify specific trees that may need to be removed or pruned to create a separation buffer near property boundaries, although it is unclear whether or not little red flying-foxes will return to roost within the park close to properties. Mixtures of native and exotic trees near property boundaries are not naturally occurring having all been planted within the park.
- Residents adjoining the camp on the southern bank are most impacted when the little red flying-foxes occupy this part of the camp near property boundaries. Exotic Jacaranda trees have been requested to be removed and minor branch pruning in addition to works noted by Geolink (2014) in work areas 11 to 15 to create a separation buffer.
- The Crowe Horwath Accountancy principal is severely affected by bats roosting consistently in two large Small-fruited Fig (Ficus microcarpa) leaning over the heritage listed building, along with other native and exotic vegetation close by (work area 1 Geolink, 2014). Proprietors are concerned about customers entering and leaving the building below roosting bats. Tree pruning and/or removal was requested to create a separation buffer and reduce impacts and conflict. Works would be costly and a funding application may be prudent. Note that the two large fig trees are heritage listed and any works on them would require consent from the property owner, Richmond Valley Council and the Heritage Council of NSW.
- The principal of Casino Public School and adjoining Djanenjam Preschool reported that 2014 tree pruning works by Council along property boundaries adjoining the camp have been successful to buffer the school and preschool from roosting flying-foxes. No further vegetation works were requested at present (work areas 6 & 7 Geolink, 2014) and the school effectively implements a flying-fox education program and risk management plan to minimise health risks associated with hygiene and potential contact with bats by children and staff.

4.4. Health Risks

NSW Health (2012) provided advice on flying-fox health related matters as follows:

- ABL can only be spread to other animals and people through the bite or scratch of a flying-fox and it is not spread through flying fox urine or droppings.
- There is no evidence that people can catch Hendra virus directly from flying-foxes. It is believed that horses catch the Hendra virus when they eat food which has recently been contaminated with an infected flying fox's urine, saliva or birth products. Hendra Virus can be transmitted from infected horses to humans

following close contact with body fluids, like blood and saliva, from infected horses.

- Human infections with these viruses are very rare. In Australia, there have been three confirmed cases of Australian Bat Lyssavirus in humans. All were in Queensland. There have been seven confirmed cases of Hendra virus in humans, also all in Queensland.
- If bitten or scratched by a flying-fox the wound should immediately be washed gently but thoroughly with soap and water, an antiseptic applied, and a doctor consulted as soon as possible to assess the need for further treatment.
- Members of the community should not handle flying foxes unless they have been trained, vaccinated against rabies and use the proper protective equipment.
- Direct handling of flying fox droppings should be avoided. The health risks associated with flying fox droppings relate mainly to the small potential risk to humans of gastrointestinal diseases. Flying foxes may carry a range of bacteria in their guts and, similar to domestic pets and birds, their droppings may contaminate the environment and potentially cause illness in humans if swallowed.
- Droppings from many animals including flying foxes may end up on roofs. These contaminants can then be washed into rainwater tanks when it rains. Where there is potential contamination of rainwater tanks, the water should not be used for drinking.
- The main odour associated with flying foxes is the scent male flying foxes use to mark their territory. While this smell may be offensive to some people, it does not represent a risk to human health.
- Schools in close proximity to flying fox colonies should encourage students to stay away from the flying foxes, their droppings and urine. Children should always wash their hands with soap and water after playing outside as a matter of good hygiene.
- Pets should be kept away from flying foxes if possible. If a pet becomes sick after contact with a flying fox, seek advice from a veterinarian.

4.5. Management response to date:

Richmond Valley Council is a rural Council with limited funds and staff resources. Management responses to date have been reactive. Since establishment of the flying-fox camp in its current location Council has made the following management responses:

- Council continues to respond to community concerns and complaints and provide advice on personal health and welfare in relation to flying-foxes.
- Continued liaison with OEH over the problematic camp including a 2014 OEH presentation to Councillors and senior staff, and joint site inspection with OEH staff.

- Council commissioned preparation of a Review of Environmental Factors (REF) in 2014 for vegetation works to reduce impacts near private residences, a business and Casino Public School.
- In 2014 Council commenced tree removal and pruning works on trees in close proximity to residences to create a separation buffer between residences and roosting flying-foxes. This proved to be very effective to reduce impacts, although costly due to the need for precautionary measures when working near buildings and working within the flying-fox breeding and rearing season. As a consequence, works are only partly completed due to limited funding availability (Stuart Hall, Co-ordinator Open Space, Cemeteries & Waste, RVC, pers. comm. 17/02/15).
- Following seasonal heat-related events resulting in mass mortality of bats, Council has a program of cleaning up dead flying-foxes and disposing of dead flying-foxes under strict Hygiene and Work Health and Safety regimes. This has been effective to improve public health and amenity although many dead bats are difficult to access on steep riverbanks (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/03/15).
- When bats are roosting in McAuliffe and Webb Parks Council supervises the regular clean-up of fallen, damaged and hanging branches along pathways to reduce hazards and improve public amenity (Stuart Hall, Co-ordinator Open Space, Cemeteries & Waste, RVC, pers. comm. 17/02/15). The damage is caused by the mass weight of numerous roosting bats, particularly little red flying-foxes.
- Continued Council environmental health inspections of public areas where flying-foxes roost in close proximity to residences to identify health and safety hazards (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/03/15).
- Preparation of media releases highlighting flying-fox camp matters of interest, e.g. heat-related mass bat mortality events and seasonal arrival of little red flying-foxes in Casino.
- Council commissioned preparation of this management plan in 2015 to address flying-fox management over a five year period and beyond.
- Council has sought information on specific impacts and mitigation measures from those adjoining the camp via a Flying-fox Impacts & Mitigation Questionnaire.

Council's responses to community concerns and complaints, liaison with those most impacted by roosting bats, and media releases have had limited success in reducing conflict (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/03/15).

Wildlife carers continue to rescue sick and injured flying-foxes in the camp for rehabilitation and release, particularly during heat waves.

Figures 10 & 11. Tree pruning along the Casino Public School boundary has reduced the risk of contact between roosting bats and children and staff to acceptible levels. The school effectively implements a flying-fox education program and risk management plan to address health risks associated with hygiene and potential contact with flying-foxes by children and staff.

5. Ecological considerations

5.1. Ecological role

Bats are unique in being the only mammals capable of sustained flight. Around 20% of living mammal species are bats with over 80 species occurring in Australia. Bats belong to the order Chiroptera meaning hand-wing. They fall into two distinct suborders, ie Microchiroptera (microbats) being small and largely insectivorous, and Megachiroptera (megabats) which are larger, fruit and nectar eating, and include flying-foxes, fruit-bats and blossom bats (Strahan 1995).

Flying-foxes are essential for the maintenance of healthy forests. They play an important role in dispersal of pollen and seeds from plants they visit during nightly foraging trips. In doing so, they make a significant contribution to the reproductive and evolutionary processes of forest and woodland communities. Their ability to move freely among habitat types allows them to transport genetic material across fragmented, degraded and urban landscapes. The ecological services they provide benefits many plants, other fauna and vegetation communities, including many threatened species. Flying-foxes are also regarded as essential to the hardwood timber industry with up to 75% of the pollination of timber species being carried out by flying-foxes (Sunshine Coast Council 2013).

5.2. Diet and camp characteristics

Flying-fox camps exist up and down the east coast of Australia within nightly flying distance of food resources. Some camps, such as the Casino camp, are occupied permanently in response to year-round availability of pollen, nectar and fruit. Most nectar sources come from the Myrtaceae family, in particular the *Eucalyptus, Corymbia, Angophora and Melaleuca* genera. Blossoms of Proteaceae, Fabaceae, Xanthorrhoeaceae, Elaeocarpaceae and Arecaceae plant families are also favoured. Forested land around Casino, including state forests and national parks, support flying-foxes particularly from the south east to west of Casino, refer to **Figures 12 and 13**. Fruit from backyard fruit trees, street plantings and weed trees and palms in and around Casino supplement their diet.

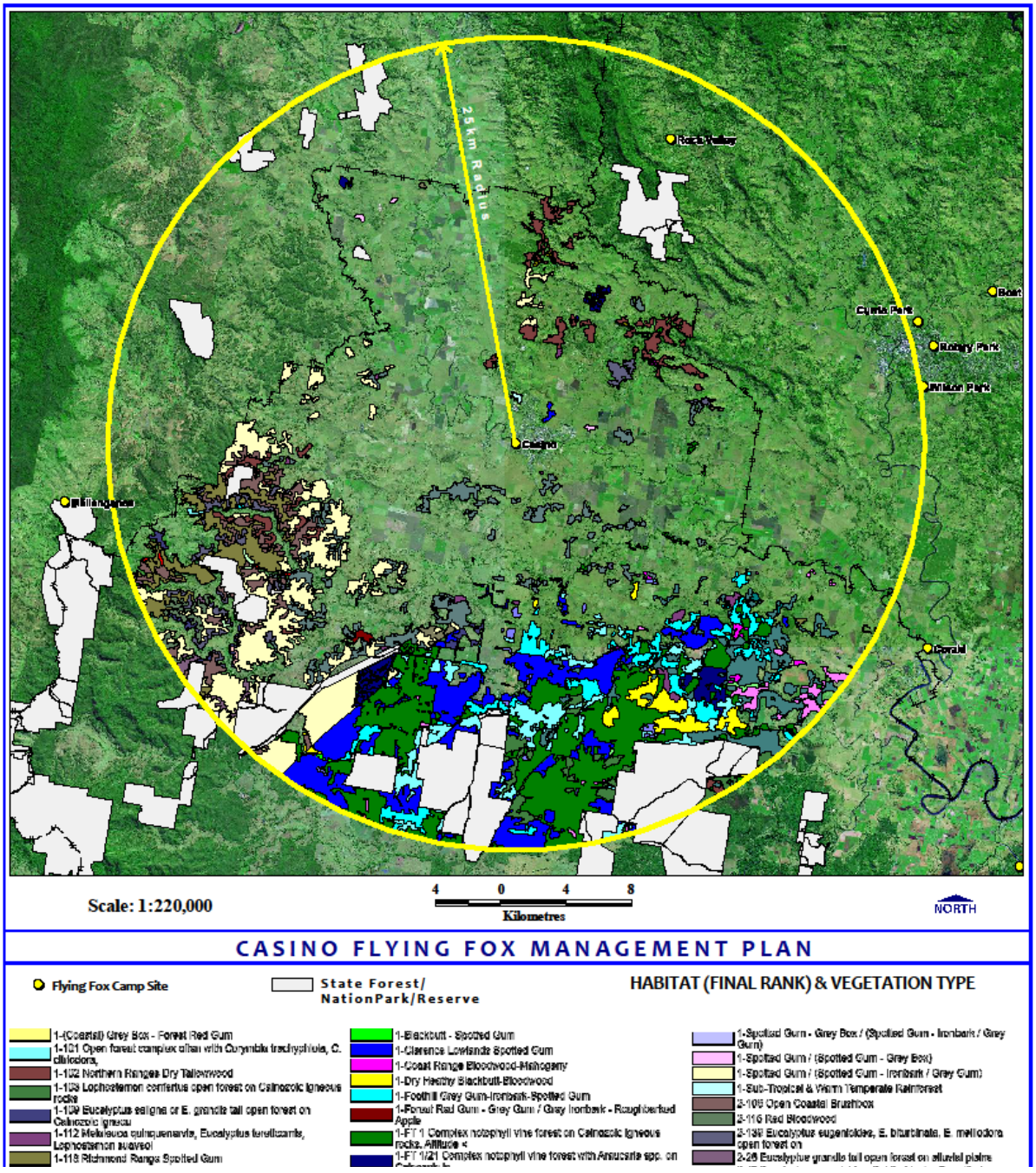


Figure 12. GHFF foraging vegetation type and habitat rank around Casino.

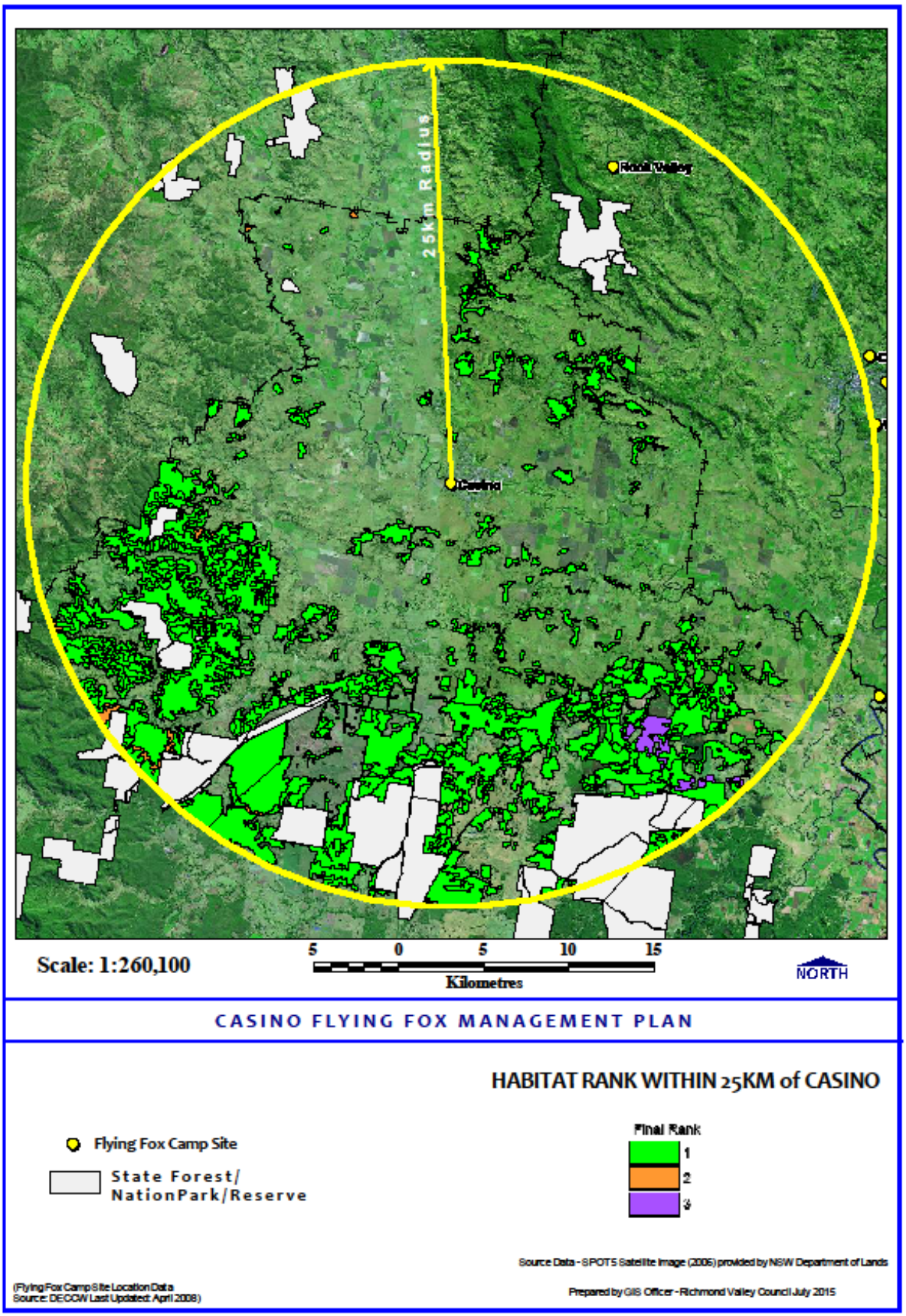


Figure 13. GHFF foraging habitat rank around Casino.

Flying-foxes prefer tall trees with dense understorey and cool, humid and sheltered sites with some protection from hot summer northern winds and cool winter south-westerly winds. These conditions prevail along the Richmond River at Casino.

Camps are located in a range of vegetation communities including rainforests, moist eucalypt forests, mangrove, casuarina, paperbark and riparian vegetation. They commonly occur adjacent to waterbodies such as rivers, creeks and wetlands. These areas offer sheltered environments for animals to rest, breed, socialise and raise their young.

Camps are highly socially structured. The majority of roost trees are occupied by mixed groups of adults which comprises of a single male, who scent-marks and defends a territory shared by one or more females and their dependent young. The roosting positions of individual animals are highly consistent and animals return to the same branch of a tree over many weeks or months. Some GHFFs are known to occupy a single area within a camp for several years, while others may return to the same branch of a tree after having migrated over large distances. Flying-foxes have well-developed spatial memories which assists them to remember the locations of camps and associated feeding sites. They often have a strong connection to campsites and can be extremely resistant to relocation efforts (Sunshine Coast Council 2013).

Flying-foxes often have a highly visible impact on vegetation at camps. Impacts are noticeable at the Casino camp and include defoliation, ringbarked and broken branches under their mass weight, and death of some trees, particularly when large numbers of little reds are present. From a landscape perspective, such damage can be justified since it is localised to camps which are relatively small in area, and damage is offset by the important ecological services that flying-foxes provide in pollination and seed dispersal over broad forest areas.

Numerous flying-fox camps occur within 50 kilometres of the Casino camp, refer to **Figure 14** and in other regional areas, refer to **Figure 15**. The vast majority of camps occur to the east including camps near coastal lowlands which provide important GHFF winter food resources such as Swamp Mahogany (*Eucalyptus robusta*), Forest Red Gum (*Eucalyptus tereticornis*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) (Eby *et al*. 1999). Exchange of flying-foxes between camps in the local area can be expected in response to available food resources (Eby 1999) but is not predictable.

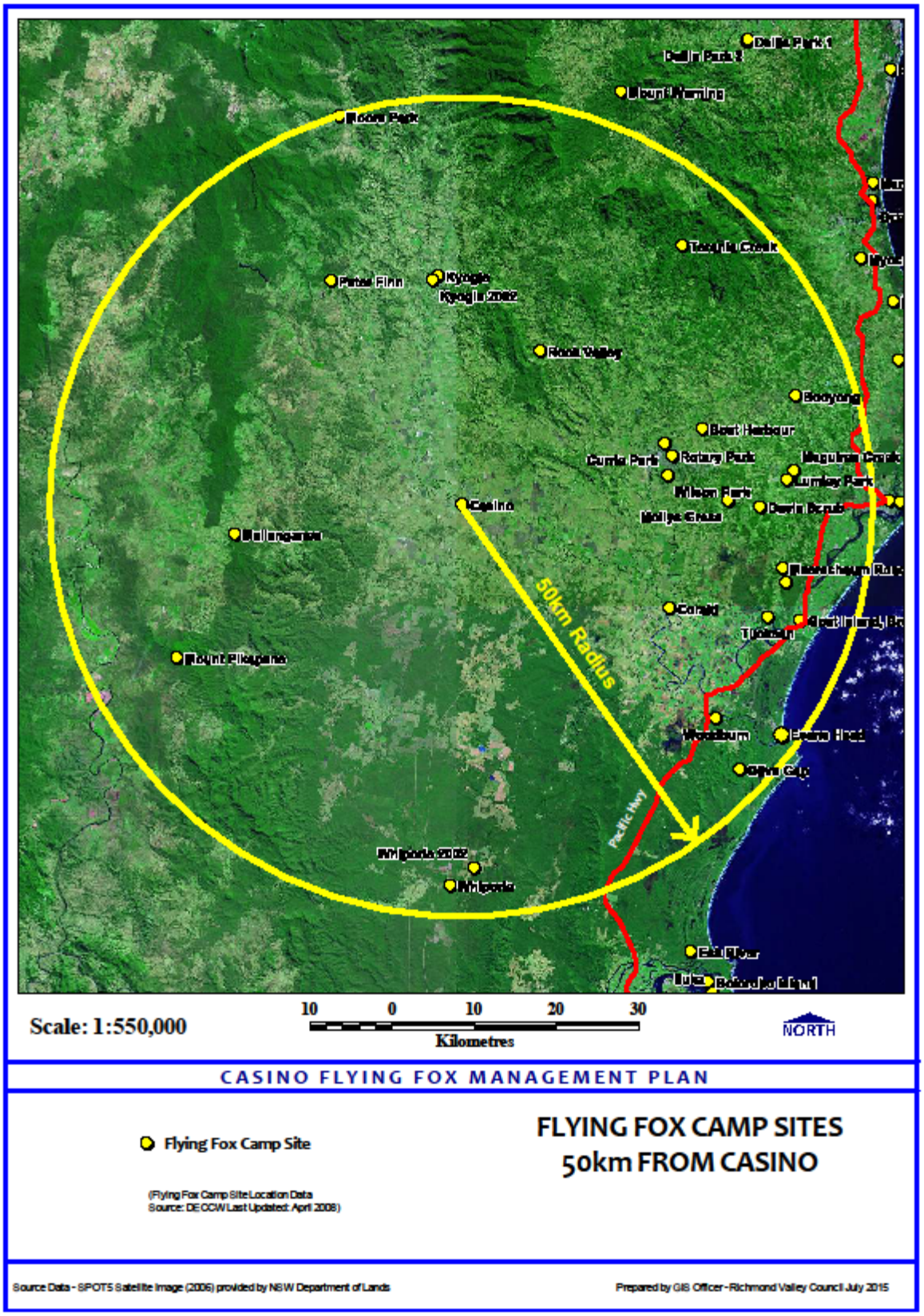


Figure 14. Flying-fox camps located within 50 km of the Casino camp.

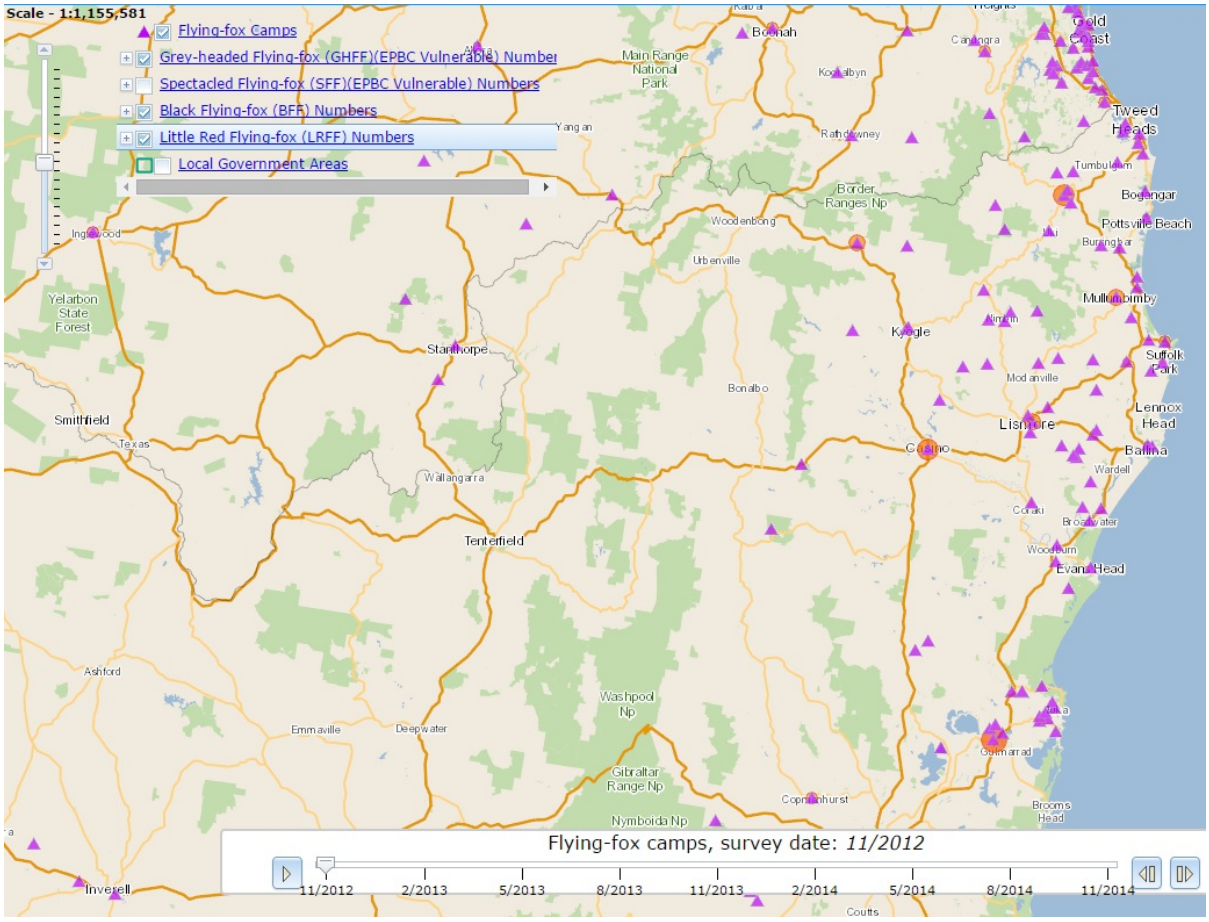


Figure 15. Flying-fox camps in NE NSW & SE Qld (Australian Department of the Environment 2015).

5.3. Flying-fox species

Three species of flying-fox occur in northern NSW and all three species occur at the Casino camp, i.e. the Black Flying-fox (*Pteropus alecto*), Grey-headed Flying-fox (*Pteropus poliocephalus*), and Little Red Flying-fox (*Pteropus scapulatus*).

The Grey-headed Flying-fox

- Large flying-fox similar in size to the Black Flying-fox;
- predominantly grey furred with a distinctive orange/brown collar and fur extends to the ankle;
- can travel as far as 50km from camp in a single night in search of food;
- primarily feed on the blossom of *Eucalyptus* spp. but also blossoms and fruits of native and exotic species in rural and urban landscapes, and commercial fruit orchards;
- generally roosts in large trees in the middle and upper canopies;
- Australia's only endemic flying-fox species;

- their range extends in the coastal belt from Rockhampton in central Queensland to Adelaide in South Australia.
- roost permanently at the Casino camp and represents the majority species apart from when little reds occupy the camp.
- numbers of individuals fluctuate largely in response to available food resources with exchange likely to and from local and regional camps, refer to **Figure .**

The Black Flying-fox

- Largest of the Australian flying-foxes;
- short black fur;
- variable markings in some animals such as brown eye rings and silver or brown-yellow hind neck and shoulder fur, no fur on the lower legs;
- roost high in the canopy;
- commonly feed within 20km of the camp;
- occur around the northern coast of Australia (Western Australia, Northern Territory, Queensland and northern NSW) and inland wherever permanent water is found in rivers;
- in recent years they have extended their range down the east coast to around Sydney; and
- roost permanently at the Casino camp in relatively small numbers in recent years.

The Little Red Flying-fox

- Smaller than greys and blacks and has prominent ears;
- Reddish brown fur with greyish fur over the head and little to no fur on the legs;
- Roost in tight clusters generally in the lower canopy;
- Almost exclusively nectar-eating
- Highly nomadic following the flowering of Eucalypts inland and to the coast throughout their range;
- Widespread across northern and eastern Australia ranging from Shark Bay in WA through northern Australia, and down the east coast to northern Victoria, and far inland;
- Often the cause for complaints when they arrive at Grey-headed and Black Flying-fox camps as they travel in extremely large groups; and
- little reds have roosted in large numbers on annual basis for up to eight weeks from around mid-summer to early autumn in response to large scale flowering of Myrtaceae, eg Eucalyptus species, and Proteaceae, eg Banksia species in surrounding forests, particularly in the 10km to 25km range (and beyond) from west to south-east of casino, refer to **Figures &** .

Figure 16. Grey-headed Flying-fox.

Figure 17. Black Flying-fox.

Figure 18. Little Red Flying-fox.

Figures 16 to 18, courtesy of Northern Rivers Wildlife Carers.

5.4. Reproduction

Flying-foxes generally live for up to fifteen years in the wild. Females reach maturity at two to three years of age, and produce only one offspring per year. Grey-headed and black flying-fox mating normally occurs between March and May. Females give birth between September and November following a six month gestation period. Young are raised for three to four months after which they become independent (Eby 2000, Roberts *et al*. 2006). The nomadic little red breeding and rearing cycle is offset by about six months.

The Casino camp is recognised as a maternity camp for grey-headed and black flying foxes where heavily pregnant females, dependant young and newly weaned young learning to fly can be viewed at different stages of the breeding and rearing season generally between August and April (Michael Hallinan, Ecologist, Arbor Ecological, pers. obs. 2013-2015).

5.5. Heat-related mass bat mortality events

Heat-related mass bat mortality events in flying-fox colonies appear to be increasing in intensity and frequency in the past two decades (Australian Museum 2014). Heat Stress Events (HSE) occur when temperatures within the colony reach 40ºC and above. Factors that determine the type and extent of heat stress impacts on animals are identified as follows (Stanvic, McDonald & Collins 2013):

- Temperatures and humidity levels;
- Animals access to adequate understory vegetation;
- Birthing season: early - normal – late;
- Time of the event: late December - early January-late January;
- Number of animals occupying the colony;
- Number of lactating females;

- Number and age of juveniles;
- Condition of flying-foxes prior to the HSE;
- Adequacy of food source prior to the HSE;
- Frequency of 40ºC plus temperatures;
- Any influx in numbers just prior to the HSE;
- What species are present (Blacks, Greys, Little Reds); and
- What resources are available to assist the animals.

NSW Rural Fire Service has in the past sprayed high-pressure water on roosting bats to help relieve heat stress. Wildlife carer volunteers continue to care for large numbers of flying-fox casualties suffering from heat stress during heat waves. Council crews are responsible for cleaning up and disposing of dead animals.

6. Camp Management Options

A range of practical camp management options have been considered based on community impacts, site conditions, the NSW Flying-fox Camp Management Policy (OEH 2015a) and the Commonwealth draft camp management guidelines for the Grey-headed and Spectacled flying-fox (DoE 2014). Brief background information is provided on management options under consideration as follows:

6.1. Remove roosting habitat in high impact areas to create a separation buffer

Separation buffers clear of roost trees between residents and flying-foxes are recognised as best practice to minimise potential conflict and impacts. A buffer distance of 300 metres is recommended in new residential areas (DECCW 2009). This type of buffer is normally not able to be retrofitted in existing residential areas and a buffer distance as wide as is practicable is best practice.

A continuation of the works commenced in November 2014 and outlined by Geolink (2014) will create a separation buffer of as wide as is practicable between occupants and roosting flying-foxes. Works will continue to focus on removal and pruning of roost trees to generate unsuitable and unfavourable conditions for roosting flying-foxes. A trial will be conducted of understory weed control to generate unsuitable and unfavourable conditions under small to medium sized trees to be retained. Understory weed control is considered unlikely to be effective under medium to large sized trees.

Works will be prioritised based on:

- The distance between properties and roost trees; i.e. trees and branches near to structures will continue to be given priority;

- reported levels of impact in responses to the Flying-fox Camp Questionnaire (**Appendix 1**);
- neighbourhood amenity values, i.e. requests to retain or remove roost trees;
- conservation values, i.e. exotic species will be removed first, e.g. Camphor Laurel, Jacaranda, Chinese Celtis and Cocos Palm; and
- cost of works and availability of funding.

From responses to the Flying-fox Camp Questionnaire, only one indigenous tree, a Forest Red Gum (*Eucalyptus tereticornis*), has been requested to be removed to increase the buffer area. Values placed on native trees by residents, including shade, privacy, bird habitat, erosion control and bushland amenity, are such that residents would rather retain the trees than have them removed to increase the distance between them and roosting bats. This situation may change over the five year life of this plan, particularly if residents' values change in response to continued and/or increased impact levels.

Future resident requests for tree removal in buffer areas on Crown Land or Council owned land will be actioned following a site assessment and subject to factors such as funding availability, impacts on neighbours, timing of works, safeguards required and the obtaining of any necessary approvals. Council encourages tree removal in buffer areas to increase separation and reduce conflict. However no tree removal near residences on Crown or Council owned land is currently planned without resident consultation.

Flying-foxes regularly roost in two large Small-fruited Fig (*Ficus microcarpa*) on private land adjoining Crowe Horwath Accountancy. The business operator reported in the Flying-fox Camp Questionnaire that selective branch removal and reduction pruning of the two trees is desirable. Works are however constrained by the heritage listing of the building and trees, and the high cost of works considering the large size of trees and their proximity to the heritage-listed building. Preparation and submission of an application for approval and works funding by Council, the landholder and business operator is recommended to the Heritage Council of NSW to enable works to be prioritised.

The principal of Casino Public School and adjoining Djanenjam Preschool reported in the Flying-fox Camp Questionnaire (**Appendix 1**) that 2014 tree pruning works by Council along property boundaries adjoining the camp have been successful to buffer the school and preschool from roosting flying-foxes. No further vegetation works were requested at present and the school effectively implements a risk management plan to minimise health risks associated with hygiene and potential contact with bats by children and staff.

Tree removal and reduction work can be done at ground level to fell small trees, and where trees can be safely felled away from private property and with minimal impact to surrounding native vegetation. Alternatively, tree sections would be pieced down using a tree climber or Elevated Work Platform (EWP). Equipment such as chainsaws and pole saws will continue to be used, and cut vegetation will be chipped where it is practical to do so. Glyphosate herbicide will be injected into cut stems of exotic weed species at recommended rates. The application of herbicide into cut stems of native trees will be decided on a case by case basis. Epicormic regrowth from cut stems will be monitored for structural strength and stability where regrowth is permitted.

6.1.1. Erosion control

Erosion hazards on the steep erodible riverbanks will be minimised as follows:

- Compensatory offset plantings (refer to Section 6.2), both at the site of tree removal and in the preferred alternative campsite for all native trees removed and at rates outlined in Table 4;
- no tree removal on lower riverbanks;
- tree root retention in situ for stabilisation purposes;
- the use of soil stabilisation matting where other measures are considered to be inadequate; and
- minimal loss of understory vegetation through staged weed control of understory vegetation.

6.2. Planting & Rehabilitation of Alternative Habitat

The riparian area of Queen Elizabeth Park (refer to **Figure 1**) has been identified as the preferred alternative roost site. It is relatively remote from residential areas and makes up a large part of the existing camp on the southern riverbank.

As a medium to long term strategy, this alternative site will be targeted for plantings and rehabilitation works in the hope that flying-foxes will occupy this or other less problematic areas. Plantings represent compensatory offsets for trees removed to create a separation buffer between residences and flying-foxes. The primary purpose of compensatory offset plantings is to ensure no net loss of roost trees over the long term and to minimise the risk of erosion. A past program of tree planting and weed control at the preferred alternative roost site is planned to restart. A funding application to the Australian Government to assist in funding works is currently in preparation (Andrew Edwards, Env. Health Officer, RVC, pers. comm. 05/03/15).

As noted above, a range of noxious and environmental weeds thrive in the disturbed riverbank camp area. Exotic environmental weed species include Cocus Palm

(*Syagrus romanzoffiana*), Jacaranda (*Jacaranda mimosifolia*) and threatening vine weeds including Balloon Vine (*Cardiospermum grandiflorum*), Madeira Vine (*Anredera cordifolia*) and *Ipomoea* species.

Noxious weeds include Class 3[3] noxious weeds Chinese Celtis (*Celtis sinensis*) and Green Cestrum (*Cestrum parqui*); and Class 4[4] noxious weeds Camphor Laurel (*Cinnamomum camphora*), Broad-leaved Privet (*Ligustrum lucidum*) and Crofton Weed (*Ageratina adenophora*).

Weed control work is to occur in a mosaic pattern so as to gradually stage removal of dense weeds in the understory which are favoured by roosting flying-foxes. Contracting a professional bush regenerator in possession of a scientific licence under s132(C) of the NPW Act, or a Council application for a s132(C) licence, may be required to carry out such works in threatened Grey-headed Flying-fox habitat.

Compensatory offset plantings at the site of tree removal near residences will use small, non-roost indigenous plantings. Plantings will include highly fragrant, low-growing, indigenous species that appear to be unfavourable for roosting flying-foxes, eg Blue Lilly Pilly (*Syzygium oleosum*). Compensatory offset plantings in the preferred alternative roost site will use tall, indigenous roost tree species such as Forest Red Gum, *Eucalyptus tereticornis.*

Plantings and weed control will be done by professional bush regenerators working with Council staff. No Landcare group is known to be active in the area of the camp. All plantings will be indigenous riverbank species, frost-tolerant, minimum 75mm tubestock and sourced from local provenance nursery stock. Site preparation and maintenance considerations will include weed control, installation of tree guards, fertilising, mulching and on-going weed control. Compensatory offset plantings will occur at minimum rates outlined in **Table 2**:

Table 2. Minimum compensatory offset native tree replacement ratio

Trees removed	**Replacement rate at tree**	**Replacement rate at preferred alternative roost**

3 Class 3 noxious weeds are plants that must be fully and continuously suppressed and destroyed as they pose a potentially serious threat to primary production or the environment, are not widely distributed in the area and are likely to spread in the area or to another area.

4 Class 4 noxious weeds are plants that must be managed to reduce its numbers, spread and incidence, and continuously inhibit its reproduction as they pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area and are likely to spread in the area or to another area.

	removal site	site
Small sized tree (< 15cm DBH)	3	3
Medium sized tree (15 to 35cm DBH)	4	4
Large sized tree (> 35cm DBH)	5	5

Figure 19. One of several access tracks to the preferred alternative camp area in the riparian area of Queen Elizabeth Park.

6.3. Community Education, Awareness & Complaint Management

Community complaints about flying-foxes are generally directed to Council. Council's use of a flying-fox complaints register would record the number and types of public complaints and follow up actions taken; and record chronological information about the Casino camp and provide a historical record over time. Documented information on community complaints and concerns are critical to monitoring the effectiveness of management actions.

Effective community education and engagement has potential to raise public awareness of matters such as:

- public health risks (real and perceived);
- ways to minimise impacts from flying-foxes;
- how to make properties less attractive to flying-foxes, e.g. bat-friendly netting for backyard fruit trees; & native vegetation landscaping species that does not attract flying-foxes;

- flying-fox ecology, e.g. why little red flying-foxes roost in the Casino camp seasonally; and why Grey-headed Flying-foxes are listed as threatened;
- times when impacts may be heightened, eg when little red flying-foxes arrive; and during heat-related mass bat mortality events.
- challenges to effective and lasting dispersal of flying-foxes; and
- Council responses to date to the problematic camp.

Heightened public awareness offers substantial benefits for managers, residents and site users. DECC (2007) promote the use of clear, concise and accurate information about flying-foxes by camp managers. A range of freely available information may be used in community education programs such as NSW Health and bat group factsheets.

A range of education delivery methods are generally required for an effective community education program. Bat education initiatives successfully used elsewhere include interpretive signage, viewing platforms in parks, printed brochures, public information sessions, website information, media releases, and experiential learning activities such as schools education programs. The principal of Casino Public School reported that flying-fox education programs are in place for all school children at the school. It is recommended that Council liaise with stakeholders such as NSW Health, OEH, wildlife carer groups to plan education initiatives for the wider community.

6.4. House and Property Modifications to Reduce Impacts

Various property modifications are available to alleviate impacts for residents and property owners severely impacted by roosts. These include:

- double glazed windows and acoustic insulation to minimise noise disturbances;
- clothes dryers to reduce spoiling of washing on outdoor clothes lines;
- air conditioners to minimise odours and potentially hotter conditions from any loss of shade trees, e.g. tall Forest Red Gum roost trees; and
- carports and covered outdoor areas to minimise faecal drop problems on vehicles, outdoor eating and recreation areas, and outdoor clothes lines.

Responses to the Flying-fox Impacts & Mitigation Questionnaire indicated that fencing screens and dense screen plantings of low-growing, non-roost species on residential boundaries to reduce noise, odour and other impacts are generally not suited to the site due to the steep descending riverbanks on property boundaries.

Council has no control over what modifications residents and property owners choose to install to reduce impacts. However, the services of Council Building

Inspectors to conduct building modification appraisals are planned to be made freely available to residents impacted by bats.

6.5. Nudging flying-foxes away from human settlement

Nudging can refer to either creation of separation buffers or disturbance of flying-foxes to move them away from urban settlements (OEH 2014a and VDSE 2011). For the purposes of this management plan 'nudging refers to use of low intensity noise disturbance to gently and slowly move roosting flying-foxes from inappropriate sites. The specific methods for nudging flying-foxes away from human settlement should be planned in consultation with OEH, and detailed in a Standard Operating Procedure.

VDSE (2011) highlight in regard to nudging that the GHFF is most vulnerable during extreme heat; when pregnant females are in their third trimester; and during the period when there are flightless dependent young left alone in the colony.

Responses to the Flying-fox Impacts & Mitigation Questionnaire indicated that some residents use noise and hoses to nudge flying-foxes out of trees near residences. Residents reported that flying-foxes invariably returned to roosting trees near residences following the cessation of noise and water jets. The effectiveness of this activity was reported to be short lived.

In accordance with best practice camp management (OEH 2014a and DoE 2014) nudging should be considered as a last option and only if other measures have failed. Prior to any nudging activities, it is recommended that:

- Liaison occur with OEH and DoE over specific methods, potential flying-fox impacts and approval and referral requirements;
- High and Medium Priority management actions be first implemented and monitored for success;
- a Nudging Standard Operating Procedure (SOP) be prepared and adopted, and include methods, timing, safeguards and monitoring requirements; and
- The Nudging SOP would be appended to any applications, approvals and referrals.

The Australian Department of the Environment (2014) recommends in-situ management of camps and assisting residents to co-exist with camps. However, where nudging is considered, suggested best practice mitigation standards to avoid significant impacts are outlined by DoE (2014). Where an action is likely to have a significant impact on the GHFF, approval for the action from the Australian Department of the Environment must be sought under the EPBC Act prior to the action commencing.

6.6. Dispersal of flying-foxes

Flying-fox dispersals (or relocations) have attempted to move problematic camps around Australia over many years. Non-lethal dispersals by active disturbance has used various methods such as noise (e.g. loud banging, loud machinery, gas guns, stock whips, etc.), bright lights (e.g. intensive flood lighting), ultrasonic sound, water jets, smoke (e.g. smoke machines), inflatable clowns and helicopters.

Although shooting and culling of flying-foxes in urban areas is not supported by OEH and DoE, camp dispersal is supported under certain circumstances. OEH (2014a) notes that camp dispersal is challenging for reasons including:

- Dispersals can be expensive and can have uncertain outcomes;
- dispersal may result in relocating the animals rather than resolving the issue. Past disturbances in Australia have sometimes failed to remove flying-foxes from the area or have resulted in flying-foxes relocating to other nearby areas where similar community impacts have occurred;
- attempts to disperse camps are often contentious;
- disturbing flying-foxes may have an adverse impact on animal health; and
- the cumulative impacts of flying-fox camp dispersals may negatively impact on the conservation of the species and the ecosystem services flying-foxes provide;

A review of 17 attempted flying-fox dispersals between 1990 and 2013 found that:

- In all cases, dispersed animals did not abandon the local area.
- In 16 of the 17 cases, dispersals did not reduce the number of flying-foxes in a local area.
- Dispersed animals did not move far (in approx. 63% of cases the animals only moved <600m from the original site). In 85% of cases, new camps were established nearby.
- In all cases, it was not possible to predict where bats would move to and if new 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 extensive vegetation removal).
- 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 (eg using noise, smoke, etc).
- Outcomes of dispersals are often not known for several years.

The few exceptions to these patterns occurred when there were abundant financial and human resources to undertake dispersals (e.g. Royal Botanic Gardens Melbourne and Royal Botanic Gardens Sydney) and/or specific landscape characteristics (e.g. isolation from neighbours at Batchelor NT) or habitat links to acceptable locations (e.g. Royal Botanic Gardens Melbourne) (Roberts & Eby 2013) that assisted with dispersal success.

In accordance with best practice camp management (OEH 2014a and DoE 2014) camp dispersal should be considered as the very last option and only if other measures have failed. Prior to any dispersal activities, it is recommended that:

- High and Medium Priority management actions be first implemented and monitored for success;
- Liaison occur with OEH and DoE over specific methods, potential flying-fox impacts and approval and referral requirements;
- A comprehensive feasibility assessment be conducted and a report prepared for Council's consideration detailing factors such as proposed methods, timing, safeguards, cost estimates, contingencies and risks (financial, environmental, social and legislative);

The Australian Department of the Environment (2014) recommends in-situ management of camps and assisting residents to co-exist with camps. However, where dispersal is considered, suggested best practice mitigation standards to avoid significant impacts are outlined by DoE (2014). Where an action is likely to have a significant impact on the GHFF, approval for the action from the Australian Department of the Environment must be sought under the EPBC Act prior to the action commencing.

6.7. Do nothing

The do nothing management option involves no intervention or management response from Council regarding the Casino flying-fox camp and reported impacts from the local community.

An analysis of above-listed management options examines their strengths and weaknesses, particularly in terms of addressing community concerns, cost effectiveness, and ecological implications as outlined below in **Table 3**.

Table 3. Management Options Analysis

Considerations	Strengths	Weaknesses
Remove roosting habitat in high impact areas to create a separation buffer		
Community Concerns	Effective to displace roosting flying-foxes in high impact areas. Improved resident lifestyle / amenity in high impact areas. Likely less community conflict with increased separation. Recognised as best practice camp management action.	Effective only for those directly adjoining the camp. Doesn't address many community concerns. Reduced bushland amenity, shade and other tree services for residents. Potential for disagreement between residents over trees to be retained and removed.
Ecological Implications	Current plans for removal of exotic weeds and only one medium-sized native tree will have minimal flora and fauna impacts, e.g. availability of flying-fox habitat, vegetation structure, vegetation integrity and weed invasion potential. Biodiversity values may be improved through weed control and compensatory offset plantings of indigenous species. Substantial other suitable roost vegetation available for flying-foxes upstream and downstream. Works planned outside threatened GHFF breeding and rearing season for minimal impact. Likely less community frustration and deliberate disturbance of roosting flying-foxes. Recognised as best practice camp management action.	Ecological impacts likely to increase if substantial areas of native vegetation are proposed to be removed in future. Complete native tree removal likely required if native trees are to be pruned to Australian Standard (AS 4373 – 2007 Pruning of amenity trees) which prohibits the drastic pruning needed to make trees unsuitable for roosting flying-foxes. Incremental loss of flying-fox roosting habitat. Emergency and urgent works in GHFF breeding and rearing season may be more costly due to additional impact mitigation measures.
Likelihood of Success	Proven to be successful in many problematic camp areas. Immediate effect. High likelihood of reduced conflict and improved resident lifestyle and amenity.	Only reduces the scale and intensity of some impacts.
Cost	Able to be staged according to identified priorities and available funds.	High cost for: • large trees such as Small-fruited Fig (*Ficus microcarpa*) and mature Forest Red Gum (*Eucalyptus tereticornis*); and • trees that can't be felled safely at ground level away from structures and with minimal impact to native vegetation.
Other Considerations	No likely legislation barriers. Mitigation measures planned to address riverbank stability and increased	Additional approvals may be required if substantial areas of native vegetation are proposed to be removed in the future.

Considerations	Strengths	Weaknesses
	erosion and sedimentation potential. Consistent with objectives of this management plan.	Tree removal inherently reduces bank stability and increases erosion and sedimentation potential.
Planting & Rehabilitation of Alternative Habitat		
Community Concerns	Medium to long term initiative. Obvious location relatively remote from residences. Recognised as best practice camp management action.	Doesn't address community concerns and impacts in the short term and may not address them in the longer term.
Ecological Implications	Increased roosting habitat provides long-term benefits for flying-foxes. Benefits biodiversity values including other flora and fauna. Recognised as best practice camp management action.	Minimum ten year time lag in creation of suitable roost habitat from new plantings. Weed control in understory may create unsuitable roosting habitat in short term if not staged and done in a mosaic pattern.
Likelihood of Success	Flying-foxes likely to require additional roost trees following their continued damage to existing roost trees. Likely to provide roost habitat if well planned, coordinated, resourced and maintained. Successful previous plantings at site.	Uncertain that flying-foxes will use alternative habitat in medium to long term.
Cost	External funding opportunities available to help pay for works. Able to be staged in line with available resources.	Council resourcing required for follow-up maintenance. Cost dependent on funding application outcomes and extent of works.
Other Considerations	No substantial legislative barriers. Improved bank stability and reduced erosion and sedimentation potential. Consistent with objectives of this management plan.	Steep site with high weed cover in part.
Community Education, Awareness & Complaint Management		
Community Concerns	Complaints register used to record numbers and types of reported health, lifestyle and amenity impacts. Opportunity to engage with affected community members. Potential improved community awareness, understanding and tolerance of bats. Recognised as best practice camp management action.	Doesn't address community impacts directly or in the short term.

Considerations	Strengths	Weaknesses
Ecological Implications	Potential improved community awareness, understanding and tolerance of bats. Community education and complaints register recognised as best practice camp management actions.	
Likelihood of Success	Education initiatives have a high likelihood of success for a proportion of the community if well planned, targeted and coordinated. Information from complaints register used for future camp management.	Successful education and increased awareness relies on individuals being receptive to new information. Unable to reach all community members.
Cost	Low cost options available, e.g. complaints register, Council's website, Facebook, use of existing information from NSW Health, OEH, bat groups, etc. Able to be staged depending on priorities and available resources. External funding opportunities may be available for education initiatives. May be incorporated into environmental education roles and responsibilities for Council staff.	Requires Council staffing and resourcing. Cost dependant on funding application outcomes and type and extent of education program.
Other Considerations	Council to continue to periodically do flying-fox species count estimates in partnership with OEH. Consistent with objectives of this management plan.	
House and Property Modifications		
Community Concerns	Addresses some impacts for some residents. Recognised as best practice camp management action.	Some buildings are not suitable for measures such as acoustic insulation and double glazing.
Ecological Implications	No flying-fox welfare implications. Recognised as best practice camp management action.	
Likelihood of Success	Likely to address some impacts for some residents. High potential to improve lifestyles and reduce conflict for some properties.	Unlikely to reduce lifestyle impacts to satisfactory levels for some residents. Council has no control over private property modifications.
Cost	Cost effective if well targeted.	Substantial costs for property renovations and other measures. Substantial ongoing electricity costs for air conditioners and clothes dryers. Who pays? Is grant funding available for some modifications?

Considerations	Strengths	Weaknesses
Other Considerations	Consistent with objectives of this management plan.	Many buildings are already modified to alleviate impacts.
Nudging flying-foxes away from human settlement		
Community Concerns	Addresses impacts temporarily and in case of emergencies.	Doesn't addresses impacts in a lasting way as bats normally return. Noise methods in early morning would impact surrounding residents.
Ecological Implications	Likely low bat impacts if done outside breeding and rearing season and using low intensity methods.	Potential flying-fox stress, fatigue and mortality if done in breeding and rearing season or where non-low intensity methods are used. Ecologist monitoring of flying-fox impacts required to assess bat impacts.
Likelihood of Success	Successful temporarily at least. A nudging Standard Operating Procedure (SOP) required including methods, timing, safeguards and monitoring requirements. Unlikely to inadvertently cause camp dispersal if done in a localised and low intensity manner.	Flying-foxes have strong fidelity with camps and tend to habituate to disturbances. Repeated efforts over a lengthy period of time required to prevent bats returning. Casino residents report no permanent success from having trialled noise. Height of fig and Forest Red Gum trees increases difficulty.
Cost		Costs dependent on duration, methods, numbers of personnel, etc. which would be estimated as part of Standard Operating Procedure (SOP) preparation.
Other Considerations	Consistent with management plan objectives to address community concerns and impacts if successful.	Precautionary preparation of TSC Act S.91 licence application to OEH recommended. Liaison with OEH over Species Impact Statement (SIS) requirement. Liaison with Commonwealth DoE over referral and approval requirements. Substantial Work Health and Safety issues if large numbers of people involved in the large camp area and steep and difficult riverbank terrain. Potential legal implications if displaced flying-foxes impact other property owners. Potentially significant impacts to threatened GHFF & inconsistency with related management plan objective. Has potential to escalate from low intensity methods. Difficult to monitor and regulate with community involvement.

Considerations	Strengths	Weaknesses
		Substantial Work Health and Safety issues due to steep and difficult terrain. Likely to continue to be done by some residents with or without approvals if other planned actions are ineffective.
Dispersal of Flying-foxes		
Community Concerns	Addresses community impacts directly if successful.	Depending on dispersal methods, likely substantial community disruption and inconvenience from active disturbance and repeated attempts over an unknown period of time.
Ecological Implications	Would allow recovery of trees impacted by roosting flying-foxes.	Potential high flying-fox stress, fatigue and mortality rates, particularly if done within breeding and rearing season.
Likelihood of Success	A comprehensive feasibility assessment would be prudent detailing proposed methods, timing, safeguards, cost estimates, contingencies and risks (financial, environmental, social and legislative) to determine likelihood of moving flying-foxes permanently.	Flying-foxes have strong fidelity with camps and tend to habituate to disturbances. Unpredictable outcomes and low chance of success considering past experience. Unable to control where dispersed flying-foxes move to, i.e. it could create a worse problem elsewhere. High likelihood flying-foxes will continue to move upstream or downstream along the riverbank.
Cost	Estimated as part of comprehensive feasibility assessment.	Costs depend on methods and duration of dispersal activities. Requires ongoing funds for an unknown period of time to prevent flying-foxes reoccupying the camp. Depending on method, likely to be very high cost considering the camp size and location on steep riverbanks with dense understory vegetation.
Other Considerations	Consistent with management plan objectives to address community concerns and impacts if successful.	Preparation of TSC Act S.91 licence application to OEH recommended. Liaison with OEH over Species Impact Statement (SIS) requirement. Liaison with Commonwealth DoE over referral and approval requirements. Substantial Work Health and Safety issues if large numbers of people involved in the large camp area and steep and difficult riverbank terrain. Potential legal implications if displaced flying-foxes impact other property owners.

Considerations	Strengths	Weaknesses
		Potential significant impacts to threatened GHFFs & inconsistency with related management plan objective.
Do Nothing		
Community Concerns	Positive community reaction to inaction by some community members.	Doesn't address community concerns, impacts and general amenity. Likely negative community reaction to inaction by community members living adjacent to camp. Council may be perceived as irresponsible or negligent in its duty of care.
Ecological Implications	No short term loss of flying-fox roost habitat.	No intervention may result in community frustration and harm to flying-foxes.
Likelihood of Success		Lack of intervention will not address management issues. No change in current situation is unacceptable to Council.
Cost	Low/no direct cost to Council.	Continued indirect staff resourcing costs to Council.
Other Considerations	Low/no management input required.	Largely inconsistent with objectives of this management plan.

7. Camp Management Actions & Implementation

The 'Do Nothing' option is considered to be unfeasible considering that it does not address community concerns and impacts and will not promote change to the current situation. This would be unacceptable to Council.

Priorities are in line with OEH (2015a) recommendations of using the lowest form of intervention required. High Priority actions are the most urgent and will be acted upon as soon as practicable. Moderate Priority actions will generally follow High Priority actions, and Low Priority actions may be triggered following annual monitoring of outcomes from High and Medium priority actions.

The options of Nudging flying-foxes away from human settlement and dispersal of flying-foxes are currently listed as Low priority. Their priority may however be elevated in future in light of new information or technologies (e.g. sonic and olfactory deterrents); changing circumstances; or if monitoring results show that actions have not substantially reduced community impacts and conflict. A flying-fox camp complaints register at Council and continued liaison with those most affected is planned to gauge community impacts and conflict for this purpose.

In accordance with OEH (2015a), **Table 4** lists camp management actions grouped into Level 1 actions, routine camp management actions, Level 2 actions, creation of buffers, and Level 3 actions, camp disturbance or dispersal. Council is primarily responsible for implementing all actions unless otherwise noted, and in partnership with stakeholders noted. Planned activities will be staged over five years and as Council financial and staffing resources allow. Works are set to commence immediately following finalisation of consultation, referrals and approvals.

Sourcing external funds to implement management actions is planned where practicable. Progress and outcomes from management actions will be reviewed and reported annually as part of Council's State of the Environment (SOE) reports.

Table 4. Management action priorities, partnerships and performance measures.

Management Options & Issues	Action	Priority & Action Level	Partner ships	Performance Measures
Vegetation removal to create a separation buffer	Continue to prioritise tree removal and pruning to create unsuitable and unfavourable roosting conditions. Promote and encourage residents to accept roost tree removal in high conflict areas. Trial understory weed control to create unsuitable and unfavourable roosting conditions under small to medium sized trees to be retained. Trial strategic plantings of highly fragrant, low-growing indigenous species that appear to be unfavourable for roosting flying-foxes, e.g. Blue Lilly Pilly (*Syzygium oleosum*). Implement vegetation removal safeguards / controls as outlined in Section 7.2 of this plan.	High Level 1&2	Residents & landholders adjoining the camp	Change in separation buffer area in high conflict areas. Numbers and types of complaints registered with Council. Reported levels of impacts from continued direct liaison with affected residents. No. of flying-fox injuries & fatalities from vegetation works.
Planting & Rehabilitation of Alternative Habitat	Finalise funding application/s including priority works and mosaic work zones, work directions, timing, etc. – e.g. Commonwealth DoE; NSW Env. Trust. Contract professional bush regenerator/s with s132(C) licence (NPW Act). Prepare a Standard Operating Procedure for working near flying-foxes. Schedule Council staff to work with professional bush regenerator/s. Source indigenous riverbank roost tree tubestock of local provenance.	High Level 1	OEH DoE Other funding bodies.	Land area treated / rehabilitated. Numbers of plantings. Work hours. Presence of increasing numbers of flying-foxes using the site as roosting

Management Options & Issues	Action	Priority & Action Level	Partner ships	Performance Measures
	Maintain photographic and other monitoring data.			habitat.
Plan & implement community education initiatives	Use existing factsheets / information brochures, e.g. Living with Flying-foxes and NSW Health factsheets. Provide information on how to make properties less attractive to flying-foxes. Include educational information in media releases. Continue to use Facebook to engage community members over flying fox camp management.	High Level 1	Stakeholder s including NSW Health, OEH and WIRES	Numbers and types of complaints registered with Council. Numbers of flying-fox related website hits.
Investigate funding opportunities to ease the burden on Council's budget	Investigate and lobby for funding opportunities for: • Any costly community education initiatives planned; • planting and rehabilitator of the preferred alternative flying-fox roost area; and • pruning of heritage listed large fig trees in Crowe Horwath Accountancy (Heritage Council of NSW).	High Level 1	OEH Heritage Council of NSW DoE	No. of funding applications prepared and submitted. No. of funding applications successfully funded.
Address community health concerns	Continued Council environmental health inspections of public areas and private properties where flying-foxes roost in close proximity to bats. Provide accessible health information for local residents, particularly residents in close proximity to the Casino camp and public park users. • NSW Health fact sheets on flying-foxes and health matters. • Provide links on Council's website to relevant health information. • Continue to use Facebook to engage community members over flying fox camp management. • Include information in this plan on community health risk and precautions in relation to flying-foxes.	High Level 1	NSW Health	Numbers of inspections undertaken; health and welfare incidents; flying-fox related website hits; and health concerns / complaints reported to Council & recorded on complaints register.
Monitor effectiveness of management actions and community responses.	Prepare, operate and periodically review a camp complaints register at Council; Continue to use Facebook to engage community members over flying fox camp management. Continue to liaise directly with those most impacted by roosting bats. Maintain a photographic record of vegetation works and activities. Continue to liaise on animal welfare issues with WIRES and NRWC. Continue to use Facebook to engage community members over flying fox camp	High Level 1	Residents & landholders	Change in separation buffer area in high conflict areas. Numbers of complaints registered with Council and flying-fox related website hits. Reported levels of

Management Options & Issues	Action	Priority & Action Level	Partner ships	Performance Measures
	management.			impacts from continued direct liaison with affected residents. No. of flying-fox injuries & fatalities.
Finalise consultation, referral & licensing requirements.	Request comment on draft plan from government and non-government stakeholders. Submit final Casino Flying-fox Camp Management Plan with S.91 application to OEH.	High Level 1	OEH & other stakeholder s	All approvals in place, plan finalised and implementation commenced.
Adhere to any licence or approval requirements.	Adhere to any License conditions imposed by OEH as part of S.91 application. Adhere to NSW State and Commonwealth conditions of approval from any future applications or referrals.	High Level 1	OEH & potentially DoE	All actions undertaken in accordance with approval conditions.
Facilitate house and property modifications to reduce impacts	Continued liaison with residents most affected by the camp. Council Building Inspectors to offer building modification appraisals to reduce impacts where practical.	Medium Level 1	Residents & landholders	No. of Council building modification appraisals. No. of known property modifications to reduce impacts.
Council to remain informed of best practice flying-fox management	Participate in communication networks about new information and technologies (e.g. changing government legislation and guidelines, successful sonic, olfactory or other deterrents) with government agencies, researchers and other councils managing urban flying-fox camps. Continue to participate in flying-fox counts as part of the National Flying-fox Monitoring Programme.	Medium Level 1	OEH & other councils managing urban flying-fox camps	Nunber of flying-fox census counts. Number and type of staff engagement activities.
Adopt a flexible and adaptive management approach	Review Council complaint register annually and continue to liaise with most affected residents. Council able to respond effectively to changing circumstances or priorities using best practice management information, methods or technologies. Respond to future roost tree removal and pruning requests to increase separation buffers and minimise conflict promptly.	Medium Level 1	OEH & other councils managing urban flying-fox camps	Number, type and timeframe of Council responses to changing circumstances or priorities.
Nudging flying-	Consider nudging as a last resort following demonstrated failure of High and	Low	OEH	Community acceptance

Management Options & Issues	Action	Priority & Action Level	Partner ships	Performance Measures
foxes away from human settlement	Medium priority actions, and following detailed investigations. The following is recommended as part of considerations: • Liaise with OEH and DoE over methods, potential ecological impacts, referral, approvals, etc; • Prepare nudging Standard Operating Procedure (SOP) including methods, timing, safeguards and monitoring requirements. • Any nudging methods should adopt best practice mitigation standards (Attachment 2) DoE (2014).	Level 2&3		of proposal. Success in moving flying-foxes away from problematic areas over the medium and long term. Amount of community disruption and inconvenience from dispersal attempts. No. of flying-fox injuries & fatalities.
Dispersal of Flying-foxes	Continue to investigate cost-effective and reliable techniques for dispersing the Casino flying-fox camp. Consider dispersal as a last resort following demonstrated failure of High and Medium priority actions and nudging, and following detailed investigations. The following is recommended as part of considerations: • Liaise with OEH and DoE over methods, potential ecological impacts, Species Impact Statement (SIS), referral, approvals, etc; • A comprehensive feasibility assessment including proposed methods, timing, safeguards, cost estimates, contingencies and risks (financial, environmental, social and legislative); • Any dispersal methods should adopt best practice mitigation standards (Attachment 2) DoE (2014).	Low Level 3	OEH	Community acceptance of proposal. Success in displacing or relocating flying-foxes to a more appropriate site. Amount of community disruption and inconvenience from dispersal attempts. No. of flying-fox injuries & fatalities.

7.1. Timing of Vegetation Works

Apart from urgent work, vegetation removal works will be concentrated in the annual May to July period, i.e. outside the breeding and rearing season of the GHFF, to minimise flying-fox impacts and costs associated with additional mitigation measures required in the GHFF breeding and rearing season.

The GHFF breeding and rearing season includes the last trimester of pregnancy (normally August to September) when mothers are heavily pregnant and can spontaneously abort if subject to additional stresses; females are birthing and have dependent young (normally October to February) when young may be dropped by mothers if subject to additional stresses; and months when females are weaning dependent young that may be unable to fly (normally March to April). The May to July period also coincides with the period when little red flying-foxes do not occupy the campsite which is preferable for vegetation works.

Emergency and urgent works may need to be conducted outside the May to July period and would be subject to additional safeguards and mitigation measures outlined in **Section 7.2.1**. Urgent vegetation removal works to address impacts associated with large numbers of little red flying-foxes may be required in the mid-summer to early autumn period. Approved works may proceed without specific safeguards where roosting grey-headed flying-foxes do not occur within 100 metres of proposed works.

Tree planting, weed control and maintenance works in the preferred alternative site are considered to be routine camp management actions unlikely to adversely impact roosting flying-foxes and carried out in accordance with a Standard Operating Procedure to be prepared for working near flying-foxes.

7.2. Vegetation Removal Safeguards / Controls

Recommended safeguards / controls to avoid and minimise impacts to the threatened Grey-headed Flying-fox from vegetation removal works are consistent with best practice mitigation standards (Australian Department of the Environment 2014) and modified from those of Geolink (2014) and Arbor Ecological (2014) as detailed below in Sections 7.2.1 and 7.2.2.

7.2.1. Vegetation works outside the GHFF breeding and rearing season

- Works will not occur during or immediately after heat stress events[5]; cyclone events[6]), or during a period of significant food stress[7] (Australian Department of the Environment 2014).
- A qualified and experienced ecologist with knowledge and experience relevant to the management of flying-foxes and their habitat will be present at commencement of works if grey-headed flying-foxes are present within 50 metres of works to monitor the GHFF behaviour and responses and ensure appropriate buffers are present. The ecologist must be able to identify dependent young and be aware of the impacts of climatic extremes and food stress events on flying-foxes. The ecologist must make an assessment of the relevant conditions and advise the works supervisor whether the activity can go ahead consistent with these safeguards / controls (Australian Department of the Environment 2014).
- A project briefing/toolbox meeting will occur between participants prior to commencement of works and include discussions of flying-fox welfare, risk assessment outcomes, and Work Health and Safety measures.
- Trees to be removed will be clearly marked to avoid unnecessary vegetation removal.
- Where GHFF roost within 50 metres of work sites, flying-foxes will be allowed to become accustomed to machinery noise. Chainsaws, chippers and other machinery will be idled for at least ten minutes near the work site prior to work commencement to avoid sudden disturbance.
- Adjoining residents will be informed of the proposed works and their timing. Any work carried out on private land will be approved by landholders.
- Where possible, vegetation will be directionally felled away from native vegetation.
- Pruning works on native species will be undertaken in accordance with relevant sections of Standards Australia AS4373 Pruning of amenity trees by a minimum AQF level 3 qualified arborist with appropriate experience.
- If injured fauna are found on the site, a local wildlife care group and/or local veterinarian will be contacted immediately and arrangements made for animal welfare. The phone number of the local WIRES group would be known to the project supervisor (eg WIRES Northern Rivers – 6628 1898).

[5] A 'heat stress event' is defined for the purposes of this document as a day on which the maximum temperature does (or is predicted to) meet or exceed 38 °C.

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

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

7.2.2. Vegetation works within the GHFF breeding and rearing season

The following additional safeguards are recommended, in addition to those outlined above to avoid and mitigate impacts to the threatened Grey-headed Flying-fox where works are conducted inside the GHFF breeding and rearing season, i.e. August to May, and where works are proposed within 100 metres of roosting GHFFs:

- Immediately prior to works commencing an experienced ecologist will inspect flying-foxes roosting in trees near proposed works to observe behaviour and assess the GHFF stage of breeding and rearing and potential impacts, e.g. females with dependant young.
- Works will only occur when there are no Grey-headed Flying-foxes in an area of at least 50 metres from vegetation works. This may require that Council consider conducting works in the late afternoon and evening following the fly-out when flying-foxes leave work areas in the camp.
- A suitably qualified and experienced ecologist with knowledge and experience relevant to the management of flying-foxes and their habitat will be on site at all times while vegetation works occur to monitor flying-fox responses, and ensure works are conducted as proposed, including ensuring a buffer of greater than 50 metres is maintained free of GHFFs.
- If works are judged by the project ecologist to cause excessive stress to GHFFs, the ecologist will immediately notify the project manager, the work crew will cease works and the timing of further works will be reviewed.
- Works are limited to one work zone at a time.

8. Impact Assessment

Impact assessment is made only in relation to High and Medium Priority actions listed above. Further impact assessment would be required if Low Priority nudging or dispersal activities are triggered.

Planned camp boundary vegetation management works are a combination of minor or Level 1 routine camp management practices and level 2 buffer creation or in-situ camp boundary management as defined by DoE (2014) and OEH (2015a). Planned works include:

- Midstory and overstory roost tree removal and pruning in high conflict areas;
- A trial of understory weed control to create unsuitable and unfavourable roosting conditions under small to medium sized trees to be retained; and

- Compensatory offset planting of vegetation;

DoE (2014) notes that actions that may impact on nationally important flying-fox camps include in-situ management, clearing of all camp vegetation or dispersal of animals through disturbance by noise, water, smoke or light. In situ management includes actions that are not minor or routine, but aim to retain the camp whilst reducing human-flying-fox conflict. In-situ management actions include creation of separation buffers by:

- Selectively clearing canopy trees at the camp boundary; and/or
- disturbing animals at the camp boundaries to encourage roosting in adjacent vegetation, i.e. nudging.

8.1. NSW State statutory matters

The following Endangered Ecological Community (EEC) and threatened species listed under Schedule 1 of the TSC Act are known to occur at the site:

- The Grey-headed Flying-fox is listed as Vulnerable under the TSC Act.
- a single Rough-shelled Bush Nut (*Macadamia tetraphylla*) listed as Vulnerable under the TSC Act; and
- degraded and modified Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion Endangered Ecological Community (EEC).

As noted in S2.4, no further works are proposed in close proximity to the Rough-shelled Bush Nut (*Macadamia tetraphylla*) and the tree is not expected to be impacted. Therefore, no further impact assessment is provided in relation to the Rough-shelled Bush Nut (*Macadamia tetraphylla*).

No other significant threatened flora or fauna have been detected or are known to occur in the camp area and no significant impacts are expected to any other locally occurring threatened species.

An assessment of significance for the Grey-Headed Flying-fox and Subtropical Coastal Floodplain Forest EEC is included as **Appendix 3**, in accordance with S.5A of the NSW EP&A Act and S.94 of the TSC Act, *Significant effect on threatened species, populations or ecological communities, or their habitats*. The assessment forms part of a S.91 licence application to OEH for activities that may harm threatened species, populations or ecological communities or damage habitat. Inclusion of a S.91 licence application is precautionary and recommended by OEH (2015a).

This assessment concluded that currently planned vegetation works are unlikely to significantly affect habitat values, contribute substantially to Key Threatening Processes, nor have a significant adverse effect either the occurrence of Subtropical Coastal Floodplain Forest EEC or viability of the Grey-headed Flying-fox population. Thus, preparation of a Species Impact Statement is not required.

As recommended in OEH (2015a), a S.91 threatened species licence application, refer to **Appendix 3**, assists in evaluation of significant impacts on threatened species, populations or ecological communities, or their habitats. Based on that assessment OEH may approve the S.91 threatened species licence application as is; approve it with conditions; refuse it; or require further assessment, e.g. preparation of a Species Impact Statement (SIS).

As noted by SEQ Catchments (2012) an approved S.91 application can provide a valid legal defence in the event of any allegation that threatened species/populations or communities or their habitat have been harmed as a result of the work being done, provided the works are carried out according to the proposal and any relevant conditions applied. It may also assist in obtaining funding to carry out the planned works, e.g. NSW Environment Trust.

A search of the Aboriginal Heritage Information Management System (AHIMS) database, refer to Appendix 6, found that no Aboriginal sites or places are located within or in close proximity to the camp. Planned works are therefore considered unlikely to impact on any Aboriginal objects or places.

A Scientific Licence under s132(C) of the NPW Act is likely to be required to carry out planting and rehabilitation works at the preferred alternative site in threatened Grey-headed Flying-fox habitat.

Currently planned works are considered unlikely to significantly impact any key fish habitat, threatened species, population, ecological community or the habitats of fish and marine vegetation listed under the NSW Fisheries Management Act 1994 (FM Act). Current plans to remove native trees will contribute in a minor way to one FM Act Key Threatening Process (KTP) *Degradation of native riparian vegetation along New South Wales water courses*. Impact mitigation measures outlined in **Section 6.1.1** are designed to minimise potential soil erosion and sedimentation impacts to aquatic habitats. Thus, planned vegetation works are considered unlikely to have any significant impact on any threatened species, population or community listed under the FM Act.

8.2. Matters of National Environmental Significance

Geolink (2014) found that there was a low risk of any significant impact to Matters of National Environmental Significance including Commonwealth listed threatened species, migratory species and threatened ecological communities from proposed tree pruning and tree removal in the camp area in 2014. Much of this work has since been completed and currently plans focus on completing works and extending separation buffers where substantial impacts and conflict remain.

Current plans do not include substantially new tree pruning or tree removal, and works are proposed to be carried out in accordance with best practice mitigation standards listed by DoE (2014), refer to Section 3. DoE (2014) note that the proposed works are 'unlikely to require approval under the EBPC Act as they are unlikely to have a significant impact'. Therefore, no further consideration is made in relation to impact assessment for Matters of National Environmental Significance and referral to the Australian Department of the Environment is not recommended at present.

Referral to the Australian Department of the Environment may however be required in the future prior to any new substantial GHFFs roost vegetation clearing, habitat modification, nudging or dispersal of GHFFs where activities are not carried out in accordance with best practice mitigation standards (Attachment 2), DoE (2014). Liaison with DoE would be recommended is this instance.

9. References

Arbor Ecological 2014, *Ecologist REF Review, Comments and Recommendations - Proposed Changes to Works Associated with the Approved Casino Flying-fox Camp Habitat Modification REF*, September 2014, unpublished report to Richmond Valley Council.

Australian Department of the Environment (DoE) 2015, *Monitoring Flying-Fox Populations*, accessed 05/03/15, http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring

Australian Department of the Environment (DoE) 2014, *Draft EPBC Act Policy Statement, Camp management guidelines for the Grey-headed and Spectacled flying-fox*, 15 December 2014

Australian Museum 2014, *Australian summer – too hot to handle for flying-foxes?*, Dr Anja Divljan, accessed 14/02/15, http://australianmuseum.net.au/

Eby P 1991, *Seasonal movements of grey-headed flying-foxes, Pteropus poliocephalus (Chiroptera : Pteropodidae), from two maternity camps in northern New South Wales*, Wildlife Research 18(5) 547 – 559.

Eby P 2000, *Background Biology, Ecology and Public Health Issues*, in 'Proceedings of a Workshop to Assess the Status of the Grey-headed Flying-Fox in NSW', Ed. G. Richards, University of Sydney, 29th April 2000.

Eby P, Collins L, Richards G, and Parry-Jones K, 1999, *The distribution, abundance and vulnerability to population reduction of a nomadic nectarivore, Pteropus poliocephalus during a period of resource concentration*, Australian Zoologist 31, 240-253.

Geolink 2014, *Review of Environmental Factors - Casino Flying-fox Camp Habitat Modification*, April 2014, unpublished report to Richmond Valley Council.

Morand DT 1994, *Soil Landscapes of the Lismore-Ballina 1:100,000 Sheet report*, NSW Department of Land and Water Conservation, Sydney.

NSW Department of Environment and Climate Change (DECC) 2007, *Flying-fox camp management policy*, NSW Department of Environment and Climate Change, Sydney.

NSW Department of Environment, Climate Change and Water (DECCW) 2009, *Draft National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus*, prepared by Dr Peggy Eby, DECCW NSW Sydney.
NSW Health 2012, *Flying Foxes and Health*, accessed 23/02/15, http://www.health.nsw.gov.au/environment/factsheets/Pages/flying-foxes.aspx

NSW Office of Environment and Heritage (OEH) 2014a, Flying-fox Camp Management Policy 2014: Consultation draft, NSW Office of Environment and Heritage, Sydney South.

NSW Office of Environment and Heritage (OEH) 2014b, Grey-headed Flying-fox - profile, accessed 23/02/15, http://www.environment.nsw.gov.au

NSW Office of Environment and Heritage (OEH) 2015a, *Flying-fox Camp Management Policy 2015:* NSW Office of Environment and Heritage, Sydney South.

NSW Office of Environment and Heritage (OEH) 2015b, *Vegetation Types Database*, accessed 23/02/15, http://www.environment.nsw.gov.au/

Richmond Valley Council (RVC) & Australian Koala Foundation (AKF) 2008, *Richmond Valley Koala Habitat Atlas 2008*, Australian Koala Foundation.

Roberts B & Eby P 2013, *Review of past flying-fox dispersal actions between 1990-2013*, unpublished report.

Roberts BJ, Kanowski J, & Cattererall C 2006, *Ecology and Management of Flying-fox Camps in an Urbanising Region, Issues in Tropical Forest Landscapes*, Issue 5 June 2006, Rainforest CRC and Environmental Sciences, Griffith University.

Scotts D 2003, *Key habitats and corridors for forest fauna: A landscape framework for conservation in north-east NSW*, NSW National Parks & Wildlife Service, Sydney.

SEQ Catchments 2012*, Management and Restoration of Flying-fox Camps: Guidelines and Recommendations*, accessed 23/02/15, www.seqcatchments.com.au

Stanvic S, McDonald V & Collins L 2013, *Managing Heat Stress in Flying-foxes Colonies*, accessed 14/02/15, http://www.longgrasssystems.com.au/linked/managing_heat_stress_in_flying-fox_colonies.pdf

Strahan R 1995, *The Mammals of Australia*, Reed Books, Chatswood NSW.

Sunshine Coast Council 2013, *Draft Regional Flying Fox Management Plan*. Julie O'Connor Senior Conservation Project Officer Environmental Operations, April 2013

Trove 2015, *Digitised newspapers and more*, National Library of Australia, accessed 14/02/15, http://trove.nla.gov.au/newspaper/result?q=flying+fox+casino

Victorian Department of Sustainability and Environment (VDSE) 2011, *Standard Operating Procedure: Nudging of Grey-headed Flying-fox at Yarra Bend Park*, accessed 14/02/15, http://xa.yimg.com/kq/groups/15057567/1427560363/name/DSE_GHFF_Nudging_SOP_Final_November_2011.pdf

Webb NJ & Tidemann CR 1996, *Mobility of Australian flying-foxes, Pteropus spp. (Megachiroptera): evidence from genetic variation*, Proceedings of the Royal Society of London B, 263: 497-502.

10. Appendix 1. Flying-fox Impacts and Mitigation Questionnaire

Responses to this questionnaire will assist in preparing the Casino Flying-fox Camp Management Plan. The plan is a Richmond Valley Council initiative.

1. Do roosting flying- foxes impact you or your family? *If 'yes', please provide details including:*

    - *Impact type, e.g. noise, odour, faecal droppings, health issues; and*
    - *Frequency of impacts, e.g. always, after rain, during heatwaves, when Little Reds arrive, occasionally.*


2. If 'yes' above, what, if anything, would help reduce impacts including:

    - Branch removal in flying-fox roost trees;
    - Tree removal of flying-fox roost trees (exotic or native trees) & if so which tree/s;
    - Screen plantings of low-growing fragrant plants;
    - double glazed windows or acoustic insulation to minimise noise disturbances;
    - clothes dryers to reduce spoiling of washing on outdoor clothes lines;
    - air conditioner to minimise odours and potentially hotter conditions from potential loss of shade trees, e.g. tall Forest Red Gum roost trees;
    - carport or covered outdoor area to minimise faecal drop problems;
    - Disturbing flying-foxes near your property boundary to encourage animals to roost elsewhere.



11. Appendix 2. Example of a Flying-fox Complaints Register, (DECC 2007).

Example of a record on the flying-fox camp complaints database

Date	Name	Address	Phone no.	Concerns	Camp	Action	Officer	Date	Comments
12.9.07	P. Ublic	12 Flying-fox Lane, Blossomville	02 9XXXXXXX	Smell/noise	Blossomville	Meet on site	A. Ranger	14.9.07	e.g. Met on site, discussed camp history, species conservation status, provided information and contact details. Complainant requested more information on weeds, rainforest regeneration and Bushcare. Further information provided 15.9.07

12. Appendix 3. Section 91 Application.

Application for a

Section 91 Licence

under the *Threatened Species Conservation Act 1995* to harm or pick a threatened species, population or ecological community* or damage habitat.

1. Applicant's Name ^: *(if additional persons require authorisation by this licence, please attach details of names and addresses)*	Richmond Valley Council	
2. Australian Business Number (ABN):	54 145 907 00	
3. Organisation name and position of applicant ^: *(if applicable)*		
4. Postal address ^:	Locked Bag 10, Casino NSW 2470	Telephone ^: B.H. (02) 6660 0300 A.H.
5. Location of the action *(including grid reference and local government area and delineated on a map).*	Refer to **Section 2.1** in attached Casino Flying-fox Management Plan	
6. Full description of the action and its purpose *(e.g. environmental assessment, development, etc.)*	Refer to **Sections 1.1, 1.2, 6 and 7** in attached Casino Flying-fox Management Plan	
7. Details of the area to be affected by the action *(in hectares)*.	Refer to **Section 2.1** in attached Casino Flying-fox Management Plan	
8. Duration and timing of the action *(including staging, if any).*	Refer to **Section 7** in attached Casino Flying-fox Management Plan	
9. Is the action to occur on land declared as critical habitat*? *(tick appropriate box)*	☐ Yes X No	

10. Threatened species, populations or ecological communities to be harmed or picked.	Scientific name ***Pteropus poliocephalus***	Common name *(if known)* **Grey-headed Flying-fox**	Conservation status *(i.e. critically endangered, endangered or vulnerable)* **Vulnerable**	Details of no. of individual animals, or proportion and type of plant material *(e.g. fertile branchlets for herbarium specimens or whole plants or plant parts)* **Numbers vary between 2000 and 4000 individuals**
		Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion	**Endangered Ecological Community (EEC)**	

11. Species impact: *(please tick appropriate box)* a) For action proposed on land declared as critical habtat; or b) For action proposed	an SIS is attached	☐ Yes X No

* A threatened species, population or ecological community means a species, population or ecological community identified in Schedule 1, 1A or Schedule 2 of the *Threatened Species Conservation Act 1995.*

^The personal details of all Section 91 licences will be displayed in the register of Section 91 licences required under Section 104 of the *Threatened Species Conservation Act 1995.* See notes.

* Critical habitat means habitat declared as critical habitat under Part 3 of the *Threatened Species Conservation Act 1995*.

on land <u>not</u> declared as critical habitat.	Items 12 to 25 have been addressed X Yes ☐ No

N.B: Provision of a species impact statement is a statutory requirement of a licence application if the action is proposed on critical habitat.
The provision of information addressing items 12 to 17 is a statutory requirement of a licence application if the action proposed is <u>not</u> on land that is critical habitat. Information addressing any of the questions below must be attached to the application.

12. Describe the type and condition of habitats in and adjacent to the land to be affected by the action.	Refer to **Section 2.3** in attached Casino Flying-fox Management Plan
13. Provide details of any known records of a threatened species in the same or similar known habitats in the locality *(include reference sources).*	Refer to **Section 2.4** and **Appendices 4 & 5** in attached Casino Flying-fox Management Plan
14. Provide details of any known or potential habitat for a threatened species on the land to be affected by the action *(include reference sources).*	Refer to **Sections 2.3 and 2.4** in attached Casino Flying-fox Management Plan
15. Provide details of the amount of such habitat to be affected by the action proposed in relation to the known distribution of the species and its habitat in the locality.	Refer to **Section 5.2** in attached Casino Flying-fox Management Plan
16. Provide an assessment of the likely nature and intensity of the effect of the action on the lifecycle and habitat of the species.	Refer to **Sections 7 and 8** in attached Casino Flying-fox Management Plan
17. Provide details of possible measures to avoid or ameliorate the effect of the action.	Refer to **Section 7**, particularly **Sections 7.1 and 7.2** in attached Casino Flying-fox Management Plan

N.B: The Director-General must determine whether the action proposed is likely to significantly affect threatened species, populations or ecological communities, or their habitats. To enable this assessment the Applicant is required to address items 18 to 24. Any additional information referred to in addressing these items must be attached to the application.

18. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	**The Grey-headed Flying-fox** Currently planned vegetation works (refer to Section) involve the removal of one indigenous Forest Red Gum (*Eucalyptus tereticornis*), two large non-indigenous Small-fruited Fig (*Ficus microcarpa*), several exotic weed trees, understory weeds and pruning of several trees to create a separation buffer between roosting flying-foxes and human habitation areas. Affected vegetation represents roosting habitat for the Grey-headed Flying-fox (GHFF) over an area of less than one hectare. The extent of vegetation removal may increase over a five year period to increase the separation buffer area or in response to roosting flying-foxes occupying trees in close proximity to other residences. The loss and modification of roosting habitat is considered unlikely to have a significant adverse effect on the life cycle of the local GHFF such that the population is likely to be placed at risk of extinction for the following reasons: •Trees planned to be removed and pruned represent a very minor proportion of roost trees used and available for use by the GHFF and other flying-fox species at the camp. The vast majority of potential roosting trees will remain unaffected; •the GHFF is highly mobile, is able to and has a history of moving to other suitable roost trees in the camp area, upstream or downstream from the camp area or to other camps in the locality and beyond; •works would generally be undertaken outside of the breeding and rearing season of the GHFF; •A number of mitigation measures would be implemented as part of vegetation works and include additional mitigation measures for any urgent works done within the breeding and rearing season of the GHFF; •Proposed vegetation works would not exacerbate any other recognised threats to the GHFF.
19. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.	There are no endangered populations recorded in the locality, thus the planned works are not likely to affect any endangered population.
20. In the case of an endangered ecological	Currently planned vegetation works (refer to **Section 6.1**) involve removal of one indigenous Forest Red Gum (*Eucalyptus*

community or critically endangered ecological community, whether the action proposed: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	*tereticornis*), several exotic weed trees, understory weeds and pruning of several trees in an area of less than one hectare within the area of the Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion EEC. Although the extent of vegetation removal may increase over a five year period to increase the separation buffer area or in response to roosting flying-foxes occupying trees in close proximity to other residences, the anticipated limited extent of works within the EEC is considered unlikely to have a significantly adverse effect on the extent or composition of the EEC such that its local occurrence is likely to be placed at risk of extinction, particularly with proposed compensatory offset plantings and weed control, refer to **Sections 6.1 and 6.2** .
21. In relation to the habitat of a threatened species, population or ecological community: (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	**The Grey-headed Flying-fox** Currently planned vegetation works (refer to **Section 6.1**) involve removal of one indigenous Forest Red Gum (Eucalyptus tereticornis), several exotic weed trees, understory weeds and pruning of several trees in an area of less than one hectare. Although the extent of vegetation removal may increase over a five year period, vegetation removal will only occur in areas adjoining residences thus minimising the risk of fragmentation and loss of habitat critical to the survival of the GHFF. Furthermore, the GHFF is highly mobile and able to move to other suitable roost trees in the camp area and beyond, and implementation of mitigation measures outlined in **Sections 6.1 and 6.2** would minimise habitat loss and fragmentation. **Subtropical Coastal Floodplain Forest EEC** Currently planned vegetation works (refer to **Section**) involve removal of one indigenous Forest Red Gum (Eucalyptus tereticornis), several exotic weed trees, understory weeds and pruning of several trees in an area of less than one hectare within the area of the Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion EEC. Although the extent of vegetation removal may increase over a five year period, works are proposed along the edges of the EEC adjoining residences, and implementation of mitigation measures outlined in **Sections 6.1 and 6.2** would minimise the risk of further fragmentation and degradation of the EEC.
22. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).	No areas of TSC Act listed critical habitat exists within the study area, thus no areas of critical habitat are likely to be affected by the proposal.
23. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.	Threatened species assessment guidelines (DECC 2007), state that *When deciding whether the proposal is consistent with the objectives or actions of a recovery plan or threat abatement plan, applicants/proponents must consider all relevant approved recovery plans and threat abatement plans. In addition, it is recommended that they refer to draft recovery plans and draft threat abatement plans, and threatened species profiles and related guidelines* As an alternative to recovery plans or threat abatement plans, OEH has prepared Priorities Action Statements (PAS) to promote the recovery of threatened species and the abatement of key threatening processes in NSW. Consideration should be given to measures outlined in the priorities action statements as well as existing recovery plans and threat abatement plans which will remain in place (DECC 2007). **The Grey-headed Flying-fox** Priority actions for the GHFF are as follows: •Protect roost sites, particularly avoid disturbance September through November. •Identify and protect key foraging areas. •Manage and enforce licensed shooting. •Investigate and promote alternative non-lethal crop protection mechanisms. •Identify powerline blackspots and implement measures to reduce deaths; implement measures to reduce deaths from entanglement in netting and on barbed-wire. •Increase public awareness/understanding about flying-foxes, and their involvement in flying-fox conservation. •Monitor the national population's status and distribution. •Improve knowledge on demographics and population structure to better understand ecological requirements of the species. Vegetation works are planned to occur outside of the September to November period to minimise impacts on the species. A draft national recovery plan has been prepared for the Grey-headed Flying-fox (DECCW 2009) and notes that 'On the basis of current knowledge, roosting habitat that meets at least one of the following criteria can be explicitly identified as habitat critical to survival, or essential habitat, for Grey-headed Flying-foxes. Roosting habitat that: 1. is used as a camp either continuously or seasonally in > 50% of years

2. has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 10 000 individuals, unless such habitat has been used only as a temporary refuge, and the use has been of limited duration (i.e. in the order of days rather than weeks or months)
3. has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 2 500 individuals, including reproductive females during the final stages of pregnancy, during lactation, or during the period of conception (i.e. September to May).

On this basis, roosting habitat at the Casino camp is critical to survival, or essential habitat, for the GHFF.

The planned removal of a small amount of roosting habitat is therefore not consistent with Objective 4 of the draft GHFF recovery plan, ie *To protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes*. However, a number of impact avoidance and mitigation measures are planned as outlined in **Section 6.2** to minimise loss of habitat and enhance existing habitat. This includes compensatory offset habitat plantings and weed control. Thus, planned vegetation works are not considered significantly inconsistent with objectives or actions of priority actions and recovery plans.

Subtropical Coastal Floodplain Forest EEC
There are no recovery plans or threat abatement plans (final or draft) directly relating to Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion EEC. Two PAS apply to Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion EEC, ie *Undertake weed control where required and ensure plans of management, fire planning and other planning processes consider Freshwater Wetland EECs*.

Weed control is planned within the EEC area and consideration has been given to impacts and impact mitigation for Freshwater Wetland EECs as part of this management planning process. Planned activities are therefore considered to be consistent with priorities actions for Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion EEC.

24. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The Grey-headed Flying-fox and Subtropical Coastal Floodplain Forest EEC

Threatened species assessment guidelines (DECC 2007), state that In addition to deciding whether the action/activity constitutes a KTP, consideration must also be given to whether the proposal is likely to exacerbate a KTP. Species listed in the determination as being 'at risk' warrant particular consideration if these species are known or likely to occur within the study area of the development or activity.

A threat can be listed under the TSC Act as a 'key threatening process' if it adversely affects threatened species, populations or ecological communities or if it could cause species, populations or ecological communities that are not threatened to become threatened (OEH 2015). **Table** provides an assessment of planned works and activities and their likely effects in contributing to KTPs.

Table . KTPs listed in Schedule 3 of the TSC Act

Key Threatening Process	Likelihood of activities to be classed as or substantially exacerbate a KTP		
	Likely	Possible	Unlikely
Aggressive exclusion of birds by noisy miners (Manorina melanocephala)			X
Alteration of habitat following subsidence due to longwall mining			X
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands			X
Anthropogenic climate change			X
Bush rock removal			X
Clearing of native vegetation	X		
Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus (L.)			X
Competition and habitat degradation by feral goats			X
Competition from feral honey bees			X
Death or injury to marine species following capture in shark control programs on ocean beaches			X
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments			X
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners			X
Herbivory and environmental degradation caused by feral deer			X
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition			X
Importation of red imported fire ants (Solenopsis invicta)			X
Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations			X
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			X
Infection of native plants by Phytophthora cinnamomi			X
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae			X
Introduction of the large earth bumblebee, Bombus terrestris			X
Invasion and establishment of exotic vines and scramblers			X
Invasion and establishment of Scotch broom (Cytisus scoparius)			X
Invasion and establishment of the Cane Toad (Bufo marinus)			X
Invasion of native plant communities by African Olive			X

Olea europaea L. subsp. cuspidata			
Invasion, establishment and spread of Lantana camara			X
Invasion of native plant communities by Chrysanthemoides monilifera (bitou bush and boneseed)			X
Invasion of native plant communities by exotic perennial grasses			X
Invasion of the Yellow Crazy Ant			X
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants			X
Loss of hollow-bearing trees			X
Loss and/or degradation of sites used for hill-topping by butterflies			X
Predation and hybridisation of feral dogs (Canis lupus familiaris)http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=20116			X
Predation by the European Red Fox Vulpes vulpes (Linnaeus, 1758)			X
Predation by the Feral Cat Felis catus (Linnaeus, 1758)			X
Predation by Gambusia holbrooki Girard, 1859 (Plague Minnow or Mosquito Fish)			X
Predation by the Ship Rat Rattus rattus on Lord Howe Island			X
Predation, habitat degradation, competition and disease transmission by Feral pigs			X
Removal of dead wood and dead trees			X

At present the site is substantially degraded by invasion of exotic perennial grasses, escaped garden plants and exotic vines and scramblers. Planned weed control and native plantings are likely to reduce these KTPs.

OEH (2015) define clearing as *the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long term modification, of the structure, composition and ecological function of stand or stands. The definition of clearing does not preclude management activities to control exotic species, or Australian species growing outside their natural geographic range.*

The planned vegetation works contribute to clearing of native vegetation through removal and pruning of native trees over an area of less than one hectare. However, compensatory / offset plantings at prescribed rates (refer to **Table 2**) are planned for indigenous non-roost species where native trees are removed, and Forest Red Gum and other indigenous trees in the alternative, preferred roost location in the riparian area of Queen Elizabeth Park. With adequate maintenance, these plantings are considered likely to sufficiently compensate for lost native vegetation over the medium to long term. Proposed works are therefore considered to be unlikely to substantially contribute to any KTP.

Important information for the applicant

Processing times and fees

The *Threatened Species Conservation Act 1995* provides that the Director-General must make a decision on the licence application within 120 days where a species impact statement (SIS) has been received. No timeframes have been set for those applications which do not require a SIS. The Director-General will assess your application as soon as possible. You can assist this process by providing clear and concise information in your application.

Applicants may be charged a processing fee. The Director-General is required to advise prospective applicants of the maximum fee payable before the licence application is lodged. Therefore, prospective applicants should contact the Office of Environment and Heritage (OEH) prior to submitting a licence application.

A $30 licence application fee must accompany a licence application.

Protected fauna and protected native plants*

Licensing provisions for protected fauna and protected native plants are contained within the *National Parks and Wildlife Act 1974.* However, a Section 91 Licence may be extended to include protected fauna and protected native plants when these will be affected by the action.

If you are applying for a licence to cover both threatened and protected species please provide the information requested in Item 10 *as well as* a list of protected species and details of the number of individuals animals or proportion and type of plant material which are likely to be harmed or picked.

Request for additional information

The Director-General may, after receiving the application, request additional information necessary for the determination of the licence application.

Species impact statement

Where the application is not accompanied by a SIS, the Director-General may decide, following an initial assessment of your application, that the action proposed is likely to have a significant effect on threatened species, populations or ecological communities, or their habitats. In such cases, the *Threatened Species Conservation Act 1995* requires that the applicant submit a SIS. Following initial review of the application, the Director-General will advise the applicant of the need to prepare a SIS.

Director-General's requirements for a SIS

Prior to the preparation of a SIS, a request for Director-General's requirements must be forwarded to the relevant OEH Office. The SIS must be prepared in accordance with section 109 and 110 of the TSC Act and must comply with any requirements notified by the Director-General of OEH.

Disclosure of Personal Information in the Public Register of s91 Licences

* Protected fauna means fauna of a species not named in Schedule 11 of the *National Parks and Wildlife Act 1974.*
Protected native plant means a native plant of a species named in Schedule 13 of the *National Parks and Wildlife Service 1974.*

The Public Register provides a list of licence applications and licences granted. A person about whom personal information is contained in a public register may request that the information is removed or not placed on the register as publicly available.

Copies of all applications and licences issued under section 91 and certificates issued under section 95 of the Act are available on the OEH website at www.environment.nsw.gov.au/threatenedspecies/S91TscaRegisterByDate.htm
or in hardcopy form from The Librarian, OEH, 59 Goulburn St, Sydney.

Certificates

If the Director-General decides, following an assessment of your application, that the proposed action is not likely to significantly affect threatened species, populations or ecological communities, or their habitats, a Section 91 Licence is not required and the Director-General must, as soon as practicable after making the determination, issue the applicant with a certificate to that effect.

N.B: An action that is not required to be licensed under the Threatened Species Conservation Act 1995, may require licensing under the National Parks and Wildlife Act 1974, if it is likely to affect protected fauna or protected native plants.

I confirm that the information contained in this application is correct. I hereby apply for a licence under the provisions of Section 91 of the *Threatened Species Conservation Act 1995.*

Applicant's name
(Please print)

Applicant's Position & Organisation *(if relevant)*
(Please print)

Applicant's signature

Date

For more information or to lodge this form, contact the nearest branch of OEH's Conservation and Regulation Division:

Metropolitan Branch
P: 02 9995 6802
F: 02 9995 6900
PO Box 668
Parramatta
NSW 2124

North East Branch
P: 02 6640 2500
F: 02 6642 7743
PO Box 498
Grafton
NSW 2460

North East Branch
P: 02 4908 6800
F: 02 4908 6810
PO Box 488G,
Newcastle
NSW 2300

North West Branch
P: 02 6883 5330
F: 02 6884 8675
PO Box 2111
Dubbo
NSW 2830

South Branch
Biodiversity Conservation Section
P: 02 6122 3100
F: 02 6299 3525
PO Box 622 Queanbeyan
NSW 2620

Office of Environment and Heritage (NSW)
PO Box A290, Sydney South NSW 1232
Phone: 131 555 (Environment Line) Fax: 9995 5999
Email: info@environment.nsw.gov.au

13. Appendix 4. Atlas of NSW Wildlife (BioNet) threatened species search results

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -28.81 West: 152.99 East: 153.09 South: -28.91] returned a total of 193 records of 24 species.
Report generated on 15/02/2015 11:36 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Aves	Anseranatidae	0199	*Anseranas semipalmata*		Magpie Goose	V,P		9	
Animalia	Aves	Anatidae	0216	*Oxyura australis*		Blue-billed Duck	V,P		6	
Animalia	Aves	Anatidae	0214	*Stictonetta naevosa*		Freckled Duck	V,P		13	
Animalia	Aves	Phaethontidae	0107	*Phaethon rubricauda*		Red-tailed Tropicbird	V,P		1	
Animalia	Aves	Ciconiidae	0183	*Ephippiorhynchus asiaticus*		Black-necked Stork	E1,P		104	
Animalia	Aves	Ardeidae	0196	*Ixobrychus flavicollis*		Black Bittern	V,P		1	
Animalia	Aves	Jacanidae	0171	*Irediparra gallinacea*		Comb-crested Jacana	V,P		14	
Animalia	Aves	Rostratulidae	0170	*Rostratula australis*		Australian Painted Snipe	E1,P	E	4	
Animalia	Aves	Scolopacidae	0161	*Calidris ferruginea*		Curlew Sandpiper	E1,P	C,J,K	1	
Animalia	Aves	Scolopacidae	0152	*Limosa limosa*		Black-tailed Godwit	V,P	C,J,K	1	
Animalia	Aves	Turnicidae	0013	*Turnix maculosus*		Red-backed Button-quail	V,P		2	
Animalia	Aves	Cacatuidae	0265	*^Calyptorhynchus lathami*		Glossy Black-Cockatoo	V,P,2		1	
Animalia	Aves	Tytonidae	0252	*^^Tyto longimembris*		Eastern Grass Owl	V,P,3		1	
Animalia	Aves	Monarchidae	0376	*Carterornis leucotis*		White-eared Monarch	V,P		1	
Animalia	Mammalia	Dasyuridae	1017	*Phascogale tapoatafa*		Brush-tailed Phascogale	V,P		1	
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	V,P	V	9	
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V	12	
Animalia	Mammalia	Vespertilionidae	1346	*Miniopterus australis*		Little Bentwing-bat	V,P		1	
Plantae	Flora	Fabaceae (Faboideae)	2833	*Desmodium acanthocladum*		Thorny Pea	V,P	V	2	
Plantae	Flora	Fabaceae (Faboideae)	3030	*Sophora fraseri*		Brush Sophora	V,P	V	2	
Plantae	Flora	Fabaceae (Mimosoideae)	7757	*Archidendron hendersonii*		White Lace Flower	V,P		1	
Plantae	Flora	Myrtaceae	11894	*Gossia fragrantissima*		Sweet Myrtle	E1,P	E	2	
Plantae	Flora	Myrtaceae	4255	*Melaleuca irbyana*		Weeping Paperbark	E1,P		3	
Plantae	Flora	Proteaceae	5372	*Grevillea hilliana*		White Yiel Yiel	E1,P		1	

14. Appendix 5. Commonwealth EPBC Act Protected Matters Report

Australian Government
Department of the Environment

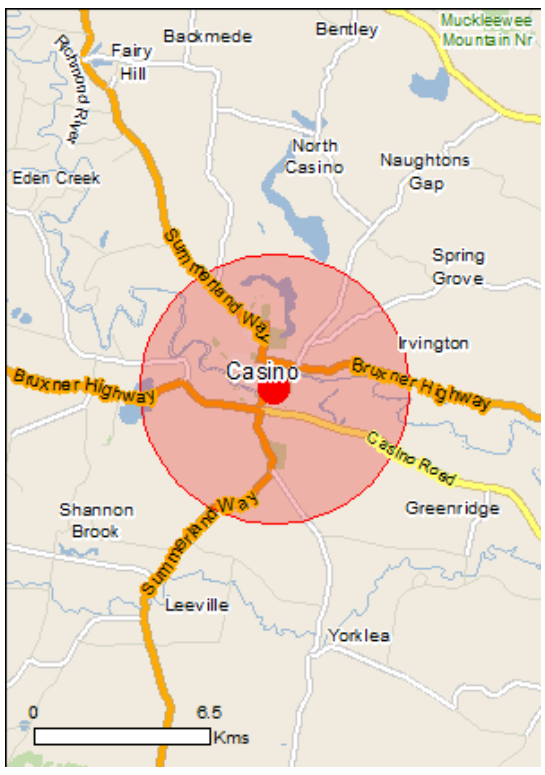
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

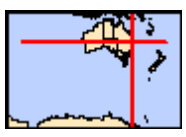
Report created: 15/02/15 23:49:45



This map may contain data which are ©Commonwealth of Australia(Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Areas	None
Listed Threatened Ecological Communities	1
Listed Threatened Species	21
Listed Migratory Species	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	5
Commonwealth Heritage Places:	1
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	15
State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	33
Nationally Important Wetlands:	None
Key Ecological Features (Marine):	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities (Resource Information)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area

Listed Threatened Species (Resource Information)

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus		
Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor		
Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Turnix melanogaster		
Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area

Mammals		
Name	Status	Type of Presence
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Allocasuarina defungens		
Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat may occur within area
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Eucalyptus glaucina		
Slaty Red Gum [5670]	Vulnerable	Species or species habitat likely to occur within area
Marsdenia longiloba		
Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis		
Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Streblus pendulinus		
Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species (Resource Information)

* Species is listed under a different scientific name on the EPBC Act – Threatened Species List.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Telstra Corporation Limited
Defence - CASINO GRES DEPOT (Army Training Depot) ; 41 RNSWR CASINO

Commonwealth Heritage Places		[Resource Information]
Name	State	Status
Historic		
Casino Post Office	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area

Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Richmond River (Casino to Broadwater)	NSW	Indicative Place
Historic		
Armstrong Residence	NSW	Indicative Place
Casino Roundhouse and Harman Coal Stage	NSW	Indicative Place
E S and A Bank (former)	NSW	Indicative Place
Manse (former) at rear of present Manse	NSW	Indicative Place
Police Station	NSW	Indicative Place
St Marks Anglican Church	NSW	Indicative Place
St Marys Catholic Church	NSW	Indicative Place
St Marys Convent Including Fence and Tree	NSW	Indicative Place
St Pauls Presbyterian Church	NSW	Indicative Place
Westpac Bank	NSW	Indicative Place
CBC Bank (Former) Including Residence and Stables	NSW	Registered
Casino Courthouse	NSW	Registered
Casino Post Office	NSW	Registered
Casino Post Office Group	NSW	Registered

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area

Sturnus vulgaris

Common Starling [389]

Species or species habitat likely to occur within area

Frogs

Rhinella marina

Cane Toad [83218]

Species or species habitat likely to occur within area

Mammals

Bos taurus

Domestic Cattle [16]

Species or species habitat likely to occur within area

Canis lupus familiaris

Domestic Dog [82654]

Species or species habitat likely to occur within area

Felis catus

Cat, House Cat, Domestic Cat [19]

Species or species habitat likely to occur within area

Lepus capensis

Brown Hare [127]

Species or species habitat likely to occur within area

Mus musculus

House Mouse [120]

Species or species habitat likely to occur within area

Oryctolagus cuniculus

Rabbit, European Rabbit [128]

Species or species habitat likely to occur within area

Rattus norvegicus

Brown Rat, Norway Rat [83]

Species or species habitat likely to occur within area

Rattus rattus

Black Rat, Ship Rat [84]

Species or species habitat likely to occur within area

Vulpes vulpes

Red Fox, Fox [18]

Species or species habitat likely to occur within area

Plants

Alternanthera philoxeroides

Alligator Weed [11620]

Species or species habitat likely to occur within area

Cabomba caroliniana

Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]

Species or species habitat likely to occur within area

Chrysanthemoides monilifera

Bitou Bush, Boneseed [18983]

Species or species habitat likely to occur within area

Chrysanthemoides monilifera subsp. rotundata

Bitou Bush [16332]

Species or species habitat likely to occur within area

Eichhornia crassipes

Water Hyacinth, Water Orchid, Nile Lily [13466]

Species or species habitat likely to occur within area

Genista sp. X Genista monspessulana

Broom [67538]

Species or species habitat may occur within area

Hymenachne amplexicaulis

Hymenachne, Olive Hymenachne Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]

Lantana camara

Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]

Species or species habitat likely to occur in area

Species or species habitat likely to occur within area

Pinus radiata

Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]

Rubus fruticosus aggregate

Species or species habitat may occur within area

Blackberry, European Blackberry [68406]

Species or species

Species or species habitat likely to occur within area

Sagittaria platyphylla

Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]

Salvinia molesta

Species or species habitat likely to occur within area

Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]

Senecio madagascariensis

Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]

Species or species habitat likely to occur within area

Solanum elaeagnifolium

Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]

Coordinates

-28.86673 153.04916

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International
Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from
recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic
distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales

-Department of Sustainability and Environment, Victoria

-Department of Primary Industries, Parks, Water and Environment, Tasmania

-Department of Environment and Natural Resources, South Australia

-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts

-Environmental and Resource Management, Queensland

-Department of Environment and Conservation, Western Australia

-Department of the Environment, Climate Change, Energy and Water

-Birds Australia

-Australian Bird and Bat Banding Scheme

-Australian National Wildlife Collection

-Natural history museums of Australia

-Museum Victoria

-Australian Museum

-SA Museum

-Queensland Museum

-Online Zoological Collections of Australian Museums

-Queensland Herbarium

-National Herbarium of NSW

-Royal Botanic Gardens and National Herbarium of Victoria

-Tasmanian Herbarium

-State Herbarium of South Australia

-Northern Territory Herbarium

-Western Australian Herbarium

-Australian National Herbarium, Atherton and Canberra

-University of New England

-Ocean Biogeographic Information System

-Australian Government, Department of Defence

-State Forests of NSW

-Geoscience Australia

-CSIRO

-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

15. Appendix 6. Aboriginal Heritage Information Management System (AHIMS) database search results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 00000

Client Service ID : 188823

Date: 04 September 2015

Michael Hallinan

334 pearces creek road
alstonville New South Wales 2477

Attention: Michael Hallinan

Email: mjhallinan@netspace.net.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -28.8707, 153.0411 - Lat, Long To : -28.8647, 153.0506 with a Buffer of 50 meters, conducted by Michael Hallinan on 04 September 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0 Aboriginal sites are recorded in or near the above location.
0 Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.

If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.

You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.

AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;

Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,

Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.

Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
ahims@environment.nsw.gov.au
Tel: (02) 9585 6380 Fax: (02) 9873 8599
www.environment.nsw.gov.au

ABN 30 841 387 271
Email:

Web: