Cannes Reserve and Gunyah Place Reserve Plan of Management

including Cannes Reserve Flying-fox Colony Management Plan

Note. This document forms a reserve chapter in the Pittwater Natural Areas Plan of Management, 2010

Prepared under the Local Government Act, 1993

Adopted 1 August 2011

PITTWATER COUNCIL

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1. Reserve Profile

1.1 Geographical Names Board

The Reserves are not registered with the Geographical Names Board.

1.2 Study Area

The study area includes Cannes Reserve (Lot 18 DP 236595 and Lot 2 DP 209496) Gunyah Place Reserve (Lot 4 DP 232257) and a section of Net Road, which is an unformed road. Currently there are no plans to develop the unformed road as a thoroughfare for traffic. Refer to Figure 1. Study Area.

1.3 Location

Cannes Reserve – 7a Cannes Drive, Avalon. Gunyah Place Reserve – 6a Gunyah Place, Avalon.

1.4 Previous Plan of Management

Gunyah Place Reserve – Parks & Playgrounds PoM, November 2000. Cannes Reserve - nil

1.5 Tenure

The study area is managed by Pittwater Council. Cannes Reserve and Gunyah Place Reserve are owned by Pittwater Council having been developed from the subdivision of land in 1967/1968.

1.6 Area

Cannes Reserve - 0.53 hectares, Gunyah Place Reserve – 0.08 hectares, unformed road (section of Net Road) - 0.14 hectares. Total - 0.75 hectares

1.7 Zoning

Reserves - 6(a) Existing Recreation. Unformed road - unzoned. Adjoining properties 2(a) Residential "A". Refer to Figure 4. Zoning map.

1.8 Context

The Reserves were created as part of a suburban subdivision dating from the late 1960s. The area surrounding the Reserves is zoned 2(a) Residential ("A") consisting of low density housing within a forest setting. 14 residences adjoin the Reserves.

1.9 Catchment

Stokes Point Catchment.

1.10 Classification

Reserves - Community land. Unformed road - unclassified.

1.11 Categorisation - Local Government Act 1993, s. 36 (5)

Proposed categories: 'Natural Area - Bushland'; 'Natural Area - Watercourse' and 'Park'. Refer to Figure 3 Proposed land categories map.

1.12 Land Use/Purpose

Cannes Reserve provides the local area with scenic and environmental qualities. The bushland setting promotes habitat and movement corridors for native fauna.

Gunyah Place Reserve provides an area of cleared open space for outdoor recreation and a playground consisting of a swing and a slide.

Extent of study area

Figure 1. Study area - Canes Reserve and Gunyah Place Reserve

1.13 Access

The only area easily accessible to the public is Gunyah Place Reserve. Cannes Reserve is difficult to access due to steepness, boggy conditions and dense vegetative growth. The area occupied by the unmade road once provided pedestrian access between Cannes Drive and Therry Street, however the lower section of the track is currently inaccessible.

1.14 Topography and soils

The site is steep, sloping towards the west - from Cannes Drive towards Therry Street. The shale soils are derived from **the Narrabeen Group.**

1.15 Hydrology

A drainage line is located along the north-west-facing slope. Stormwater enters Cannes Reserve from a culvert between 7 to 9 Cannes Drive and adjacent to 17 Net Road.

1.16 Vegetation description

The current vegetation is indicative of the presence of two endangered ecological communities - Littoral Rainforest and Pittwater Spotted Gum Forest. The site was impacted by clearing during the 1970s for drainage works and was used by Council for material storage and is currently weed infested.

Endangered Ecological Communities

The vegetation communities at the site consist of Littoral Rainforest and Pittwater Spotted Gum Forest which have both been listed as Ecologically Endangered Species under Schedule 1 of the *NSW Threatened Species Conservation Act, 1995*. The forest species tend to be more prevalent towards the eastern edge of Cannes Reserve and the rainforest species tend to be more prevalent near the watercourse. Two mature Cheese Trees (*Glochidion ferdinandii*) are also located in open parkland at Gunyah Place Reserve.

Cannes Reserve is degraded by encroachments and weed growth. Weeds include Small Leaved Privet (*Ligustrum sinense,)* Wandering Jew (*Tradescantia fluminensis*) and Balloon Vine (*Cardiospermum grandiflorum*). Introduced tree species include exotic Palm species, Bananas (*Musa sp.*) and Citrus species.

A vegetation survey has recently been conducted in the Pittwater local government area. The results of the survey are available in the draft Pittwater Vegetation Classification and Mapping, pre 1750 Vegetation Mapping and Bushland Management Plan by Bangalay (Ecological and Bushfire) and Eastcoast Flora Surveys.

The distribution of the vegetation communities at the Reserve can be seen in Figure 2.

Pittwater Spotted Gum Forest - Two subforms of Spotted Gum Forests occur in the Pittwater local government area - dry and wet. Cannes Reserve contains the wet form. This community occurs on the lower slopes of shale derived soils in areas of high rainfall. It is characterised by the presence of a tall, canopy of Spotted Gum (*Corymbia maculata*), over a lower tree layer of Cabbage Tree Palm (*Livistona australis*), Turpentine (*Syncarpia glomulifera* subsp. *glomulifera*) and Forest Oak (*Allocasuarina torulosa*). The understorey vegetation is generally dominated by mesic species, such as Sweet Pittosporum (*Pittosporum undulatum)*, Native Olive (*Notelaea longifolia*), *Wilkea, Acmena smithii* and *Ficus coronota*.

Littoral Rainforest is found on protected escarpment slopes and gullies along the NSW Coast within a two kilometre radius of the coastline. The florestic composition reflects both dry and subtropical forms (Floyd, 1990). Various subforms of Littoral Rainforest occur in the Pittwater local government area. The canopy at some sites may have occasional emergent eucalyupt species. The most frequently recorded species include Lilly Pilly (*Acmena smithii*), Cabbage Tree Palm (*LIvistona australis*), Sweet Pittosporum (*PIttosporum undulatum*) Scentless Rosewood (*Synoum glandulosum*) and Cheese Tree (*Glochidion ferdinandi*). The ground cover generally consists of ferns, broken only by fallen trees and rock outcrops. A diversity of vines and climbers are present between the upper canopy and the forest floor.

Further information on the vegetation is included in the Cannes Reserve Flying-fox Colony Management Plan and Addendum as attached.

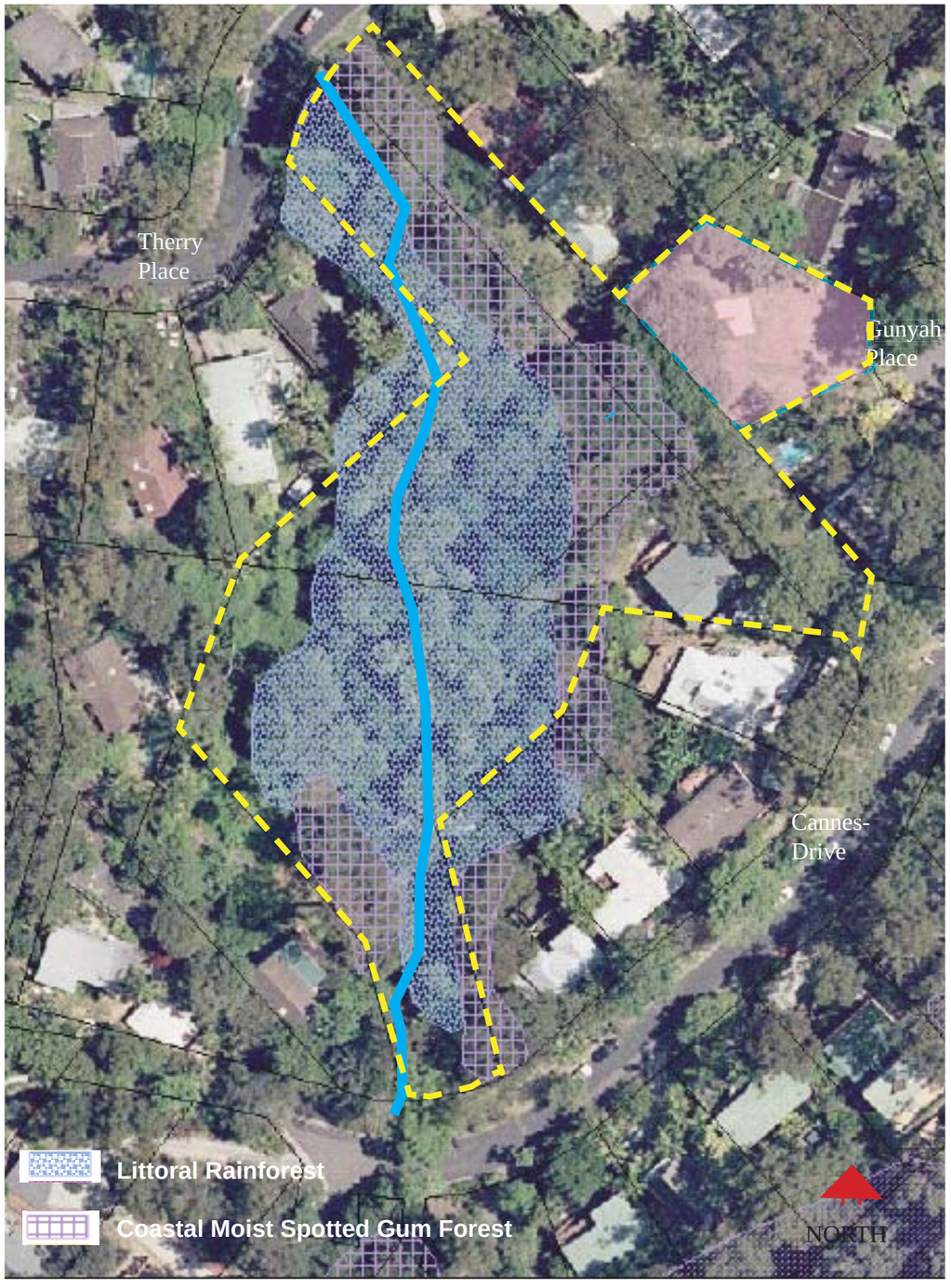


Figure 2. Vegetation distribution

1.17 Weeds

The vegetation is heavily disturbed with dense weed and exotic species present in all structural layers, although intact stands of Cabbage Tree Palms (*Livistona australis)*, emergent eucalypts and native understorey species are present.

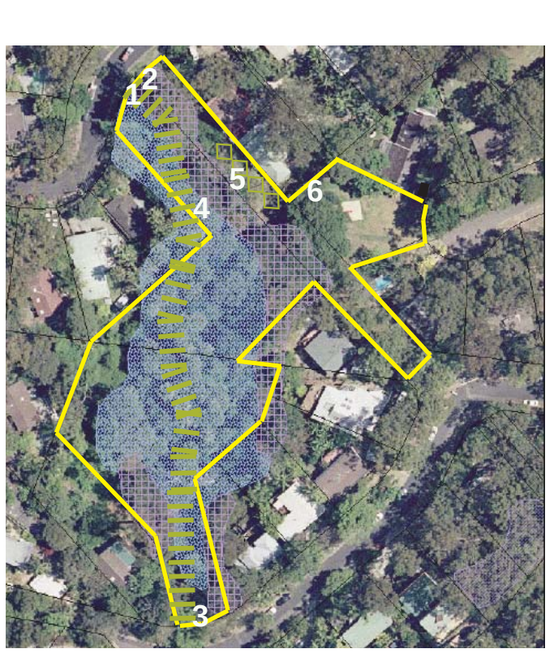
Canopy weeds have led to the death of some mature trees, particularly towards the edges of the Reserve. Garden escape trees at the edges of the Reserve includes Bamboo, exotic palms and Banana (*Musa sp.*)

Canopy weeds include Morning Glory (*Ipomea indica*), Moth Vine (*Araujia sericifera*), Balloon Vine (*Cardiospermum grandiflorum*), Water Vine (*Cissus hypoglauca)* and Black Eyed Susan (*Thunbergia alata).*

The sub-canopy and understorey; particularly within the Littoral Rainforest zone along the watercourse, is dominated by Lantana (*Lantana canara*), Small Leaved / Chinese Privet *(Ligustrum sinese) and* Broad Leaf Privet (*Ligustrum lucidum).*

The ground layer is dominated by a dense cover of Wandering Jew (*Tradescantia fluminensis*) and vines, both native and exotic, and some native herbs mixed in with the herbaceous weeds and vines.

Note: The boundaries between Cannes Reserve and adjoining residences are unclear and the dense vegetation restricts access to some areas.



KEY

dense weeds in riparian area

grass

Numbers refer to Plates 1-6.

Figure 3. Weeds map

1. Cannes Reserve - entrance from Therry Street

2 Cannes Reserve - entrance from Therry Street

3 Cannes Reserve - entrance from Cannes Drive

4 Cannes Reserve -Cabbage Tree Palms near the drainage line

5 Net Road (unmade road) adjacent to Gunyah Place Reserve

6 Gunyah Place Reserve

Plates 1 - 6 Existing site conditions

1.18 Fauna

Recordings of Threatened Species

Squirrel Glider (*Petaurus norfolcensis*)

Anecdotal evidence suggests that 17 years ago there were Squirrel Gliders in the area. One sighting has been recorded locally at Stapleton Reserve in 2002.

Powerful Owl (*Ninox strenua*)

One sighting at 29 Cannes Drive by Council staff in April 2010.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

Cannes Reserve has been home to a colony of Grey-headed Flying-fox for at least the past ten years. In March / April 2010 numbers rose to 1,500. since then numbers have stabilised at around 360 animals. Refer to Cannes Reserve Flying-fox Management Plan and Addendum for further information.

Recordings of Non-threatened Native Species

Other species recorded within the Reserve include Sulphur Crested Cockatoo, Rainbow Lorikeet, Galah, Southern Boobook Owl, Wood Duck, Pacific Black Duck, Noisy Miner, Eastern Rosella, Long-nosed Bandicoot, Brushtail Possum, Sydney Toadlet, Striped Malsh Frog.

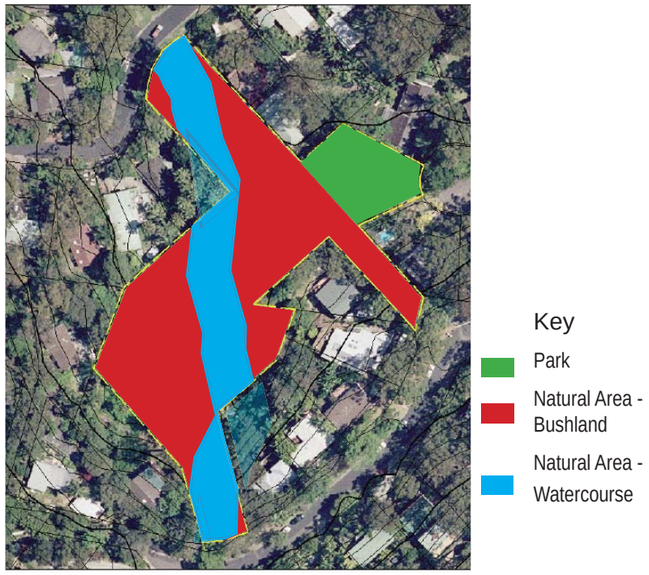


Figure 4. Proposed land categories map

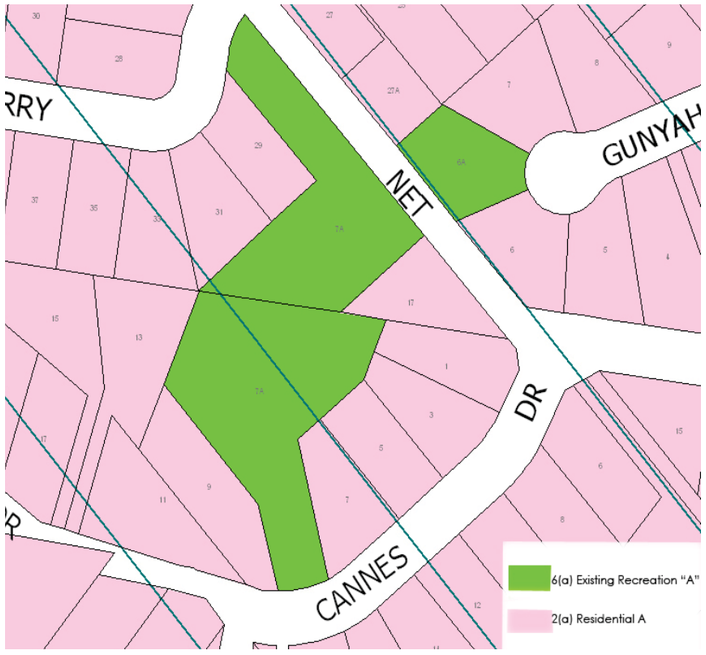


Figure 5. Zoning

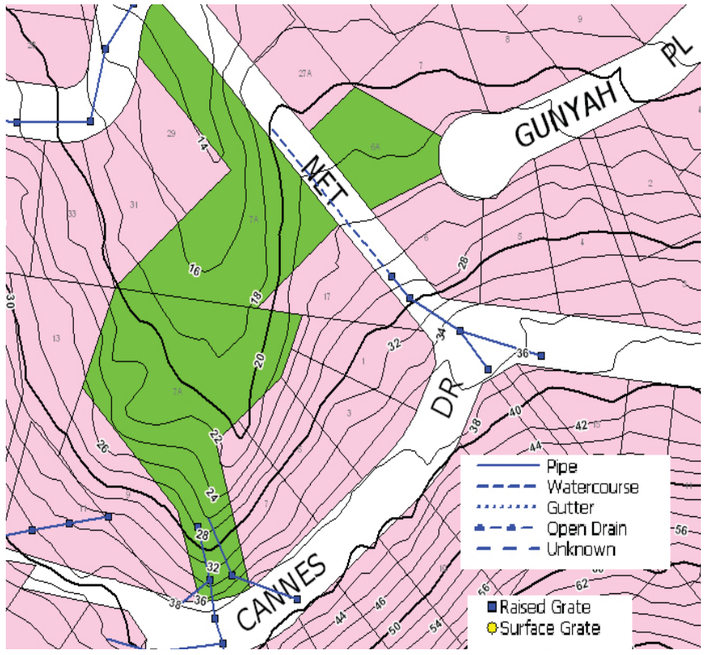


Figure 6. Topography and hydrology

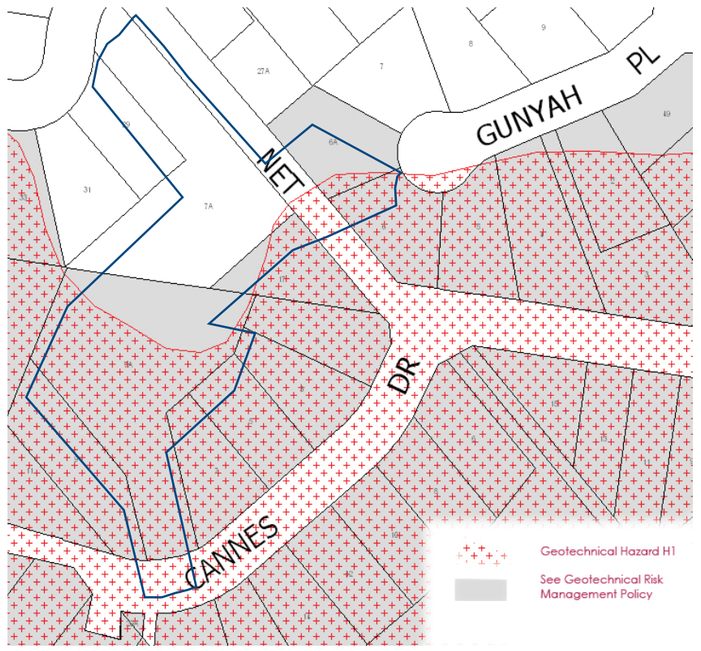


Figure 7. Geotechnical

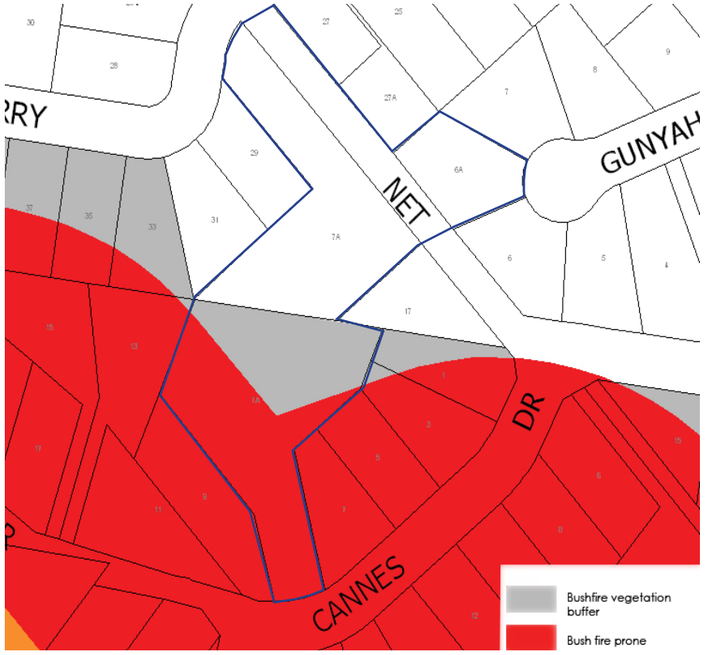


Figure 8. Fire

2. Management Issues, Policies and Actions

This document forms a reserve chapter in the Pittwater Natural Areas Plan of Management. The management strategies for Cannes Reserve and Gunyah Place Reserve are contained in the following table which should be read in conjunction with Part 1 of the Pittwater Natural Areas Plan of Management. Refer to Management Issues and Policies pp. 17-39 and Management Strategies Table pp. 40-51.

Table 1. Management Issues, Policies and Actions

Issue	Cross Ref to Part 1	Further Issues	Further Actions
Research, Education and Community Participation	5.2	A working group has been formed to address any concerns raised by residents due to the presence of the Grey-headed Flying-fox. Refer to the Grey-Headed Flying-fox Management Plan on pp. 8 - 19.	The working group has been appointed for an initial period of 12 months to be reviewed at the end of this time frame. The working group has been involved in the development of this plan of management and will continue to provide input for the duration of the plan or as required.
Encroachments	5.3	There are a number of encroachments located at the interface with neighbouring properties.	Encorachments are located around the edge of Cannes Reserve, although it is difficult to determine the boundaries in most areas. Remove accroachments and restore the EEC in accordance with the Cannes Reserve Grey-headed Flying-fox Management Plan on pp. 8 - 19.
Water Catchment and drainage	5.7	The watercourse and surrounding riparian zone are weed infested, eroded in areas and generally degraded. Refer to Figure 5 Topography and hydrology map.	Restore the riparian zone .
Geotechnical Risk Management and Erosion	5.8	The eastern section of the Reserves are subject to slip, having been identified as Geotechnical Hazard H1. Refer to Figure 6 Geotechnical map.	Refer to Council's Geotechnical Risk Management Policy for guidance before carrying out works in areas that are subject to slip.
Biodiversity Plant Communities Bushland Restoration Weed Management Local Fauna and Introduced Animals	5.9 5.9.1 5.9.2 5.9.3 5.9.4	Remove weeds and protect and improve the viability of the Littoral Rainforest and Spotted Gum Forest endangered ecological communities.	Restore the EEC in accordance with the Cannes Reserve Grey-headed Flying-fox Management Plan on pp. 8 - 19.
Fire Management	5.10	The southern end of Cannes Reserve is fire prone in accordance with the Bushfire Management Plan. Refer to Figure 7. Fire map.	Manage the Reserves to reduce the impact of fire as required by the Rural Fire Service. Encourage adjoining residents to develop an asset protection zone on their properties in accordance with guidelines from the Rural Fire Service and Pittwater Bushfire Management Plan.
Recreational Uses	5.11	Cannes Reserve is unsuitable for recreational uses. Gunyah Place Reserve - ensure the use of the Reserve is consistent with the Land Use Planning Table (Appendix 2) contained in the Parks and Playgrounds PoM.	Cannes Reserve - discourage recreational uses Gunyah Place Reserve - Retain the parkland character of the Reserve and maintain the playground.
Access and Walking Tracks	5.13	The area occupied by the unmade road provides pedestrian access between Cannes Drive and Therry Street, although the lower section of the track is currently inaccessible.	Improve pedestrian access though Net Road over the longer term. Investigate steps from Cannes Drive.
Risk Management and Public Safety	5.15	Cannes Reserve is unsuitable for recreational uses.	Discourage recreational uses of Cannes Reserve. Provide education material to local residents regarding the Grey-headed Flying-fox.

3. Cannes Reserve Grey-headed Flying-Fox Colony Management Plan

3.1 Introduction

This management plan aims to provide the strategic framework for the conservation and management of two endangered ecological communities (EEC) being Pittwater Spotted Gum Forest and Littoral Rainforest, and the colony of Grey-headed Flying-fox that has occupied Cannes Reserve for approximately the past ten years.

The Grey-headed Flying-fox is listed in NSW and nationally as a threatened species with the conservation status of 'vulnerable' meaning likely to become 'endangered'.

The Grey-headed Flying-fox has particular requirements in regards to selecting their roosting sites. Camps are often in gullies, near water and in habitats with dense tree cover and are likely to be found in parks (McDonald Madden et al 2005). Research indicates that Grey-headed Flying-fox camps are strategically located in convenient locations in relation to food sources (Parry-Jones and Augee 2001: Smith 2007). The lower area of Cannes Reserve provides a suitable environment for the Grey-headed Flying-fox with its cool, sheltered gully with drainage line. Although westerly facing, it is sheltered by the surrounding topography.

The number of Grey-headed Flying-fox at Cannes Reserve fluctuates. It has risen significantly and declined, depending on external influences. Over the past couple of years core numbers have increased gradually from about 200 to 360 animals. This is possibly due to loss of habitat and natural food sources in other areas and the recent floods in north-eastern Australia. Monitoring of the colony indicates that it has changed from being male dominated to include a maternity colony. This is the only maternity colony in the Pittwater LGA.

Cannes Reserve (including Net Road) comprises an area of 0.67 hectares and is representative of Pittwater Spotted Gum Forest on the upper slopes and Littoral Rainforest following the drainage line, particularly in the lower section of the reserve.

Anecdotal evidence suggests that most of Cannes Reserve was cleared when drainage works were carried out approximately twenty years ago. For many years there has been little maintenance. During this time, natural regeneration has occurred, but the Reserve has also become heavily weed infested.

Further information on the site is contained within the following sections of the document:

- Land status and zoning – pages 3 - 5
- Vegetation description and mapping – page 4
- Vegetation surveys - pages 14 -17
- Grey-headed Flying-fox ecology - page 20
- Littoral Rainforest description and distribution - page 21
- Pittwater Spotted Gum Forest description and distribution - page 22

3.2 Objectives

The PoM aims to achieve the following objectives:

- comply with legislative requirements; animal welfare and conservation objectives;
- endeavour to ensure all outcomes balance the amenity of local residents with viable habitat for the Grey-headed Flying-foxes. Considering the small size of the Reserves and close proximity of adjoining residences, the Reserves will be managed in order to:
  - conserve the Grey-headed Flying-fox, encouraging roosting away from the Reserve boundaries;
  - maintain Grey-headed Flying-fox numbers at a sustainable level in relation to local amenity;
- endeavour to ensure that public health and safety are not compromised;
- protect, restore and enhance the EEC vegetation; and
- provide community education and awareness of Grey-headed Flying-fox and biodiversity issues in relation to Cannes Reserve on Council's web site. See link on page 12.

3.3 Management Directives

The general management directives can only be achieved through adaptive management practices that respond to new situations as they arise. The management of the Reserves are complex and will consist of a long term process based on modifying the vegetation to:

- encourage the Grey-headed Flying-fox to roost away from boundaries towards the core of Cannes Reserve,
- evaluate the Grey-headed Flying-fox response; then
- reassess the situation

It is recommended by the Office of Environment & Heritage that works in or near the roosting area be carried out between May to July to reduce impacts on the breeding cycle of the Grey-headed Flying-fox. This timeframe represents the only opportunity to address any issues of concern that have been existent for some time. Consequently any planning for works to be carried out will need to occur within stated timeframes.

Work plans will be devised over time and determined by outcomes from monitoring the Grey-headed Flying-fox colony and its impact on the amenity of residents.

In an ideal situation, Cannes Reserve can support about 200 Grey-headed Flying-fox with minimal impact on residents. This is the number of Grey-headed Flying-fox roosting at the Reserve before adjoining residents reported that the animals were impacting on local amenity.

The plan has been prepared to cover a five year term. During this time management practices will need to adapt to new situations as they arise. It is suggested that a working party consisting of key stakeholders meet on a six monthly basis or as required.

Stakeholders consist of adjoining residents who are directly impacted by the colony at Cannes Reserve, a representative from an animal welfare organisation, a representative from the Office of Environment & Heritage and representatives from Council.

Ongoing management directions will be in accordance with recommendations by the working group and agreed by Council and the Office of Environment & Heritage. The operation of the working group will be reviewed every 12 months with the term of appointment being extended until issues within the Reserve have been addressed. Member representation may change over time.

Preliminary works were undertaken in July 2010 in order to modify the area of occupation by the Grey-headed Flying-fox colony and to remove exotic trees and vegetation. Works were carried out under Section 95 Certificate number 1115987 issued 5 July 2010 (*NSW Threatened Species Conservation Act, 1979*).

Additional works are proposed during May to July 2011. See Attachment 1. The works aim to encourage the fGrey-headed Fying-foxes away from the northwestern boundary and towards the core of the Reserve and to rehabilitate the EEC vegetation in this area. Refer to Attachment 1.

3.4 Habitat Management

Several management zones have been designated to aid management. The zones are shown in the masterplan on page 13 and include:

- Zone 1 – current flying-fox roosting area;
- Zone 2 – proposed restricted canopy buffer zone between neighbouring residences. Vegetation in the buffer zone is restricted to species that reach a height less than three metres where impacting on neighbouring residences;
- Zone 3 – core area of Cannes Reserve. This consists of the estimated area that the flying-fox normally occupy; and
- Zone 4 – Gunyah Place Reserve.

Activities within the reserve are to be cross-referenced with the strategies provided in Table 2 Management Strategies. This will help to ensure that activities consider a range of issues that have been identified.

Zone 1 - Main Roosting Area

Description

Zone 1 is located at the north-western side of the Reserves in a sheltered gully comprising Littoral Rainforest species. Although this zone comprises the main area occupied by the Grey-headed Flying-fox, when numbers increase they also occupy areas on the upper slope towards Cannes Drive.

Note: Refer to Zone 2 to address the area that overlaps the roosting area with the canopy buffer zone.

Objectives

- Conserve roosting area (except in canopy buffer zone)
- Rehabilitate EEC

Actions

- Retain habitat for the Grey-headed Flying-fox, except in the canopy buffer zone
- Encourage Grey-headed Flying-foxes away from boundaries
- Gradually remove non-indigenous trees, vegetation and grass and rehabilitate the EEC
- Tree removals, pruning, planting and weed control shall consider any changes in the microclimate that may impact on the Grey-headed Flying-fox colony.

Priority

- High - monitor roosting trees and habitat
- High - monitor the wellbeing of the Grey-headed Flying-fox
- High - monitor the impact of the Grey-headed Flying-foxes on adjoining residences
- High – weed control and planting

Outcome - Roosting area conserved in core of Cannes Reserve

Zone 4 - Gunyah Place Reserve

Gunyah Place Reserve comprises a mown park with playground. The Reserve contains two mature Cheese trees currently not used for roosting by the Grey-headed Flying-fox.

Objectives

- Retain parkland for recreational uses
- Retain playground to Australian Standards
- Discourage Grey-headed Flying-fox from this area

Actions

- When working at the Reserve, consider the impact of noisy machinery on the Grey-headed Flying-fox.
- Retain the open grassland. Do not introduce canopy trees favoured by the Grey-headed Flying-fox.

Priority

- High – monitor trees for roosting by the Grey-headed Flying-fox

Outcome - Gunyah Place reained as parkland

Zone 2 - Restricted Canopy Buffer to the Perimeter of Cannes Reserve

Description

Zone 2 consists of a seven metre wide area located around the perimeter of Cannes Reserve and overlaps with the main roosting area towards the north-western side of the Reserves.

Objectives

- Discourage Grey-headed Flying-foxes from roosting in this area as the need arises
- Establish buffer plantings as required
- Reduce weeds and regenerate as appropriate with EEC species retaining a canopy height under three metres where appropriate.

Actions

- As the need arises, create a seven metre buffer around the perimeter of Cannes Reserve to form a buffer between the colony and adjoining residents. This may assist in reducing the impact of the Grey-headed Flying-fox on adjoining residents. Revegetation will be employed where natural regeneration potential is limited or where a dense visual screen is desired. Plants will be less than three metres high when mature (unsuitable for roosting).
- Tree removal and pruning will be carried out following discussions with adjoining residents and subject to an s. 91 licence application. Should EEC tree species germinate in the canopy buffer zone or on private property they may be considered for transplanting to the core area of Cannes Reserve or another local reserve as appropriate (see zone 3).
- Initial works will commence in the north-western side of Cannes Reserve. An s. 91 licence application has been submitted to the Office of Environment & Heritage for authority to carry out this work as well as removing or poisoning non-indigenous plants to rehabilitate this whole area. See attachment 1. Works will be carried out in May to July for least impact on the Grey-headed Flying-fox. This area shall be closely monitored over the next year to evaluate any impacts on the Grey-headed Flying-fox and on the amenity of neighbours.
- The buffer zone is also intended to restrict the size of the core area of the reserve to maintain Grey-headed Flying-fox numbers to a sustainable level in relation to local amenity (see zone 3).
- Upgrade the walking track from Cannes Drive to Therry Street using low impact materials at 1200mm wide. Upgrade steps at the corner of Net Road and Cannes Drive.

Priority

- High – works are to be carried out as the need arises depending on the presence and number of Grey-headed Flying-fox in this zone.

Outcome - Grey-headed Flying-fox colony gradually shifted a reasonable distance from residents.

Zone 3 - Core

Zone 3 is located in the core area of Cannes Reserve and covers approximately 3,000 square metres. A drainage line runs along the western side of this area with Littoral Rainforest endangered ecological community.

Objectives

- Protect, conserve and restore EEC
- Regenerate area
- Encourage Grey-headed Flying-fox to relocate towards the centre of the core area.

Actions

- Manage the core of Cannes Reserve in order to maintain the number of Grey-headed Flying-foxes at a sustainable level in relation to local amenity. Shifting the colony towards the core of Cannes Reserve will move the animals closer to residents currently less affected. This may create future issues. Additional plantings of roost trees will be kept to a minimum as determined by the outcome of management practices.
- Work slowly and systematically in this area in order to retain conditions suitable for the Grey-headed Flying-fox. Initially remove weeds that are unsuitable for roosting. Retain existing tall trees to provide roosting opportunities and upper and middle canopy trees to reduce wind exposure and retain shade. Retain shade tolerant species in the ground layer to help retain a cool, dense environment. Promote natural regeneration of the EEC.
- Undertake selective vine removal in areas that are unlikely to affect the temperature or habitat suitability for the Grey-headed Flying-fox. Assess whether some vines should remain in the canopy to prevent the creation of more roost sites.
- Consider revegetation only if natural regeneration does not occur and in consideration of the activities of the Grey-headed Flying-foxes. Leave dead plants in-situ to provide perches for birds and roosting opportunities for the flying-fox in this zone.

Priority

- High – commence in 2011. Works to be carried out according to best practice bush regeneration techniques (see footnotes page 11).

Outcome - Grey-headed Flying-fox colony retained in-situ

3.5 Management Strategies

The management strategies are intended to be incorporated into the general works program.

Table 2. Management Strategies. Strategies are intended to be incorporated into the general works program.

Issue	Strategies
Protect the Grey-headed Flying-foxes	Care should be taken to not disturb camps under the following circumstances: • During the mating season (March to May iclusive) and from when females are heavily pregnant until the young can fly independently. (August to February inclusive). • When there are adverse climatic conditions, such as fire, flood and drought as food and water availability may be low. • When daytime temperatures are extremely high due to the time taken for animals to abandon the camp and move to a new location, as they may be exposed to high daytime temperatures while searching for a new roost. • When the Office of Environment & Heritage considers it likely that, due to proximity, flying-foxes disturbed from a camp will join camps in nearby towns [reserves or suburbs], compounding problems at those sites (DECCW 2007, p.6). • Note: It is to be recognised that disturbances may be unavoidable in some circumstances.
Work practices to prevent the unnecessary disruption of the flying-fox	• Stop work if greater than or equal to 10% of the flying-foxes become unsettled and remain flying for 10 minutes or more and contact Council. • Retain vegetative cover and a cool, moist microclimate which is favourable for the Grey-headed Flying-fox. • Work within one area of the site at a time to allow the Grey-headed Flying-foxes to retreat if they feel threatened. Work in small groups, preferably during the early morning and with consistency in starting locations. • Manually remove weeds wherever possible. Noise from two stroke engines such as chainsaws, whipper snippers and lawn mowers are the most disruptive to roosting Grey-headed Flying-foxes. Avoid sudden movements and loud noises. • Where possible, replant areas that require mowing with groundcovers or shrubs less than three metres high. • Major works should take place between May and July.
Safeguard public health	• The Grey-headed Flying-fox should not be handled unless the handler is appropriately vaccinated and trained. Should you be bitten or scratched by a flying-fox wash the area thoroughly and contact your health professional immediately. • Considerations of the risk of disease are to be included in all Occupational Health and Safety directions. • Provide the Department of Health's guidelines regarding all diseases carried by the Grey-headed Flying-fox to all staff, contractors and volunteers prior to commencing works. • Ensure information on public health issues is available to the wider public on Council's website. • Discourage public access through the core area of Cannes Reserve.
Maintain suitable conditions for the flying-foxes	• Accept that defoliation and loss of upper canopy trees is a natural process associated with flying-fox camps (Hall and Richards 2000; Hall 2002) and that the vegetation will regenerate. • Research indicates that flying-foxes prefer roosting sites adjacent to water sources (Hall and Richards 2000). Although the watercourse at Cannes Reserve is ephemeral, the dampness of the site provides a moist environment. Maintain a moist, sheltered environment as favourable to the Grey-headed Flying-fox (which may include retention of weed species as an interim measure).
Restore the Endangered Ecological Plant Communities	• **Council will work with the OEH to find suitable site/s to provide an offset for any potential EEC loss from Cannes Reserve due to the creation of the buffer. Further considerations will include the suitability of sites for potential GHFF habitat** • Generally the Reserve should be allowed to regenerate naturally following weeding. Allow at least 18 months to see if regeneration has taken place before considering revegetation. • Where infill planting is required, plant tube stock grown from local provenance seed. Water plants on installation and during establishment as required. All plants shall be bagged and staked at the time of installation where rabbit activity is present. Continue to maintain protection until plants are sufficiently mature to withstand rabbit activities.

Table 2. Continued

Issue	Strategies
Weed removal	• Follow best practice bush regeneration techniques as documented by the National Trust and Buchanan. [1]. Otherwise potential roost trees should be kept away from private tenure areas. • Begin works in buffer zones where disturbance has occurred (see Appendix 1), otherwise work from upper slopes to lower slopes. • Retain some weeds where appropriate to assist with the establishment of new plantings and retain a moist microclimate. • Monitor weeds near the camp site because Grey-headed Flying-fox can introduce seeds from species they have been feeding on through their excrement. • Generally hand weeding is recommended. Should the use of herbicides be necessary, restrict spraying to edges, otherwise use 'cut and paint' or scrape and paint' methods. Do not spray around the drainage line. • Retain mulch to prevent slip especially towards Cannes Drive. Install natural terracing if required to safely work slopes and reduce the risk of erosion. • Maintain all previously worked areas prior to commencing new primary works. • It is suggested that Grey-headed Flying-fox recognise clothing, consider retaining the same people working at the Reserves.
Provide assistance to the residents to manage the impact of the flying-foxes on their properties	• Should residents wish to extend the EEC canopy buffer zone onto their properties, Council will provide technical expertise. Otherwise potential roost trees should be kept away from the home. • Should the Grey-headed Flying-fox roost in trees on private property, Council will provide technical assistance where requested for property owners to apply for an s. 91 licence. Works on private property are at the expense of the property owner.
Provide ongoing public support	• Increase public awareness and understanding of the Grey-headed Flying-fox and encourage stewardship of the Avalon colony. Provide accurate information and promote best-practice management principles • Involve the community in recovery actions that will reduce the threat of negative public attitudes and conflict with humans. (DECCW 2009, p. 23). • Refer to the DECCW guidelines on handling public complaints (DECCW 2007, pp. 9-14). • Pittwater Council has developed a database for recording public comments. Should a complaint be received, it shall be immediately logged into the database. A field meeting will be held between the resident and an experienced staff member at the earliest opportunity (DECCW 2007 pp. 9-11). The database will be used to provide a history of the colony and develop future management directions. An information package is also being developed and this will be available on Council's website • Continue to meet with and communicate with residents through the working group as required and ensure objectives are being met. Maintain a web based community engagement site for as long as required by the majority of adjoining residents. • Continue to monitor the size and location of the colony to ensure minimal negative impacts on nearby residents. Modify the Grey-headed Flying-fox habitat where required, providing advice to residents on ways to make their properties less attractive as roosting habitats. • Encourage the community to join Bushcare to help control the spread of weeds, particularly in the canopy buffer zone and promote community ownership of the Reserve. • Adjacent land holders should be encouraged to conserve local indigenous vegetation on their land. • Continue to monitor the camp and provide feedback to relevant agencies • Continue to provide opportunities for students to study the camp.

1. Brodie, L, Roxburgh, J and Whiley, L. 2010, *The National Trust Bush Regenerators Handbook,* 3rd edition. The National Trust of Australia (NSW).
   Buchanan, R. 2009, *Restoring Natural Areas in Australia*, Tocal (NSW).
   Buchanan, R. 1989, TAFE NSW Bush Regeneration. *Recovering Australian Landscapes*.

3.6 Review

The Cannes Reserve Grey-headed Flying-fox Management Plan will require continual review over its five year duration and does not guarantee success. During this time the impact of works shall be evaluated progressively as they are implemented. The success of the Plan is to be measured by its ability to:

- protect the Grey-headed Flying-fox colony in-situ, maintaining their well-being;
- provide residents with a reasonable level of amenity;
- restore and conserve the EEC; and
- adapt to new issues as they arise.

Relocation [dispersal] may be considered following the implementation and assessment of the effectiveness of this management plan. Relocation is unlikely to be successful in the longer term. Relocation is stressful for the Grey-headed Flying-fox and requires an expensive and involved process.

3.7 Further information

Further information on the Grey-headed Flying-fox is available from the following sources:

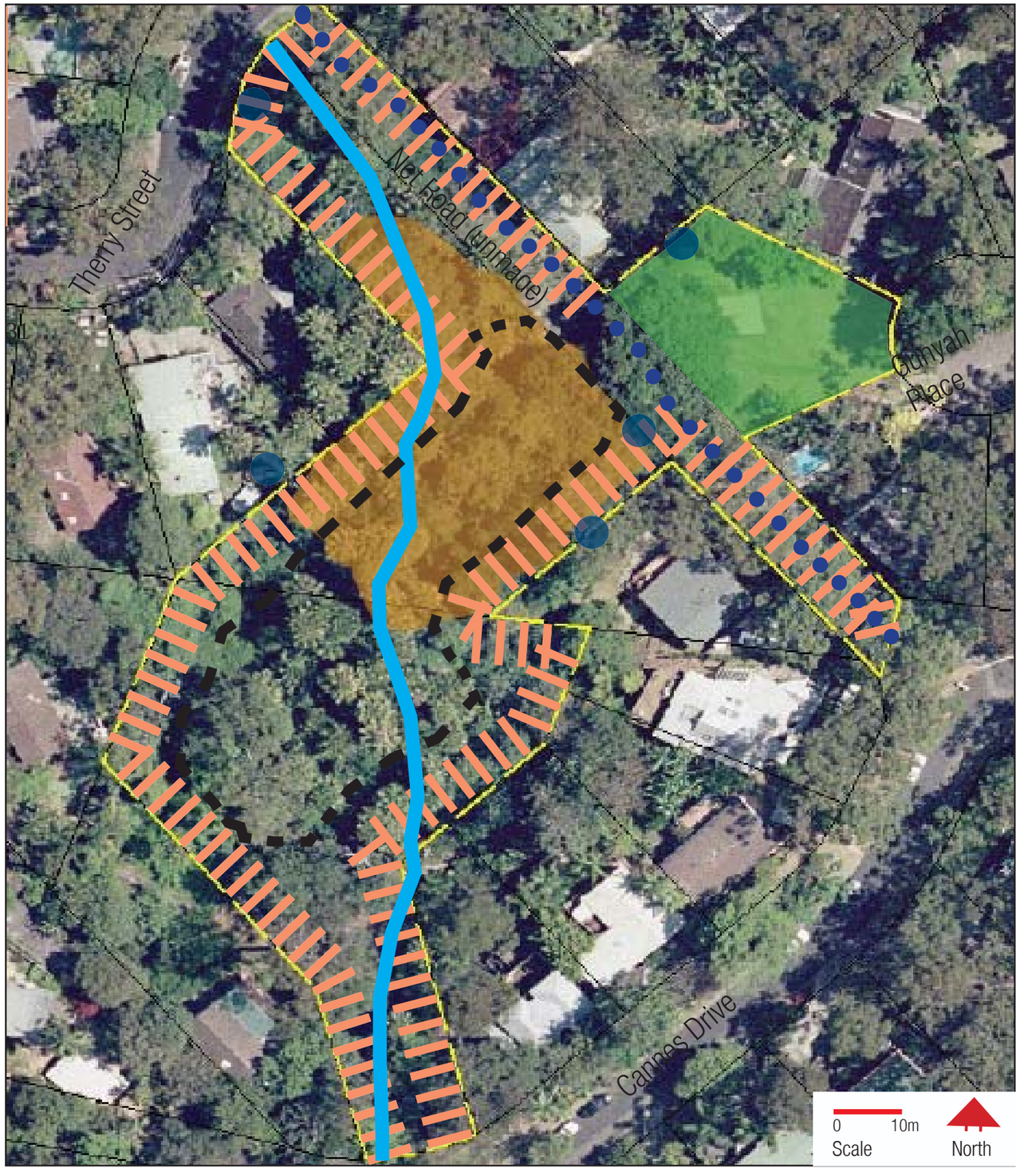
- Pittwater Council, Grey-headed Flying-fox. Available on: http://www.pittwater.nsw.gov.au/environment/plants__and__animals/native_animals/grey-headed_flying_foxes
- Department of Environment & Climate Change NSW 2007, Flying-fox camp management policy, Department of Environment and Climate Change NSW, Sydney (Now the Office of Environment & Heritage). Available on: www.environment.nsw.gov.au
- NSW Health, Infectious Disease Factsheet, Rabies and Bat Lyssavirus Infection,. Available on: www/health.nsw.gov.au/factsheets/infectious/rabiesbatinfection.html or contact the NSW Health Department on 02 9391 9000.

3.8 Selected References

DECCW, 2009, Flying Fox Camp Management Policy.
DECCW, 2009, Draft National Recovery Plan for the Grey-headed Flying-fox
DECCW, 2009, Best practice guidelines for the Grey-headed Flying-fox

McDonald-Madden, E., Schreiber, E.S.G., Forsyth, D.M., D.M., Choquenot, D. and Clancy, T.F. (2005) Factors affecting the Grey-headed Flying-fox (*Pteropus poliocephalus:Pteropidae*) foraging in the Melbourne metropolitan area, Australia, Austral Ecology, 30 (5) 600-608

3.9 Masterplan



Key

Extent of study area

Gunyah Place Reserve parkland including playground - discourage the Grey-headed Flying-fox from this area

Ephemeral watercourse - rehabilitate watercourse and surrounding riparian zone using appropriate bush regeneration techniques.

Reinstate pedestrian access if required.

Zone 1. Estimated area of Grey-Headed Flying-fox roosting as of May 2010. The area occupied by the flying-foxes fluctuates and may extend beyond this area at certain times.

Zone 2. Restricted canopy buffer zone seven metres wide. Revegetate with EEC species under three metres in height at maturity. Remove all noxious and environmental weed species. Neighbours are encouraged to extend the canopy buffer zone onto their properties where possible to remove inappropriate plant species that threaten the overall viability of the Reserve.

Zone 3. Core area of Cannes Reserve. Retain dense vegetation and moist conditions suitable for existing Grey-headed Flying-fox colony. Allow to regenerate, but avoid creating conditions that will attract addtitional Grey-headed Flying-foxes to the Reserve.

Approximate locations where tree pruning and removal were completed in 2010 under a section 91 Licence.

Figure 8. Masterplan

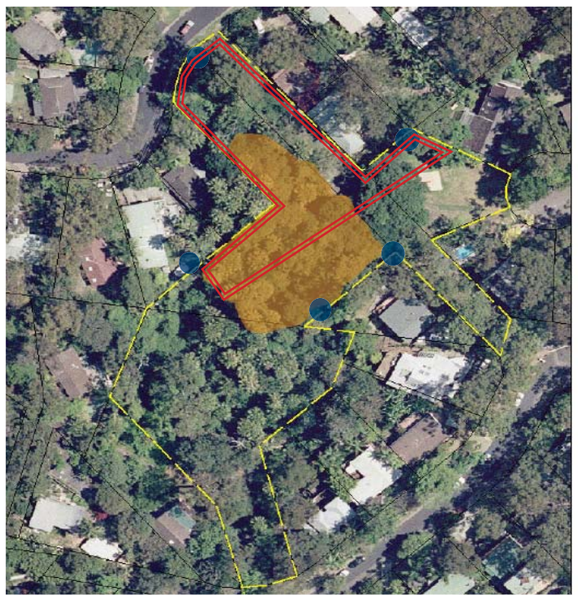
Appendix 1. Proposed works 2011

Note: Appendix 1 provides a record of works carried out in the reserve in 2011. Following assessment by the OEH, a s. 95 Certificate No 129225 permitted two Cheese trees to be pruned (see Table 3) and exotic trees and weeds removed including a clump of 17 small Kentia Palms, a Silky Oak further inside the reserve and exotic / weed species as outlined in Table 4.

Figure 10. Proposed works 2011

Table 3. EEC canopy trees to be considered for pruning or removal the Buffer Zone Area 2. Refer to Figure 10 for location of trees

Location	Species	EEC	Qty	Canopy	Roost	Comments
A	Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	no (39)	Pruning to be considered at a later date.
B	Cabbage Tree Palm (*Livistona australis*)	yes	3	yes	yes	Removal to be considered at a later date.
C	Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	yes (72)	Pruning of two branches hanging boundary to be considered at a later date.
D	Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	yes	3 trunks. Removal of one trunk overhanging boundary (leaving 1/3 of the trunk above ground level) to be considered at a later date.
E	Cheese Tree (*Glochidion ferdinandi*)	yes	2	yes	yes	Pruning of both trees close to boundary and over-hanging boundary to be considered at a later date.
F	Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	yes	Removal to be considered at a later date.
G	Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	yes	**Prune 2 trunks overhanging boundary 2011**
H	Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	yes	**Prune leading trunk, leave trunk that leans into the reserve 2011.**
I	Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	yes	Removal to be considered at a later date.
Exotic and weed species to be removed.						
J	Clump of small Kentia Palms	no	17	no	no	Transplant elsewhere
Refer to Table 4.	Weeds and non-indigenous species 57 trees (potential canopy) and 39 shrubs	no	78	no	no	Remove 78 weed species from zones 1, 2, 3 and the area between zones 2 and 3 to allow re. See tables on following pages for species list.



Note: Herbacious and ground cover weeds will be retained initially to bind soil, then strategically removed.

Plants proposed for transplanting are not indigenous to Pittwater. Where appropriate plants will be relocated to other locations where they will not impact on bushland.

Key

Study area - outline Cannes Reserve and Gunyah Place Reserve

Estimated roosting area May 2010. The total roost area covers about 0.24 ha variable. The proposed works in the roosting area comprise about 0.026ha and are located at the edge of the roosting area.

Approxminate locations where tree pruning and removal were completed in 2010 (s. 95 Certificate No 115987, 5/7/10).

Approximate location of proposed tree prunng and removal for 2011 (subject to s. 91 licence application and related s.95 Certificate).

Figure 11 Study area - location of works 2010 and 2011

Table 4. Vegetation survey showing weeds to be removed 2011

Buffer Zone - Area 1 (rear of 29 Therry Street).

Pot. Cpy. means potential canopy

Species		Qty	Canopy	Potential Canopy	Roost	Comments
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	yes (4)	-
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	yes (14)	-
Cabbage Tree Palm (*Livistona australis*)	yes	1		yes	no	juvenile on boundary 2m tall
Cabbage Tree Palm (*Livistona australis*)	yes	1	-	yes	No	juvenile 3m tall
Sandpaper Fig (*Ficus coronata*)	yes	2	-	yes	no	juvenile
Turpentine Tree (*Syncarpia glomulifera*)	yes	1	yes	-	Yes (6)	3 branches – 1 roost (heavily used). 2 in core no roost
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	Yes (7)	-
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	-	Yes (72)	-
Sandpaper Fig (*Ficus coronata*)	yes	3	-	yes	no	seedlings
Small Leaved Privet (*Ligustrum sinese*)	yes	6	-	yes	no	**POISON** 3 juveniles
Bangalow Palm (*Archontophoenix cunninghamiana*)	no	5	-	yes	no	**TRANS-PLANT** seedling
Coin Spot Tree Fern (*Cyathea cooperi*)	no	1	-	yes	no	juvenile 3 m tall
Illawarra Flame Tree (*Brachychilton acerifolius*)	no	2	-	yes	no	**REMOVE** juvenile 2 m tall
Sandpaper Fig (*Ficus coronata*)	yes	4	-	yes	no	juvenile
Wilkiea sp.	no	1	-	yes	no	juvenile
Sandpaper Fig (*Ficus coronata*)	yes	1	no	yes	no	juvenile 1.5m tall

Buffer Zone - Area 2

Commencing from Therry Street along the western edge of Cannes Reserve adjacent to 29 Therry Street.

Species	EEC	Qty	Canopy	Pot. Cpy	Roost	Comments
Dead stag (tree)	n/a	1	-	no	no	mid storey located Reserve corner
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	no	-
Cabbage Tree Palm (*Livistona australis*)	yes	1	-	yes	no	juvenile
Sandpaper Fig (*Ficus coronata*)	Yes	1	yes	-	no	-
Sandpaper Fig (*Ficus coronata*)	yes	1	-	yes	no	juvenile
Sandpaper Fig (*Ficus coronata*)	yes	1	-	yes	no	juvenile
Sandpaper Fig (*Ficus coronata*)	yes	1	-	yes	no	juvenile
Kentia Palm (*Howea forsteriana*)	no	1	yes	-	no	**TRANSPLANT**
Banana Tree (*Musa sp.*)	no	21	-	yes	no	**REMOVE**
Melaleuca sp.	no	1	yes	-	no	2 trunks - 1 in buffer, and 1 in neighbour's
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	no	-
Banana Tree (*Musa sp.*)	no	5	no	-	no	**REMOVE** juvenile
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	no	mid storey 8m tall
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	-	yes (6)	Leaning onto neigh-bouring property.
Cabbage Tree Palm (*Livistona australis*)	yes	2	yes		no	juvenile and mid storey 8m and 3m tall
Cheese Tree (*Glochodian ferdinandi*)	yes	1		yes	no	juvenile
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	-	yes (8)	Split trunks 1 in buf-fer. 1 in core. Prune trunk from buffer.
Coin Spot Tree Fern (*Cyathea cooperi*)	no	1		no	no	-
Cabbage Tree Palm (*Livistona australis*)	yes	2	no	yes	no	juvenile
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	yes (12)	
Sandpaper Fig (*Ficus coronata*)	yes	3	-	yes	no	juvenile

Buffer Zone - Area 2

Continued

Species	EEC	Qty	Canopy	Pot Cpy	Roost	Comments
Sandpaper Fig (*Ficus coronata*)	yes	1	-	yes	no	juvenile
Sandpaper Fig (*Ficus coronata*)	yes	1	yes	-	no	mid storey 10m
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	Yes (4)	-
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	no	mid storey 13m
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	Yes (21)	-
Cheese Tree (*Glochidion ferdinandi*)	yes			yes	no	juvenile
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	-	Yes (35) buffer 23 core 12	spilt trunk 80% in buffer.
Small Leaved Privet (*Ligustrum sinense*)	no	14	yes 10 trees	yes (4) trees	no	**POISON**
Illawarra Flame Tree (*Brachychilton acerifolius*)	no	2	-	yes	no	**REMOVE** juveniles
Sandpaper Fig (*Ficus coronata*)	yes	11	-	yes	no	juveniles
Cheese Tree (*Glochidion ferdinandi*)	yes	1		yes	Yes (1)	juvenile
Alexander Palm (*Archontophoenix alexandrae*)	no	2		yes	no	**TRANS-PLANT IF POSSIBLE**
Jackwood (*Cryptocarya glaucescens*)	yes	3		yes	no	
Citrus sp.	no	1		no	no	**REMOVE** seedlings
Bird of Paradise (*Strelitzia nicolai*)	no		-	no	no	**REMOVE** seedling
Macadamia sp.	no	1	-	no	no	**REMOVE** seedling
Sandpaper Fig (*Ficus coronata*)	yes	2	-	yes	no	juvenile, seedling
Illawarra Flame Tree (*Brachychilton acerifolius*)	no	1		yes	no	**REMOVE**
Cabbage Tree Palm (*Livistona australis*)	yes	1	-	yes	no	juvenile 2-3m
Coin Spot Tree Fern (*Cyathea cooperi*)	no	1	-	yes	no	juvenile 2m
Sandpaper Fig (*Ficus coronata*)	yes	1	-	yes	no	juvenile 2-3m

Buffer Zone - Area 3

Commencing from Therry Street along the northeastern edge of Cannes Reserve djacent to 27 Therry Street and Gunyah Place.

Species	EEC	Qty	Canopy	Pot. Cpy	Roost	Comments
White Cedar (*Melia azedarach*)	no	1	-	yes	no	
Castor Oil Plant (*Ricinus communis*)	no	1		no	no	juvenile
Palm Grass (*Setaria palmifolia*)	no		-	no	no	**REMOVE** dense clump
Spotted Gum (*Corymbia maculata*)	yes	3	yes	-	no	
Cheese Tree (Glochodian ferdinandi)	yes	1	yes	-	No	Multi-trunked. Previously pruned

VINES:

Morning Glory (*Ipomoea coccinea*)

Water Vine (*Cissus hypoglauca*)

Moth Vine (*Arauijia sericifera*)

Balloon Vine (*Cardiospermum grandiflorum*)

Area between buffer zones 2 and 3

Commending from Gunyah Place Reserve towards Therry Street.

Species	EEC	Qty	Cpy	Pot. Cpy	Roost	Comments
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes		yes (100)	split trunk growiing with Liv. aust (2m).
Sandpaper Fig (*Ficus coronata*)	yes	1		yes	no	juvenile
Cheese Tree (*Glochidion ferdinandi*)	yes	1		yes	no	juvenile
Sandpaper Fig (*Ficus coronata*)	yes	1		yes	no	juvenile
Cabbage Tree Palm (*Livistona australis*)	yes	2		yes	no	juvenile 4m
Notalea longifolia	yes			yes		juvenile
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes		no	
Wilkiea (*Wilkiea huegeliana*)	yes	1		yes	no	juvenile
Banana Tree (*Musa sp.*)	no	1		no	no	**REMOVE** regrowth
Lantana sp.	no	1		yes	no	**POISON** 5m x 6m slashed
Broad-leaf Privet (*Ligustrum lucidum*)	no	1		yes	no	**POISON** juvenile
Small Leaved Privet (*Ligustrum sinese*)	no	1		yes	no	**POISON**
Small Leaved Privet (*Ligustrum sinese*)	no	4		yes	no	**POISON**
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes		yes (1)	-
Small Leaved Privet (*Ligustrum sinese*)	no	1		yes	no	**POISON**
Wilkiea *(Wilkiea huegeliana)*	yes	1		yes	no	juvenile
Cabbage Tree Palm (*Livistona australis*)	yes	1		yes	no	juvenile 1.5m
Turpentine Tree (*Syncarpia glomulifera*)	yes	1	yes		no	covered by Lantana , Ipomoea and Cissus
Cheese Tree (*Glochidion ferdinandi*)	yes	1		yes	no	juvenile 5m
Cabbage Tree Palm (*Livistona australis*)	yes			yes	no	juvenile 1.5m
Turpentine Tree (*Syncarpia glomulifera*)	yes	2		yes	no	probably dead smoothered in thick vines.
Wilkiea *(Wilkiea huegeliana)*	yes	1		yes	no	juvenile 5m
Small Leaved Privet (*Ligustrum sinese*)	no	1		yes		**POISON** 6m

Area between buffer zones 2 and 3

Continued

Species	EEC	Qty	Canopy	Pot. Cpy	Roost	Comments
Turpentine Tree (*Syncarpia glomulifera*)	yes	1	yes		**yes (100)**	
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes		**yes (100)**	
Corkwood (*Endiandra sieberi*)	no	2	-	yes	no	juveniles
Notalea longifolia	yes	1	-	yes	no	juvenile
Wilkiea (*Wilkiea huegeliana*)	no	2	-	yes	no	juvenile 4m
Small Leaved Privet (*Ligustrum sinese*)	no	2	-	yes	no	**POISON** 4m
(Small Leaved Privet (*Ligustrum sinese*)	no	1	-	yes	no	**POISON** 4m
Notalea longifolia	yes	1	-	yes	no	juvenile
Catus *Dorstenia sp.*	no		-	no	no	**REMOVE** clump
Cabbage Tree Palm (*Livistona australis*)	yes	2	yes		no	-
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes		yes (1)	-
Dead stag	n/a	1	-	no	no	-
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes		no	mid storey 8m
Cheese Tree (*Glochodian ferdinandi*)	yes	1	yes		no	-
Cabbage Tree Palm (*Livistona australis*)	yes	3		yes	no	juveniles and mid storey 3m, 5m, 10m
Cheese Tree (*Glochidion ferdinandi*)	yes	1	yes	-	no	sick
Cabbage Tree Palm (*Livistona australis*)	yes	2		yes	no	juvenile 2m
Cabbage Tree Palm (*Livistona australis*)	yes	1	yes	-	no	mid storey 10m
Dead stag	n/a	1		no	no	covered in vines
Cabbage Tree Palm (*Livistona australis*)	yes	2		yes	no	juvenile 3.5m, mid storey10m
Sandpaper Fig (*Ficus coronata*)	yes	1	yes		no	-
Chinese Privet (*Ligustrum sinese*)	no	1		yes	no	**REMOVE** seedling 0.3m
Sandpaper Fig (*Ficus coronata*)	yes	1		yes	no	juvenile 3m
Bangalow Palm (*Archontophoenix Cunninghamiana*)	no	1		yes	no	**TRANSPLANT IF POSSIBL** juvenile
Cestrum	yes	1			no	

Appendix 2. Vegetation Survey whole study area - recorded 10 January 2011

Species
(*denotes weed/introduced species)
*Acacia elata**
*Acetosa sagittata**
Acmena smithii
Adiantum formosum
*Ageratina adenophora**
*Ageratina riparia**
Alphitonia excelsa
Angophora costata
*Anredera cordifolia**
*Araujia sericifera**
Blechnum cartilagineum
*Brachychiton acerifolius**
*Calathea sp.**
*Canna indica**
*Cardiospermum grandiflorum**

Cayratia clematidea
*Cestrum parqui**
Cissus antarctica
Cissus hypoglauca
Clerodendron tomentosum (mown area)

*Colocasia esculentus**
Commelina cyanea
*Conyza sp.**
*Crassocephalum crepidioides**
Cristella dentata
Crocosmia crocosmifolia*
Cyathea australis
*Cyathea cooperi**
*Cyperus eragrostis**
*Delairea odorata**
*Digitaria ciliaris** (mown/edge)
*Digitaria ciliaris** (mown/edge)
Doodia aspera
*Dracaena spp.**
*Ehrhata erecta** (mown/edge)
*Eleusine indica** (mown/edge)
Endiandra sieberi
*Erythrina x sykesii**
Eucalyptus (paniculata?)
Eucalyptus spp. (unidentified)
Eucalyptus maculata
Eucalyptus punctata
Ficus benjamina (edge)*
Ficus coronata
Gahnia sp.(?)
Geitenoplesium cymosum
Geranium homeanum (mown/edge)
Glochidion ferdinandii
Homalanthus populifolius
Hypolepis muelleri
*Hyposteses phyllostachya**
*Ipomoea cairica**
*Ipomoea indica**
Ixora coccinea (?) (*Rubiaceae sp. of garden origin)
*Jacaranda mimosifoliea**
*Jasminum polyanthuea**
*Lantana camara**
Lastreopsis (decomposita?)
*Ligustrum lucidum**
*Ligustrum sinense**
Livistona australis
Lomandra longifolia
Microlaena stipoides (var. B?- rare)
*Modiola caroliniana** (mown/edge)
*Monstera deliciosa**
*Musa sp.**
Notelea longifolia
*Olea europa ssp. cuspidata**
Oplismenus aemulus (mown/edge)
Oplismenus imbecilis
*Parietaria judaica**
*Passiflora caerulea** (mown/edge)
Persia americana (Avocado)*
Persicaria (decipiens?)
Rhodamnia rubescens
*Ricinus communis**
*Rumex sp.** (mown/edge)
Sarcopetalum harveyanum
*Schefflera actinophylla**
*Senna pendula var. glabrata**
*Setaria palmifolia**
Smilax australis
Stephania japonica
*Strelitzia nicholli**
Syncarpia glomulifera
*Tradescantia fluminensis**
*Tropaeolum majus**
*Verbena bonariensis**
Viola hederacea
Wilkea huegeliana

Appendix 3. Recommended Plant List

The Littoral Rainforest and Pittwater Spotted Gum Forest species at the reserve willl benefit from pollination by the Grey-headed Flying-fox .

Natural regeneration will be encouraged prior to planting. Revegetation will occur from seed collected from Cannes Reserve or adjacent reserves, particularly Frog Hollow and Stapleton Reserves if possible.

Table 5. Recommended Planting List

Vegetation type	Littoral Rainforest	Pittwater Spotted Gum Forest	Planting areas
Emergent	*Syncarpia glomulifera subsp. glomulifera*	*Corymbia maculata, Syncarpia glomulifera subsp.glomulifera, Eucalyptus paniculata, Angophora floribunda (occasionally)*	Plant in Zone 3 - the core of the Reserve only.
Canopy	*Acemena smithii, Livistona australis*	*Livistona australis, Ficus coronata*	Plant in Zone 3 - the core of Cannes Reserve only.
Shrubs, small trees	*Eupomatia laurina, Synoum glandulosum, Glochidion ferdinandi, Homalanthus populifolius, Notelaea longifolia, Breynia oblongifolia,*	*Glochidion ferdinandi, , Synoum glandulosum* subsp. *glandulosum, Elaeocarpus reticulatus, Notelaea longifolia, Pittosporum revolutum, Breynia oblongifolia, Macrozamia communis, Wiikiea huegeliana*	Plant all zones, but do not plant any trees or shurbs with a mature height of more than three metres in buffer zones 1 and 2.
Ground covers, herbs	*Calochlaena dubia, Dianella caerulea, Oplismenus imbecillis, Pseuderanthemum variable, Doodia aspera, Blechnum cartilagineu, , Adiantum hispidulum*	*Calchlaena dubia, Lomandra longifolia, Pseuderanthemum variable, Adiantum aethiopicum, Oplismenus imbecillis, Dianella caerulea, Viola hederacea, Poa affinis, Entolasia marginata, Microlaena stipoides var. stipoides, Commelina cyanea, Gymnostachys anceps.*	Plant in all zones.
Vines and Climbers	*Cissus hypoglauca, Eustrephus latifolius, Smilax glyciphylla, Morinda jasminoides, Smilax australis*	*Cissus hypoglauca, Morinda jasminoides, Similax australis, Eustrephus latifolius, Pandorea pandorana, Geitionoplesium cymosum, Sarcopetalum harveyanum, Stephania japonica var. discolour*	Plant in all zones

Appendix 4 - Monitoring the Grey-headed Flying-fox Colonies

There are two Grey-headed Flying-fox colonies at Pittwater; at Avalon and Warriewood Wetlands. The Colonies should be continually monitored, including their numbers, health and roosting locations.

Currently Avalon is monitored once a month and counts are recorded in a database held at Council. During tree works in June and July 2010 the colony was monitored more regularly. The numbers are estimates only taken from specific locations around the edge of the Reserves. The earlier counts in 2010 were by students from the University of NSW, rather than Council.

Table 8. Grey-headed Flying-fox counts at Avalon and Warriewood Wetlands (W'wood)

	2009		2010			2011	
Month	Date	Avalon	Date	Avalon	W'wood	Avalon	W'wood
January			15	160	160	362	0
February	20	5-80	19	180		360	0
March	20	0	19	190		420	500
April	17	90-100	16	1140		360	0
May	15	95	21	598		260 - 300	0
June			8	870	2752	250 - 270	0
			10	618	2665		
			12	410			
			15	920	3350		
			17	1012	3425		
			24	1065	2488		
July			3	535		180	0
			8	503	0		
			22	343	0		
August	19	75	5	370	0		
			19	568			
	21	155	19	222	0		
September	18	140	2	232	0		
October	15	200		257	0		
November	15	165		223	0		
December	18	160		248	0		

Appendix 5. Grey-headed Flying-fox Conservation and Legislation

Conservation Status

The Grey-headed Flying-fox is listed nationally as a threatened species with the conservation status of 'vulnerable' meaning a species facing a high risk of extinction in the medium-term future. The Grey-headed Flying-fox was listed as vulnerable in 2001 under the NSW Threatened Species Conservataion Act due to an overall decline in numbers (up to 30% over a decade). This was based on national counts conducted in the 1990s. It is predicted this decline will continue into the next decade (a further 20%). The Grey-headed Flying-fox is also listed in Victoria and is under consideration in Queensland.

A draft National Recovery Plan for the Grey-headed Flying-fox has been prepared by DECCW for the Federal Department of Sustainability, Environment, Water, Population and Communities. The DECCW identified priority actions for the state of NSW which are aligned with the National Recovery Plan. These include:

- identification and enhancement of winter and spring food resources;
- identification, protection and enhancement of critical habitat;
- a significant reduction in level of destruction to agricultural crops;
- the provision of education and advice to land managers, community groups and other relevant stakeholders;
- development and implementation of flying-fox camp management policy; and
- ongoing monitoring of population and camp numbers.

National Parks and Wildlife Act, 1974

Flying-foxes are protected under Section 98 of the National Parks and Wildlife Act, 1974 (NSW Act). It is an offence under the Act to harm protected species without an appropriate approval and there are significant penalties for harming protected fauna or damaging their habitat, or for picking threatened flora, without an appropriate licence, consents or approvals. A licence under s. 132C may be issued to a person or organisation undertaking an activity for scientific, educational or conservation purposes that is likely to harm fauna and flora.

Office of Environment & Heritage

The Office of Environment and Heritage (formerly the NSW Department of Environment, Climate Change and Water) is responsible under the NPWW Act for protecting all flying-foxes on public and private land. The Office also administers NSW threatened species legislation and promotes recovery, and therefore has a role in providing advice with regards to management recommendations for the two EECs at Cannes Reserve and the flying-fox camp management plan. The Office has a licensing role for actions, but does not have a direct management role for the site. Representatives from the Office are stakeholders for Cannes Reserve Working Group.

Threatened Species Conservation Act, 1995

The Threatened Species Conservation Act, 1995 (TSC) aims to protect and encourage the recovery of threatened species, populations, and communities listed under the Act. It also sets out the requirements for an assessment as to whether an action is likely to result in the harm of a threatened species, population, or ecological community. In these circumstances an application for a license is required under Section 91 or a Certificate under Section 95 of the Act.

Once a Section 91 license has been approved, the Office of Environment & Heritage may issue a Section 95 Certificate (with or without conditions) authorising works to go ahead as outlined above. Should undertaking such an action result in the harming or picking of a threatened species, population or ecological community or damage its habitat, for example death or injury to a flying-fox, holding such a license or certificate and complying with its terms may provide a defence against prosecution.

Environmental Planning and Assessment Act, 1979

The Environmental Planning and Assessment Act, 1979 requires that impacts on protected and threatened species are considered when assessing and approving development proposals (Parts 3A, 4 and 5).

State Environmental Planning Policies (SEPPs) are made under the EP&A Act, 1979. They generally regulate decision making for managing relationships between natural systems and human systems, including:

- SEPP No. 19 Bushland in Urban Areas - generally aims to protect bushland; remnants of plant communities, habitat and wildlife corridors.
- SEPP No. 26 Littoral Rainforests – generally aims to provide a mechanism for the consideration of applications for development that is likely to damage or destroy littoral rainforests with a view to the preserve those areas in their natural state.

Environmental Protection and Biodiversity Conservation Act, 1999

The Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) protects the environment. Approval is required for actions that are likely have a significant impact on:

- a matter of national environmental significance (e.g. a threatened species);
- the environment of Commonwealth land (even if taken outside Commonwealth land);
- the environment anywhere in the world (if the action is taken by the Commonwealth).

An action includes a project, development, undertaking or activity or series of activities. Activities that may affect listed species or communities in Commonwealth areas require a permit under the EPBC Act. The Commonwealth will determine whether an approval is required under the EPBC Act. If required, NSW and Commonwealth agencies will liaise to determine what assessment process is appropriate.

Council's Planning and Development Controls

The Pittwater Local Environmental Plan, 1993 (PLEP) provides development controls. Trees are protected under the PLEP with references to the Pittwater Tree Preservation Order.

A number of plans are being developed that will provide technical information that will inform management practices. Plans include:

- Pittwater Vegetation, Mapping and Management Plan
- Pittwater Wildlife Corridor Plan
- Pittwater Fauna Management Plan

Addendum

Grey-headed Flying-fox Ecology

Grey-headed Flying-fox

Family: Pteropodidae

Scientific name: Pteropus poliocephalus

Flying-fox Species and Distribution

Although three species of flying fox are known in NSW, the Grey-headed Flying-fox, the Black Flying Fox and the Little Red Flying Fox, to-date it is only the Grey-headed Flying-fox that has been sighted within Pittwater LGA. All three species are protected under NSW legislation with the Grey-headed Flying-fox also protected by national legislation.

Grey-head Flying-foxes range throughout eastern Australia from Rockhampton (QLD) in the north to Geelong (VIC) in the south. Flying foxes are nomadic moving from camp site to camp site in line with available food resources. The Grey-headed Flying-fox population is considered a single population. One animal sighted in Pittwater today may be the same animal seen in Queensland tomorrow.

In more recent times Grey-headed Flying-fox has been identified in a number of new camp sites throughout the southern and south-eastern limits of their range. This is also thought to be due to the lack of food resources in the north.

In Pittwater, there are two camp sites for the Grey-headed flying fox. They are located in Cannes Reserve, Avalon and Warriewood Wetlands.

Ecology

The Grey-headed Flying-fox is the largest Australian bat, with a body length of 23-29cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to one metre. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle.

Grey-headed Flying-fox occur in subtropical and temperate forests, tall sclerophyll forests, woodlands and swamps as well as in urban gardens and fruit crops. Roosting camps are generally located within 20km of a regular food souce and are commonly found in gullies, close to water and in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, birth and the rearing of young. Annual mating commences in January and a single young is born each October or November.

Reasons for Decline

The Grey-headed Flying Fox is affected by a number of threatening processes, the most serious of which is loss of foraging and roosting habitat.

Site fidelity to camps is high with some camps known to have been in use for over a century. Flying-foxes may travel up to 50km per night foraging for food. They feed on the nectar and pollens of native trees especially Eucalyptus, Melaleuca, and Banksia and on the fruits of rainforests trees and vines. They are also known to forage in culti-vated gardens and also on fruiting crops, making them a pest to some sections of the agricultural industry.

The Grey-head Flying-fox provide vital ecological services in terms of pollination and seed dispersal of many species of native plants. They are known to disperse the seeds of at least 40 Australian rainforest trees (including figs, palms and lilly pillies) and are pollen vectors for more than 50 species in the Myrtacae and Proteaceae families.

Habitat Loss

The complexity of the habitat requirements of the Grey-headed Flying-fox, particularly its requirement for multiple, geographically dispersed populations of food trees, leaves the species vulnerable to population decline as poor land use decisions and management strategies take place. Annually reliable winter resources are limited in distribution to a narrow coastal strip in northern New South Wales and Queensland, and primarily occur on freehold land. These coastal areas are targeted for intensive residential development.

Exploitation

The Grey-headed Flying-fox destroys commercial fruit in Queensland and New South Wales. Direct killing of animals on orchards and harassment and destruction of roosts has played a role in the species decline.

Pollutants and Pathogens

Some urban-dwelling flying foxes accumulate lethal levels of lead from the environment and are also prone to electrocution.

Recovery Objectives

- Stabilise the population at its current level.
- Define patterns of landscape use, and identify and protect essential habitat.
- Develop non-destructive methods for crop protection.
- Develop non-destructive methods for management of camps in problem areas wherever possible.
- Ensure consistent management of the species across all range states (Queensland, New South Wales and Victoria).

Health Considerations

It is unwise for members of the public to handle bats or any wildlife. Australian Bat Lyssavirus is rare but may be transmitted by a bite or scratch from an infected bat, including a flying-fox. If you or your pet has been bitten, scratched or otherwise exposed, you should wash the wound with soap and water for five minutes and seek medical advice.

If you find an injured flying-fox contact WIRES on 1300 094 737. If you notice multiple deaths or unusual symptoms in bats you should call the Emergency Animal Disease Hotline on 1800 675 888.

Grey-headed Flying-fox colony at Cannes Reserve

Pittwater Spotted Gum Forest

Status

Pittwater Spotted Gum Forest is listed as an Endangered Ecological Community (EEC) in Part 3 of Schedule 1 of the *NSW Threatened Species Conservation (TSC) Act 1995.*

Description

Pittwater is renowned for its trees and in many places Spotted Gums dominate the canopy. They are identified by their straight grey and cream spotted trunks. Tree height is generally over 20 metres tall with individuals reaching 30 metres.

The structure of the community was originally open-forest but may now exist as woodland or as remnant trees. Characteristic tree species are Corymbia maculata and Eucalyptus paniculata, associated trees include Angophora costata, Corymbia gummifera, Eucalyptus umbra, Eucalyptus punctata, Syncarpia glomulifera, Eucalyptus botryoides, Angophora floribunda. (NSW Scientific Committee).

Pittwater Spotted Gum Forest is threatened by clearing and weeds. *In view of the small size of existing remnants, the threat of further clearing and other known threats (listed in 9), the Scientific Committee is of the opinion that the Pittwater Spotted Gum Forest in the Sydney Basin Bioregion is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate.* (NSW Scientific Committee)

Pittwater Spotted Gum forest is home to a large number of local native animals, including many bird species and the endangered Squirrel Glider.

Distribution

Pittwater Spotted Gum Forest occurs on the western and southern shores of Pittwater Estuary. On the western shores it is restricted to tiny remnants within Ku-ring-gai Chase National Park. On the southern shores it is found on the Barrenjoey Peninsula and Scotland Island.

Pittwater Spotted Gum Forest occurs on shale soils and lower hill slopes with heavy rainfall.

The *Draft Pittwater Vegetation Classification and Mapping, pre-1750 Vegetation Mapping and Bushland Management Plan* provides the following assessments regarding local distribution and abundance.

Vegetation type	Area in reserves (ha)	Other tenures (ha)	Total Extant area (ha)
Coastal Dry Spotted Gum Forest S_DSF25	18.04	24.54	42.58
Coastal Moist Spotted Gum Forest S_WSF11	32.37	37.6	69.43
Pittwater Spotted Gum Forest EEC	50.41	62.14	112.01

Cannes Reserve covers an area of 0.54 hectares. Ninety four percent of the reserve supports endangered ecological communities, being Pittwater Spotted Gum Forest - 0.11 hectares (and Littoral Rainforest - 0.4 hectares). The Pittwater Spotted Gum Forest component of the reserves represents 0.19% of this EEC in Pittwater which occurs in remnant pockets and generally within reserves (Bangalay et. al.).

The distribution of reserves containing Pittwater Spotted Gum Forest can be seen in Figure 1.

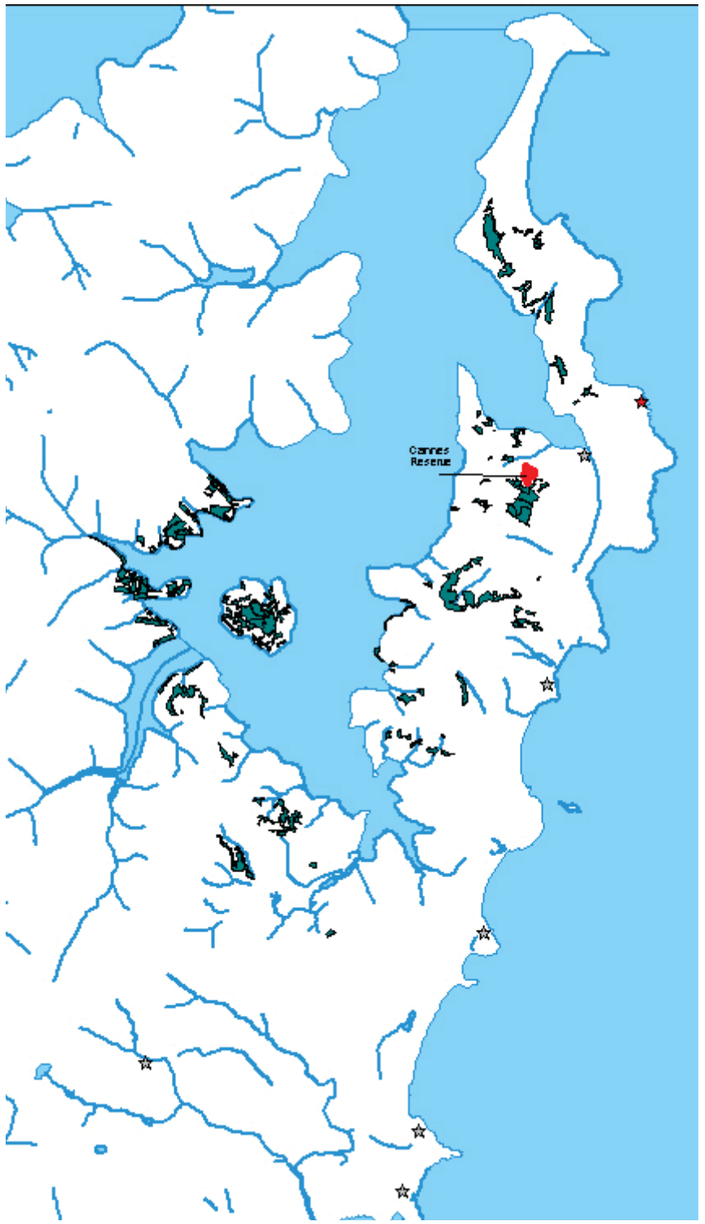


Figure 1. Distribution of Pittwater Spotted Gum EEC within Pittwater's reserves.

Reference: Bangalay (Ecological and Bushfire) and Eastcoast Flora Surveys (2011) Draft Pittwater Vegetation Classification and Mapping, pre-1750 Vegetation Mapping and Bushland Management Plan, Pittwater Council.

Pittwater's wildlife strategy is currently being updated. It is anticipated that Cannes Reserve will be mapped as high priority for rehabilitation as a wildlife corridor given the EEC. This means the reserve will receive increased maintenance based on its value for wildlife.

Main Reserves in the Pittwater LGA that contain Pittwater Spotted Gum Forest

- Angophora Reserve, Avalon
- Elizabeth Park, Scotland Island
- McKay Reserve, North Palm Beach
- Crown of Newport Reserve, Newport (West, off Grandview Drive)
- Pindari Reserve, Bayview
- Algona Reserve, Newport (adjoining Birubi Cresent)
- Palmgrove Park, Avalon
- Refuge and Saltpan Coves Foreshore Reserve, Clareville
- Bush to Bay Reserve, Careel Bay
- Western foreshores in Lovett and Morning Bays

The major remnants on the Peninsula are within Pittwater Council reserves, McKay Reserve, Angophora Reserve and Stapleton Park.

Links

NSW Scientific Committee – Final Determination

http://www.environment.nsw.gov.au/determinations/PittwaterSpottedGumForestEndComListing.htm

Pittwater Spotted Gum Forest Brochure

http://www.pittwater.nsw.gov.au/__data/assets/pdf_file/0007/24010/PSGF_brochure_update_May_07_.pdf

Pittwater Spotted Gum Forest Restoration Project

http://www.pittwater.nsw.gov.au/council/major_projects/completed_major_projects/pittwater_spotted_gum_forest_restoration

Littoral Rainforest

Status

Littoral rainforest in the NSW North Coast, Sydney Basin as and South East Corner bioregions is listed as an Endangered Ecological Community (EEC) in Part 3 of Schedule 1 of the NSW Threatened Species Conservation (TSC) Act 1995. Littoral Rainforest is also listed as critically endangered ecological community under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.* SEPP 26.

In view of the above the Scientific Committee is of the opinion that Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

This vegetation community is coming under increasing threat. Littoral Rainforest currently comprises less than 1% of NSW total rainforest areas (NSW Scientific Committee 2004). These small stands have a high chance of becoming extinct in nature unless the factors threatening its survival cease to operate. Threatening factors include urban development, fragmentation and weed invasion from garden refuse dumping.

Description

The following extract is from the NSW Scientific Committee's description:

Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions is generally a closed forest, the structure and composition of which is strongly influenced by proximity to the ocean. The plant species in this ecological community are predominantly rainforest species with evergreen mesic or coriaceous leaves. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from sclerophyll forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as Angophora costata, Banksia integrifolia, Eucalyptus botryoides and E. tereticornis occur in many stands.

The physical structure and floristic composition of Littoral Rainforest varies according to soils, climate and geographic location. Dependent upon exposure to prevailing winds and soil moisture, the closed forest may vary in height from six to thirty metres.

The most common canopy species is Broad leaved Lillypilly (*Acmena smithii).* Other species that make up this community will vary dependent upon location with plants such as Scentless Rosewood (*Synoum glandulosum*), Guoia (*Guoia semiglauca*), Common Achronychia (*Achronychia oblongifolia*). Groundcovers can be dense layers of native ferns or sedges, thick native vines twine through the shrub layer up into the canopy.

Native animals such as the Threatened Powerful Owl along with Ringtail Possums, Antechinus, and rainforest birds such as the Wonga Pigeon, Coucal Pheasant & King Parrot often inhabit this community along with the Grey-headed Flying-fox.

Distribution

Littoral Rainforest occurs along the NSW coast within two kilometres of the coastline. The community as described by the NSW Scientific Committee (2004) occurs from the Queensland border (North Coast Bioregion), the Sydney Basin Bioregion to the Victorian border (South East Corner Bioregion). Littoral rainforests not included in the determination also occur in other Australian States.

In Pittwater, Littoral Rainforest covers 0.005 percent of the local government area where it generally occurs in dotted pockets along the coast, on shale soils in gully areas. Its distribution can be seen in Figure 1.

Cannes Reserve covers an area of 0.54 hectares. Ninety four percent of the reserve supports endangered ecological communities, being Littoral Rainforest - 0.4 hectares (and Pittwater Spotted Gum Forest - 0.11 hectares).The Littoral Rainforest component of the reserves represents 1.2% of this EEC in the Pittwater which generally occurs in pockets and generally within reserves (Bangalay et. al.)

The distribution of reserves containing Pittwater Littoral Rainforest can be seen in Figure 2.

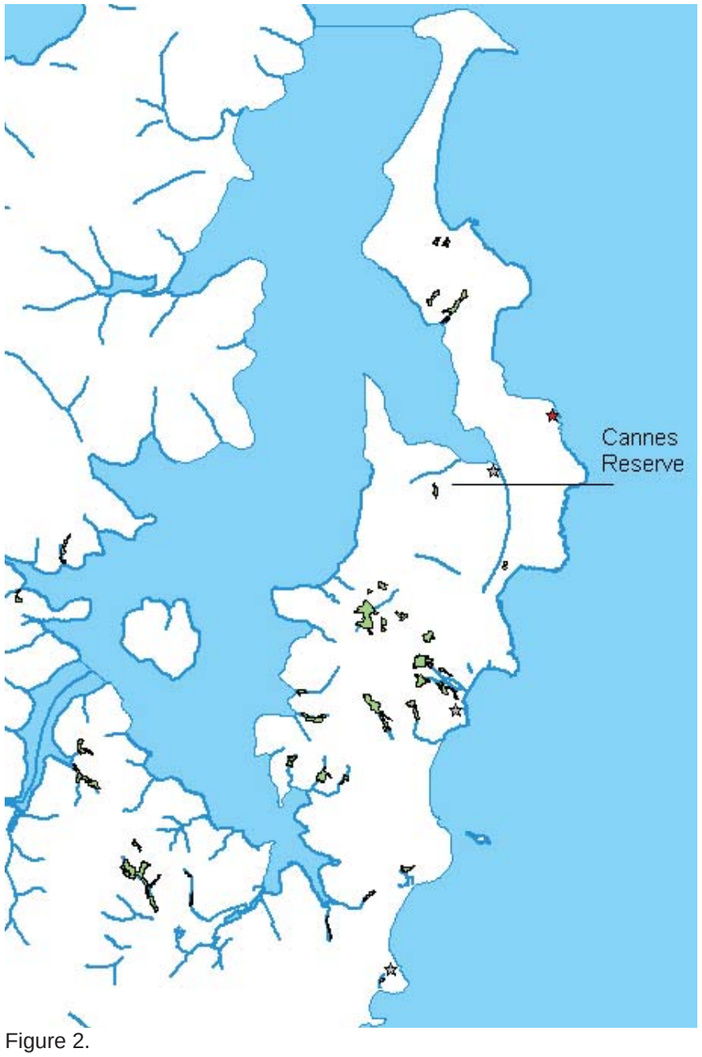


Figure 2.

Reference: Bangalay (Ecological and Bushfire) and Eastcoast Flora Surveys (2011) Draft Pittwater Vegetation Classification and Mapping, pre-1750 Vegetation Mapping and Bushland Management Plan, Pittwater Council.

Pittwater's wildlife strategy is currently being updated. It is anticipated that Cannes Reserve will be mapped as high priority for rehabilitation as a wildlife corridor given the EEC. This means the reserve will receive increased maintenance based on its value for wildlife.

Main Reserves in the Pittwater LGA that contain Littoral Rainforest

- Betty Morrison and Bungan Beach Reserve, Newport
- Wiltshire Park, Palm Beach
- Horden Park, Palm Beach
- Attunga and Porters Reserve, Newport
- Little Head Reserve, Whale Beach
- Bilgola Bends and Hewitt Park, Bilgola
- Crown of Newport Reserve, Newport
- Gully areas at Palm Beach, Whale Beach, North Mona Vale

  Headland and Gangalley Head

Links

Littoral rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing

http://www.environment.nsw.gov.au/determinations/LittoralRainforestEndSpListing.htm

Littoral Rainforest – Pittwater Council Factsheet

http://www.pittwater.nsw.gov.au/environment/plants__and__animals/threatened_species/endangered_ecological_communities/littoral_rainforest

Pittwater Council – Littoral Rainforest Brochure

http://www.pittwater.nsw.gov.au/__data/assets/pdf_file/0014/35132/Pittwater_Littoral_Rainforest_Brochure_-_final.pdf

PITTWATER COUNCIL