



Ku-ring-gai Bushland Reserves Plan of Management

Ku-ring-gai Council
November 2013



Cover Page Pictures

1	2
3	4

Photo Sources:

1: Ku-ring-gai Council:
Rofe Park Walking Track, Turramurra

2: Rosedale Road, St Ives

3: Ku-ring-gai Council:
Athena Road, St Ives

4: Ku-ring-gai Council:
Seven Little Australians, Lindfield

Version Control and Document Data					
Doc distribution	Website	Doc status	Final	File No	
Document owner	Manager Environment and Sustainability	Contact officer/s	Team Leader Natural Areas		
Approval date		Approved by	Council resolution		
Effective date		Review period	1 year	Review date	2014 / 2015
History of approved versions					
Version	Effective date	Summary of changes			
1.0	1984	Ku-ring-gai Bushland Reserves Plan of Management prepared			
2.0	1989	Ku-ring-gai Bushland Reserves Plan of Management reviewed and updated			
3.0	1996	Ku-ring-gai Bushland Reserves Plan of Management reviewed and updated			
4.0	2006	Ku-ring-gai Bushland Reserves Plan of Management reviewed and updated			
5.0	2009	Ku-ring-gai Bushland Reserves Plan of Management reviewed and updated			
6.0	2013	Ku-ring-gai Bushland Reserves Plan of Management Stage 1 review			

Contents

ABBREVIATIONS.....	5
EXECUTIVE SUMMARY.....	6
1. INTRODUCTION.....	7
1.1 OVERVIEW.....	7
1.2 HOW TO USE THIS DOCUMENT	8
1.3 KU-RING-GAI COUNCIL AND THE PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT.....	9
2. AIMS AND OBJECTIVES.....	12
2.1 AIMS.....	12
2.2 OBJECTIVES	13
3. LEGISLATIVE AND PLANNING INSTRUMENTS	14
3.1 LEGISLATION	14
3.2 PLANNING INSTRUMENTS AND DOCUMENT	19
4. GENERAL RESERVE FEATURES.....	21
4.1 LANDSCAPE CHARACTER	21
4.2 VEGETATION COMMUNITIES	21
4.3 FLORA AND FAUNA SPECIES.....	26
4.4 ABORIGINAL AND NON-ABORIGINAL HERITAGE	29
4.5 RECREATION, FIRE TRAIL AND WALKING TRACK NETWORKS	32
5. MANAGEMENT PRIORITISATION.....	33
6. CURRENT MANAGEMENT ISSUES AND THEIR CONSEQUENCES	34
6.1 CONSERVATION AND ENHANCEMENT OF NATIVE FLORA AND FAUNA	34
6.2 CORRIDORS AND CONNECTIVITY.....	34
6.3 OPEN SPACE AND URBAN INTERFACES	35
6.4 SPECIAL USES, LEASES AND LICENCES	36
6.5 STORMWATER, SEWERAGE AND WATER QUALITY.....	37
6.6 EROSION.....	38
6.7 HERITAGE ISSUES	38
6.8 WEEDS.....	39
6.9 FIRE MANAGEMENT AND ARSON.....	40
6.10 COMMUNITY PARTICIPATION AND EDUCATION.	40
6.11 VEHICLE ACCESS.....	42
6.12 <i>PHYTOPHTHORA CINNAMOMI</i>	42

6.13	RECREATION	42
6.14	UNAUTHORISED USE.....	44
6.15	AUTHORISED ACTIVITIES IN THE RESERVES.....	45
7.	PAST AND ONGOING WORKS	47
8.	PRESCRIBES ACTIONS FOR MANAGEMENT OF RESERVE FEATURES	51
9.	GLOSSARY	80
10.	REFERENCES	82
APPENDIX 1	KU-RING-GAI BUSHLAND RESERVES.....	88
APPENDIX 2	BUSHLAND RATING MATRIX AND DECISION SUPPORT TOOL.....	90
APPENDIX 3	RECOVERY AND THREAT ABATEMENT STRATEGIES AND PLANS	94

Table of Figures

Figure 1: Regional Location.....	10
Figure 2: Ku-ring-gai Natural Area - Bushland reserves.....	11
Figure 3: Relevant bushland local, state and federal planning instruments and documents	200
Figure 4: Threatened species in Ku-ring-gai LGA.....	28
Figure 5: Typical urban/bushland Interface located at Maddison Reserve, Pymble.	366
Figure 6: Riparian areas are particularly vulnerable to weed infestation	39
Figure 7: Bush regeneration in a Ku-ring-gai Council bushland reserve	41
Figure 8: Steps on Mueller Track.....	44

List of Tables

Table 1: Vegetation Communities within KC bushland.....	21
Table 2: Threatened flora.....	26
Table 3: Threatened fauna.....	27
Table 4: Recreational use in reserves.....	43
Table 5: Past and ongoing works in reserves.....	47
Table 6: Prescribed actions to protect reserve features and manage identified issues....	51

Abbreviations

AHO	Aboriginal Heritage Office
BGHF	Blue Gum High Forest
DE	Department of the Environment
<i>EP&A Act</i>	<i>Environment Protection & Assessment Act 1979 (NSW)</i>
<i>EPBC Act</i>	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
ESD	Ecologically sustainable development
GIS	Geographic information system
KC	Ku-ring-gai Council
LEP	Local Environment Plan, as per the <i>Environment Protection & Assessment Act 1979 (NSW)</i>
<i>LG Act</i>	<i>Local Government Act 1993 (NSW)</i>
LGA	Local government area
LMU	Land Management Unit (this refers to a land categorisation numbering scheme for use by Ku-ring-gai Council)
OEH	NSW Office of Environment and Heritage
PAS	NSW Threatened Species Priorities Action Statements (required under the <i>NSW TSC Act 1995</i>)
PoM	Plan of Management
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
TEC	Threatened ecological community
<i>TSC Act</i>	<i>Threatened Species Conservation Act 1995 (NSW)</i>
VCA	Voluntary Conservation agreements. These are formed under the <i>National Parks & Wildlife Act 1974</i> . Now also know as CA –Conservation Agreements

Executive Summary

This document has been prepared to assist in the management of land owned or managed by Council, categorised as Natural Area and subcategorised as Bushland under the *Local Government Act 1993*. All bushland reserves dedicated and classified as Community Lands and categorised as Natural Area - Bushland under the *Local Government Act 1993* after the publication date of this plan will be managed in accordance with this Plan of Management.

General reserve features, environmental significance, management issues, key legislation and planning instruments are outlined. Broad aims and objectives are provided and recent management actions described.

The Bushland Plan of Management prescribes a number of management actions providing:

- guidance on permissible actions;
- planning for the creation of more detailed ecological guidelines;
- recreational strategies;
- ongoing data collection;
- management and review process;
- staff and community training; and
- education programs.

Prescribed actions are aligned to services, projects and operational programs. For each action a proposed time frame is provided, as well as identifying the responsible departments and Council officer.

Council will update the Ku-ring-gai Bushland Reserves Plan of Management as a two-staged process, involving two public exhibition rounds.

1. Introduction

1.1 Overview

This Plan of Management (Plan of Management) has been prepared to meet requirements of the *Local Government (LG) Act 1993 (NSW)*, *Crown Lands Act 1989* and other relevant legislation (**Section 3**). This plan covers land owned by or under the care, control and management of Ku-ring-gai Council, classified as Community Land and categorised as Natural Area - Bushland under the *Local Government Act 1993 (Section 26 and 36)*. This is the sixth Plan of Management prepared for Ku-ring-gai bushland reserves since the first plan in 1984.

This Plan of Management sets out the management framework for Ku-ring-gai's bushland reserves for the next year, with a more formal review planned for 2014 / 2015 financial year. Council will update the Ku-ring-gai Bushland Reserves Plan of Management as a two-staged process, involving two public exhibition rounds:

Stage 1 (this stage) will result in the creation of a one (1) year Plan of Management and will involve:

- the incorporation of additional natural areas;
- legislative and other empirical changes (e.g. ha of natural areas, km of fire trails);
- additional content on lease licencing and other estates (including expressly authorising the creation of a Biobanking Agreement within natural areas);
- minor amendments to the permissible uses section; and
- amendments to responsibility position titles, as referred to within the "Prescribed actions for management of reserve features" section.

Stage 2 will involve a formal review of the Plan of Management, in conjunction with a review of Council's Biodiversity Strategy, and in consultation with Council staff, stakeholders and the community. This review is scheduled for the 2014-2015 financial year and will produce a five (5) year Plan of Management.

All bushland reserves dedicated and classified as Community Lands and categorised as Natural Area - Bushland under the *Local Government Act 1993* after the publication date of this plan will be managed in accordance with this Plan of Management.

The plan builds on past plans and mapping projects undertaken by Council (KC 2008, KC 2009), Sydney Metropolitan Catchment Management Authority (CMA) and NSW Maritime

(Allen *et al* 2006, DECC 2009). This data has provided considerable advances in knowledge regarding Ku-ring-gai's public reserves and vegetation resources. This has and will lead to improvements in Council's ability:

- to assess the needs, state and resilience of bushland areas to a variety of pressures including recreational, environmental, infrastructure and bushfire management and
- to facilitate planning and implementation of the most effective management practices to protect and regenerative bushland ecosystems in Ku-ring-gai.

1.2 How to use this document

This Plan of Management sets out the management framework for Ku-ring-gai's bushland reserves. It outlines a number of broad issues, features, objectives and actions that are directed by:

- legislative requirements and associated recovery strategies and mitigation measures;
- location and context of ecologically sensitive lands including species, populations and vegetation communities;
- consistency with the Ecologically Sustainable Development (ESD) principles; and
- needs and aspirations of the Ku-ring-gai community.

The Plan of Management is to be read and implemented in conjunction with other Federal, State and local planning instruments, biodiversity strategies and management plans (including reserve management plans and detailed site management plans for council bush regeneration sites), as summarised in **Figure 3**. Management is further informed through use of Council's GIS data, which is updated as needed and is made available to council staff. This provides live data on the bushland reserves system and its management, including:

- land categorisation;
- reserve groupings to aid reporting (see Figure 1);
- known and suspected *phytophthora cinnamomi*¹ locations;
- existing leases /licences;
- riparian areas, threatened species; and
- assets including fire trails and walking tracks

¹ *Phytophthora cinnamomi* is a soil borne pathogen belonging to the water mould group (Oomycetes), which can lead to root rot in many plant species, potentially affecting entire habitats. Details are provided in Section 6.4 and DEH (2004)

1.3 Ku-ring-gai Council and the principles of ecologically sustainable development

Ku-ring-gai Council is a Local Government Area (LGA) that incorporates 8,436 ha, and is located 16km to the North of Sydney (**Figure 1**). The LGA is bounded by Garigal National Park to the east, Lane Cove National Park to the west and Ku-ring-gai Chase National Park to the north.

The LGA contains 1,160 ha of land identified as bushland reserves (**Figure 2**). These are divided into 136 land parcels for the purpose of Council's land register.

The major bushland reserves within the LGA provide contiguous habitat areas with adjoining National Parks. A list of all reserves under care control and management of Council is provided in **Appendix 1**.

As a local government authority, Ku-ring-gai Council is bound by two (2) specific *Acts* relating to land management and must abide by the principles set out in those *Acts*. The *Environmental Planning and Assessment Act 1979 (NSW)* and the *Local Government Act 1993 (NSW)*. These explicitly require local authorities to be guided by the Principles of Ecologically Sustainable Development (ESD) which include:

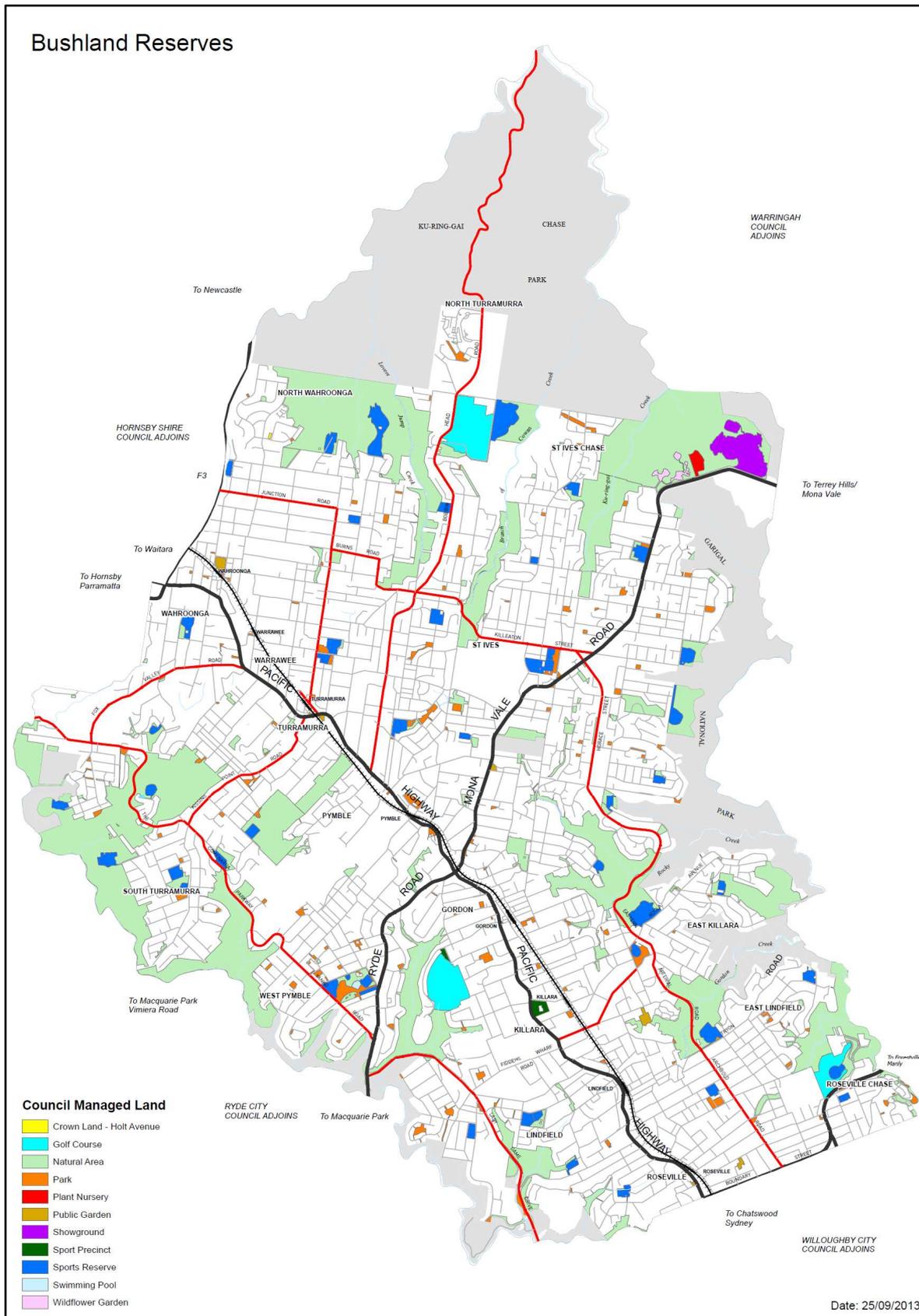
- precautionary principle;
- principle of inter-generational equity;
- principle of biodiversity conservation; and
- principle of valuation and pricing.

These principles guide the development and implementation of this Plan now and into the future.

Figure 1: Regional Location



Figure 2: Ku-ring-gai Natural Area - Bushland reserves



2. Aims and objectives

2.1 Aims

The aim of this Plan of Management is to provide a management framework for Council's bushland reserves consistent with the Principles of Ecological Sustainable Development (ESD). Adherence to these principles will ensure the ongoing viability of the bushlands' natural and cultural assets whilst providing recreational and educational opportunities.

The principles for the management of the bushland reserves aim to ensure that Council:

1. manages its reserves in accordance with relevant recovery and threat abatement strategies (referred to as threatened species priority action statements) and plans prepared by the NSW Office of Environment and Heritage (OEH), and Commonwealth Department of the Environment (DE)
2. protects, conserves, and enhances the natural, cultural, scientific and scenic values of Ku-ring-gai Council bushland reserves
3. provides appropriate recreation opportunities that are consistent with requirements for the conservation of the bushland ecosystems and particularly threatened species, populations and ecological communities
4. promotes community awareness of the natural and cultural significance of the reserves
5. manages fire hazards within and adjoining Council reserves and private lands to protect life and property and in accordance with natural fire regimes and
6. implements measures directed at minimising and managing the impacts from threats and pressures on the values and condition of the land.

2.2 Objectives

The reserves will be managed according to objectives listed in Section 36E and 36J of the *Local Government Act 1993* and the appropriate categories and sub categories as listed below.

Categorisation of 'Natural Areas'

Core objectives *LG Act 36E*

- conserve biodiversity and maintain ecosystem functions in respect of the land, or the feature or habitat in respect of which the land is categorised as a natural area
- maintain the land or that feature of habitat, in its natural state and setting
- provide for the restoration and regeneration of the land
- provide for community use of and access to the land in such a manner as will minimise and mitigate any disturbance caused by human intrusion, and
- assist in and facilitate the implementation of any provisions restricting to use and management of the land that are set out in a recovery plan or treat abatement plan prepared under the *Threatened Species Conservation Act 1995* or the *Fisheries Management Act 1994*

Further categorisation of 'Natural Areas'

Bushland - Core objectives *LG Act 36J*

- ensure the ongoing ecological viability of the land by protecting the ecological biodiversity and habitat values of the land, the flora and fauna (including invertebrates, fungi and micro-organisms) of the land and other ecological values of the land
- protect the aesthetic, heritage, recreational, educational and scientific values of the land
- promote the management of the land in a manner that protects and enhances the values and quality of the land and facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion
- restore degraded bushland
- protect existing landforms such as natural drainage lines, watercourses and foreshores
- retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term, and
- protect bushland as a natural stabiliser of the soil surface

3. Legislative and planning instruments

3.1 Legislation

Local Government Act 1993 (NSW)

The *Local Government Act 1993* requires a specific Plan of Management for community land that comprises habitat for a threatened species listed under the *Threatened Species Conservation Act 1995*. This Plan of Management is consistent with the requirements for specific plans of management as outlined in *Section 36* of the *Local Government Act 1993*. Under this Act, Council is responsible for management of public land and should include the community in the development of any strategies for managing such lands.

The Plan of Management:

- (a) must state that the land, or the relevant part, is so affected,
- (b) must categorise the land, or the relevant part, as a natural area, and
- (c) must identify objectives, performance targets and other matters that:
 - (i) take account of the Council's obligations under the recovery plan or threat abatement plan in relation to the land,
 - (ii) are otherwise consistent with the objects of the *Threatened Species Conservation Act 1995* or the *Fisheries Management Act 1994*, as the case requires, and
 - (iii) incorporate the core objectives prescribed under *section 36* in respect of community land categorised as a natural area.

The Plan of Management satisfies the requirements of the *Local Government Act 1993* in relation to:

- categorising the land that constitutes the network of Ku-ring-gai Bushland Reserves;
- defining objectives and performance targets;
- stating the means by which objectives and performance targets will be met;
- stating the means by which performance will be measured; and
- observing the requirements of any recovery and threat abatement strategies and plans made under the *Threatened Species Conservation Act 1995* or the *Fisheries Management Act 1994*.

Rural Fires Act 1997 (NSW) and Environmental Planning and Assessment Act 1979 (NSW)

This Plan of Management considers the prevention, mitigation and suppression of fire as required by the *Rural Fires Act 1997*. The main objective of the *Rural Fires Act 1997* is to provide for the prevention, mitigation and suppression of bush and other fires in those parts of the State designated as rural fire districts. Protection of life and property is a priority and fire management activities must be carried out with regard to the Principles of Ecologically Sustainable Development.

Part 3 of the *Rural Fires Act 1997* provides for the continued coordination and arrangements between bush fire fighting authorities within NSW. This includes the establishment of a Bush Fire Coordinating Committee, Bush Fire Management Committee and general bush fire management planning. Bush Fire Coordinating Committees play the primary role to plan for bush fire prevention and coordinate bush fire fighting across the State, including the creation of policies to guide Bush Fire Management Committees in undertaking their role.

The Ku-ring-gai local government area is managed by the Hornsby Ku-ring-gai Bush Fire Management Committee. This committee is required to prepare:

- a draft Hornsby Ku-ring-gai Bush Fire Risk Management Plan (2009). This would be a five (5) year plan, which would set out schemes for bush fire hazard reduction and may restrict or prohibit the use of fire or other particular fire hazard reduction activities; and
- an Operations Plan under *Section 52*.

In 2002, the *Rural Fires Act 1997* and the *Environmental Planning and Assessment (EP&A) Act 1979* were amended to include:

- assessment of development against Planning for Bushfire Protection Guidelines (Rural Fire Services 2001 and 2006) (*Rural Fires Act 1997 Section 100B* and the *EP&A Act 1979 Section 79BA*); and
- the requirement for Council to record lands, which have been identified by the Commissioner of the NSW Rural Fire Service as Bush Fire Prone Land (Ku-ring-gai Council 2008a) (*EP&A Act 1979 Section 146*).

Provisions relating to asset protection zones under the *Rural Fires Act 1997* only apply to those dwellings approved after gazettal of Planning for Bushfire Protection Guidelines (RFS 2001) on August 1, 2001. However, owners of properties with dwellings approved before this date can maintain asset protection zones according to the Planning for Bushfire Protection Guidelines (RFS 2006). These guidelines state "*bushfire protection measures that are*

essential to a development must occur on the site of the proposed development unless the most exceptional circumstances apply.”

Threatened Species Conservation Act 1995 (NSW)

The *Threatened Species Conservation Act 1995* aims to protect and encourage the recovery of critical habitats and threatened species, populations and communities listed under the *Act*. The *Act* provides for the following threat categories:

- critically endangered (**Schedule 1A**);
- endangered Species and populations (**Schedule 1**); and
- vulnerable (**Schedule 2**).

As of May 2009, no critical habitat has been recognised within the Ku-ring-gai LGA.

(refer to Sections 4.2 and 4.3 for lists of relevant threatened species, populations and ecological communities for Ku-ring-gai bushland reserves).

The *Act* also identifies key threatening processes (**Schedule 3**) and requires NSW Department of Environment Climate Change and Water to prepare and adopt recovery and threat abatement strategies. This includes NSW threatened species priority action statements, recovery plans (for listed threatened species, populations and ecological communities) and threat abatement plans for listed key threatening processes. It also requires that public authorities must not make decisions that are inconsistent with the provisions of recovery and threat abatement strategies.

This Plan of Management has been written to align with relevant priority action statements, threat abatement plans and recovery plans. A detailed list of objectives and actions for relevant plans and strategies is available within **Appendix 3**.

Under the *Threatened Species Conservation Act 1995* the following relevant key threatening processes that apply to this Plan of Management include:

- alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands;
- anthropogenic climate change;
- bush rock removal;
- clearing of native vegetation;
- competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*);
- competition and habitat degradation by feral goats (*Capra hircus*);
- competition from feral honey bees (*Apis mellifera*);

- ecological consequences of high frequency fire;
- exotic vines and scramblers;
- forest eucalypt dieback associated with over-abundant psyllids and Bell Miners;
- herbivory and environmental degradation caused by feral deer;
- infection by *psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations;
- infection of frogs by amphibian chytrid causing the disease chytridiomycosis;
- infection of native plants by *phytophthora cinnamom*;
- introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
- introduction of the large earth bumblebee (*Bombus terrestris*);
- invasion and establishment of scotch broom (*Cytisus scoparius*);
- invasion and establishment of the cane toad (*Bufo marinus*);
- invasion of native plant communities by African Olive *Olea europaea L. subsp. cuspidate*;
- invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed);
- invasion of native plant communities by exotic perennial grasses;
- invasion, establishment and spread of lantana (*Lantana camara*);
- loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants;
- loss of hollow-bearing trees;
- predation and hybridisation of feral dogs (*Canis lupus familiaris*);
- predation by the European fox (*vulpes vulpes*);
- predation by the feral cat (*felis catus*);
- predation by the plague minnow (*gambusia holbrooki*);
- predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*);
- removal of dead wood, dead trees and logs.

In addition to a priority action statement (as referred to within Appendix 3) for each listed threatened species, population and ecological community the following plans and draft plans apply (a summary of objectives and relevant key actions are provided within Appendix 3):

- Threat Abatement and Other Weed Plans:
 - Predation by the European Fox (*Vulpes vulpes*) (NPWS 2001);
 - Predation by the Plague Minnow (*Gambusia holbrooki*) (NPWS 2003); and

- Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed) (DEC 2006b).
- Plan to protect environmental assets from Lantana (*Lantana camara*) (Biosecurity Qld 2010).
- Recovery Plans:
 - *Darwinia biflora* (Cheel) Briggs (DEC 2004);
 - *Persoonia mollis* subspecies *maxima* (NSW NPWS 2000) (combined plan under the *TSC Act 1995* and *EPBC Act 1999*);
 - *Grevillea caleyii* (DEC 2004a) (combined plan under the *TSC Act 1995* and *EPBC Act 1999*);
 - Southern Brown Bandicoot (*Isodon obesulus*) (DEC 2006a);
 - Koala (*Phascolarctos cinereus*) (DECC 2008a);
 - Large Forest Owls: Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*) (DEC 2006);
 - Green and Golden Bell Frog (*Litoria aurea*) (DECC 2005); and
 - Grey-headed Flying-fox (*Pteropus poliocephalus*) (DECCW 2009).
- Draft Recovery Plan:
 - Barking Owl (*Ninox connivens*) (DEC 2003); and
 - *Melaleuca deanei* (DECC 2008).

Environment Protection & Biodiversity Conservation (EPBC) Act 1999 (Cth)

This Federal Government Act requires the preparation of recovery plans for listed threatened species, endangered ecological communities and threat abatement plans for listed key threatening processes. If a development is considered to have a significant impact on a listed community, it must be referred to Commonwealth Department of Environment for approval.

Relevant listed key threatening processes that have been identified at the national level include:

- Competition and land degradation by feral rabbits (*Oryctolagus cuniculus*);
- Predation by feral cats (*Felis catus*);
- Predation by the European Red Fox (*Vulpes vulpes*); and
- Dieback caused by the root-rot fungus *Phytophthora cinnamomi*.
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

Relevant Recovery Plans:

- Swift parrot (*Lathamus discolor*) (DEH - Swift Parrot Recovery 2001).
- Grey-headed flying-fox (*Pteropus poliocephalus*) (DECCW 2009)

This Plan of Management complies with relevant objectives and actions of the key threatening processes and recovery plans. During the creation of a recovery or threat abatement plan, the Commonwealth is required to consult with the appropriate Minister of each State and Territory in which the species or ecological community occurs.

State Environmental Planning Policy 19 - Bushland in Urban Areas (NSW)

Plan of Management must be consistent with the aims and objectives of protecting and preserving bushland within urban areas. In the event of an inconsistency between *State Environmental Planning Policy 19* and another environmental planning instrument (such as a Local Environmental Plan), *State Environmental Planning Policy 19* prevails to the extent of the inconsistency.

Other legislation

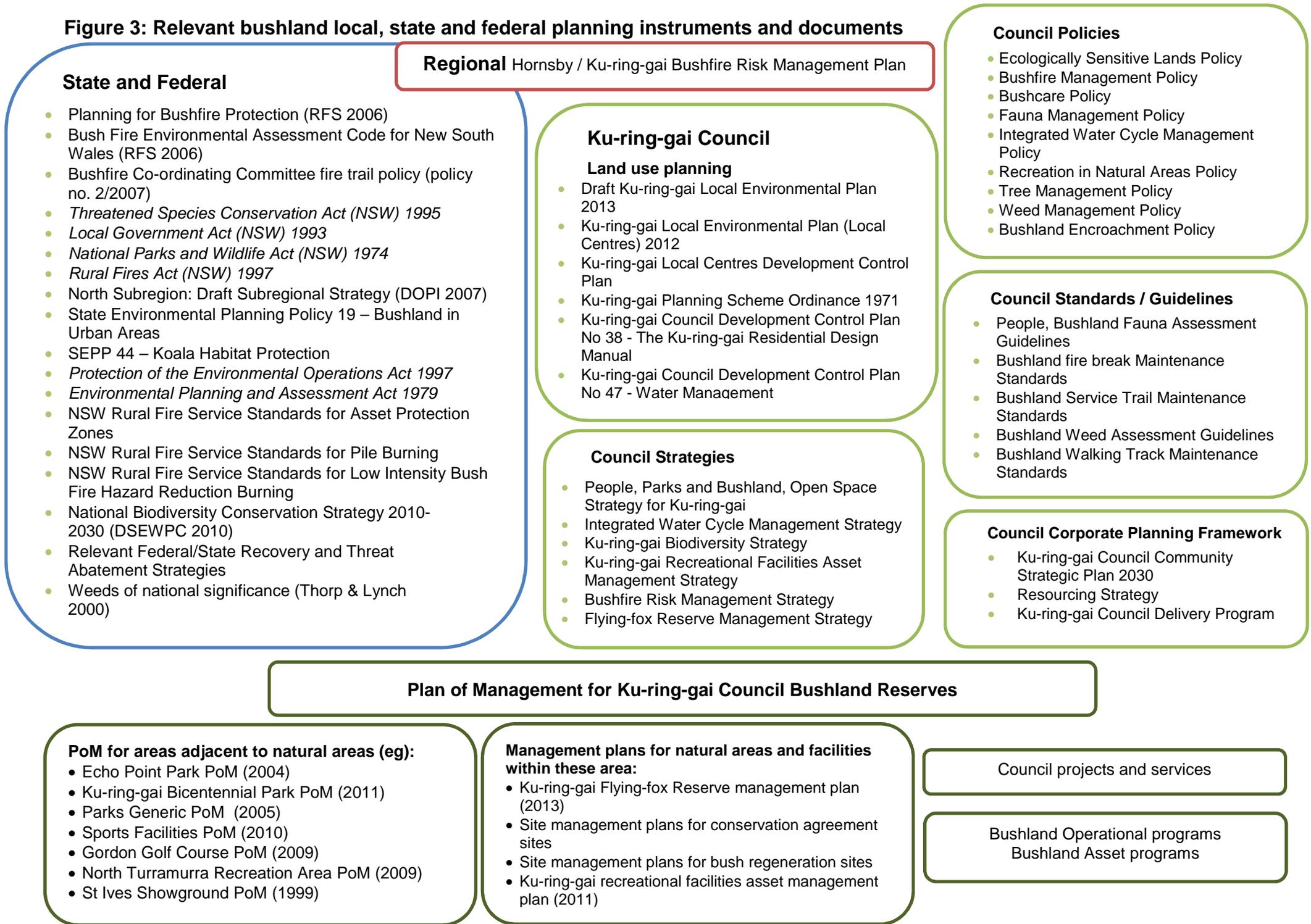
In providing active management of the Council reserves, it must give regard to the provisions and requirements of a number of Acts and Regulation. Some of these include:

- *National Parks and Wildlife Act 1974 (NSW)*;
- *Heritage Act 1977 (NSW)*;
- *Noxious Weed Act 1993 (NSW)*;
- *Rural Lands Protection Act 1998 (NSW)*;
- *Protection of the Environment Operations Act 1997 (NSW)*; and
- *Disabilities Discrimination Act 1992 (NSW)*.

3.2 Planning instruments and document

This Plan of Management should be implemented in line with relevant Federal, State and local plans and policies. Key documents are outlined within **Figure 3**.

Figure 3: Relevant bushland local, state and federal planning instruments and documents



4. General reserve features

4.1 Landscape character

Ku-ring-gai LGA lies mainly on the Hornsby plateau and is characterised by a series of ridges and gullies. The major central ridge, on which the North Shore railway line and Pacific Highway runs, dominates the LGA and defines the Lane Cove and Middle Harbour catchments. A minor ridge runs from Telegraph Road, Pymble through St Ives and to Terry Hills to the east. Flatter slopes extend from many ridge locations and are characterised by shale soils. Outside these areas, steeper slopes with incised gullies dominate. These sections of land and narrow valley floors constrained early development and now form the bushland reserves that characterise this region of Sydney.

The LGA rises from sea level to a height of 211 metres at Wahroonga and is divided into three (3) major catchments: Lane Cove Valley, Middle Harbour and Cowan Creek. The Pacific Highway and Mona Vale Road roughly delineate the catchments, which feed into Sydney Harbour and Hawkesbury-Nepean catchments systems. Reserves on the eastern edge of the LGA are located along the steep gullies formed by a number of Middle Harbour Creek tributaries. To the north, Lovers Jump Creek, Cowan Creek and Ku-ring-gai Creek wind their way along often-steep valleys into Ku-ring-gai Chase National Park. Reserves to the south and west include the Lane Cove River and its tributaries, with valleys ranging in slope from 20 to 40 degrees.

4.2 Vegetation communities

Eleven (11) vegetation communities are found within Ku-ring-gai Council bushland, as listed in **Table 1**. These include both Federal and State listed communities.

Table 1: Vegetation Communities within KC bushland

Vegetation Community	State listed (<i>Threatened Species Conservation Act 1995</i>) [▲]	Federally listed (<i>Environment Protection and Biodiversity Conservation Act 1999</i>) [▲]
Blue Gum High Forest	CEEC	CEEC
Sydney Turpentine-Ironbark Forest	EEC	CEEC
Duffys Forest	EEC	
Estuarine Fringe Forest - Swamp Oak Floodplain Forest	EEC	
Estuarine Salt marsh	EEC	
Coastal Sandstone Heath		

Vegetation Community	State listed (Threatened Species Conservation Act 1995) [▲]	Federally listed (Environment Protection and Biodiversity Conservation Act 1999) [▲]
Coastal Shale Sandstone Transition Forest		
Sydney Sandstone Gully Forest		
Sydney Sandstone Ridge-top Woodland		
Mangroves		
Coastal Upland Swamp	EEC	

[▲] CEEC - Critically Endangered Ecological Community; EEC - Endangered Ecological Community ⁴

4.2.1 Blue Gum High Forest

Blue Gum High Forest (BGHF) occurs over relatively fertile soils, derived from Wianamatta shale, in areas of high rainfall. It is characterised by a distinctively tall, open canopy dominated by Sydney Blue Gum (*Eucalyptus saligna*) and/or Blackbutt (*Eucalyptus pilularis*). BGHF is listed in NSW as a critically endangered ecological community under the *Threatened Species Conservation Act 1995* and the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*.

Recent revision of the final determination of Blue Gum High Forest (BGHF) as a *critically endangered ecological community* under the *Threatened Species Conservation Act 1995* has broadened the scope and extent of BGHF. This now encompasses “small clumps of trees without a native understorey” and “below ground soil seed banks and dormant structures” (NSW SC 2007).

Restricted to the northern half of Sydney, extensive clearing since settlement has left less than five (5%) percent of the original extent of BGHF. Existing remnants of this plant community average about two (2) hectares or less and are particularly vulnerable to fragmentation, increased nutrients, altered fire regimes and development (NSW NPWS / DEH (a) and (b)).

4.2.2 Coastal Sandstone Heath

Coastal Sandstone Heath communities generally occur over shallow, infertile and dry sandy soils, derived from Hawkesbury Sandstone. They are characterised by high species diversity, and include species such as Heath-leaved Banksia (*Banksia ericifolia*), Teatree (*Leptospermum spp*), and Needlebush (*Hakea teretifolia*).

4.2.3 Coastal Shale Sandstone Transition Forest

Coastal Shale Sandstone Transition Forest occurs in shale/sandstone transition areas associated with shale caps and creek-lines across the Ku-ring-gai LGA.

The conservation status of Coastal Shale Sandstone Transition Forest warrants further examination and will be reviewed by OEH as part of their proposed review of vegetation community listings. This community is likely to be naturally restricted and vulnerable to development and degradation.

4.2.4 Duffys Forest

The Duffys Forest Ecological Community is listed under the *Threatened Species Conservation Act 1995* as an endangered ecological community. The scientific determination for this community omits reference to remnant trees or trees lacking understorey and as such it is acknowledged that some areas of Duffys Forest are too degraded to be listed under the *Threatened Species Conservation Act 1995*.

This community commonly occurs on ridge tops, plateaus and upper slopes over shale lenses and lateritic soils on Hawkesbury sandstone. It is characterised by open-forest or woodland, with sandstone outcropping occurring within transitional locations. This community is dominated by a varied of canopy species including; Red Bloodwood (*Corymbia gummifera*), Black Ash (*Eucalyptus sieberi*), Smooth-barked Apple (*Angophora costata*), and Brown Stringybark (*Eucalyptus capitellata*). The Ku-ring-gai LGA contains eight (8%) percent of the remaining 240 ha of Duffys Forest (KC 2006).

4.2.5 Sydney Sandstone Gully Forest

The Sydney Sandstone Gully Forest communities are associated with sheltered hillsides and moist gullies that have eroded into Hawkesbury sandstone producing deep sandy soils. This is a diverse plant community characterised by dense understorey, large ecological diversity and as a structure that varies from tall open forest, open forest to closed forest. The dominant canopy species vary depending on the specific sub-community. Canopy species include Sydney Red Gum (*Angophora costata*), Red Bloodwood (*Corymbia gummifera*), Sydney Peppermint (*Eucalyptus piperita*), Silvertop Ash (*Eucalyptus sieberi*), Blackbutt (*Eucalyptus pilularis*), Turpentine (*Syncarpia glomulifera*), Lillipilly (*Acmena smithii*), Coachwood (*Ceratopetalum apetalum*) and Forest Oak (*Allocasuarina torulosa*).

4.2.6 Sydney Sandstone Ridgetop Woodland

Sydney Sandstone Ridgetop Woodland Communities are associated with ridgetops, plateaus and exposed slopes where Hawkesbury sandstone has produced shallow sandy soils.

Sydney Sandstone Ridgetop Woodland Communities are characterised by diverse vegetation structure varying considerably between communities from woodland to open forest to low open woodland. Dominant canopy species include: Red Bloodwood (*Corymbia gummifera*), Silvertop Ash (*Eucalyptus sieberi*), Scribbly Gum (*Eucalyptus haemastoma*), Sydney Red Gum (*Angophora costata*) and Sydney Peppermint (*Eucalyptus piperita*).

4.2.7 Sydney Turpentine-Ironbark Forest / Turpentine-Ironbark Forest

Sydney Turpentine-Ironbark Forest is listed as an Endangered Ecological Community under the *Threatened Species Conservation Act 1995* and a critically endangered ecological community under the *Environmental Protection and Biodiversity Conservation Act 1999* (listed as Turpentine-Ironbark Forest). It is estimated that of the original distribution four and a half (4½%) percent of the higher condition remnants occur on the Cumberland Plain within the Sydney region (DECC and DEH (b) websites).

Sydney Turpentine Ironbark Forest (STIF) occurs on clay soils (derived from Wianamatta shale) associated with ridgelines and upper to mid-slopes in moderate rainfall zones within the Ku-ring-gai LGA. Soils are generally shallower with lower clay content and drier than those supporting BGHF. Dominant canopy species include Blackbutt (*Eucalyptus pilularis*) and Turpentine (*Syncarpia glomulifera*).

4.2.8 Estuarine fringe forest - Swamp Oak Floodplain Forest

Swamp Oak Floodplain Forest is listed as an endangered ecological community under the *Threatened Species Conservation Act 1995*, with approximately 56 ha occurring within the LGA (Allen *et al* 2006).

This community occurs on humic clay and sandy loam soils that have deposited on the flats and drainage lines of the coastal floodplain. These areas are waterlogged or periodically flooded and are usually found below 20 metre in elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reed lands with scattered trees. The tree layer of Swamp Oak Floodplain Forest is most commonly dominated by Swamp Oak (*Casuarina glauca*), but will also include other trees such as Lilly Pilly (*Acmena smithii*), Cheese Tree (*Glochidion ferdinandi*) and Paperbarks (*Melaleuca* spp.). The understorey of this community is characterised by frequent occurrences of vines, sparse layer of shrubs and a number of small herbs. On the fringes of coastal estuaries where soils are more saline, the groundcover moves towards Common Reed (*Phragmites australis*), Sea Rush (*Juncus kraussii*) and salt marsh type species.

4.2.9 Estuarine Mangrove

Mangroves are widespread in estuaries occurring within the intertidal zone including

mudflats. These regularly inundated areas have a dense canopy dominated by Grey Mangrove (*Avicennia marina*) and Swamp Oak (*Casuarina glauca*).

4.2.10 Estuarine Salt Marsh

Estuarine salt marsh is listed as an Endangered Ecological Community under the *Threatened Species Conservation Act 1995*, with approximately point two (0.2) of a hectare occurring within the LGA (Allen *et al* 2006). These communalities form an essential part of healthy estuaries and salty lagoons. They have important conservation value even when heavily degraded and in poor condition.

Coastal salt marsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea and frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea*, Sea Rush (*Juncus kraussii*), Beaded Samphire (*Sarcocornia quinqueflora*), Marine Couch *Sporobolus virginicus*, Streaked Arrowgrass (*Triglochin striata*), Knobby Club Rush (*Isolepis nodosa*), Creeping Brookweed (*Samolus repens*), Swamp Weed (*Selliera radicans*), Seablite (*Suaeda australis*) and Prickly Couch (*Zoysia macrantha*). Occasionally mangroves, tall reeds and salt pans may occur.

4.2.11 Coastal Upland Swamp

The Coastal Upland Swamp is listed as an Endangered Ecological Community under the *Threatened Species Conservation Act 1995*. Coastal Upland Swamps occur primarily on impermeable sandstone plateaux with shallow groundwater aquifers in the headwaters and impeded drainage lines of streams, and on sandstone benches with abundant seepage moisture.

The vegetation of the Coastal Upland Swamp may include tall open scrubs, tall closed scrubs, closed heaths, open graminoid heaths, sedgelands and fernlands. Larger examples may include a complex of these structural forms. The flora comprising the upland swamp is diverse there are 73 plant species listed as characterising the ecological community. The total species list is much greater and is likely to exceed 200 species of vascular plants.

4.3 Flora and fauna species

Knowledge of flora and fauna within the LGA is maintained through Council's flora and fauna database (Biobase). This database is updated regularly with records from the NSW Wildlife Atlas, Wildlife Watch (community sightings), Council and consultants. In order to increase data accuracy for known threatened flora records within Council land, a field validation project was conducted in 2008 and records subsequently amended.

Council's reserves provide habitat for a broad range of flora species, including 15 state listed (*Threatened Species Conservation Act 1995*), and 12 Federally listed (*Environmental Protection and Biodiversity Conservation Act 1999*). **Tables 2** provides a list of species identified and **Figure 5** a broad indication of their distribution within Ku-ring-gai LGA.

The reserves also provide habitat for a broad range of fauna species, including 35 species listed under the *Threatened Species Conservation Act 1995* and 16 species listed under the *Environmental Protection and Biodiversity Conservation Act 1999*. A list of species identified and a broad distribution patterns within Ku-ring-gai is provided within **Table 3** and **Figure 2**. Ku-ring-gai also supports an endangered population of the Gang-gang Cockatoo (*Callocephalon fimbriatum*).

Table 2: Threatened flora

Scientific Name	EPBC Act 1999 Status [▲]	TSC Act 1995 Status [▲]	Notes
<i>Acacia bynoeana</i>	V	E	
<i>Callistemon linearifolius</i>	not listed	V	
<i>Darwinia biflora</i>	V	v	
<i>Deyeuxia appressa</i>	E	E	
<i>Dillwynia tenuifolia</i>	V	V	
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	not listed	V	
<i>Eucalyptus camfieldii</i>	V	V	
<i>Grevillea caleyi</i>	E	E	Unlikely to be local to the area.
<i>Genoplesium baueri</i>	not listed	V	About half the records of this species were made before 1960 with most of the older records being from Sydney suburbs including Wahroonga (NSW SC 2004). No recent records.
<i>Haloragodendron lucasii</i>	E	E	
<i>Leptospermum deanei</i>	V	V	
<i>Melaleuca deanei</i>	V	V	
<i>Persoonia mollis</i> subsp. <i>maxima</i>	E	E	
<i>Tetradlea glandulosa</i>	V	v	

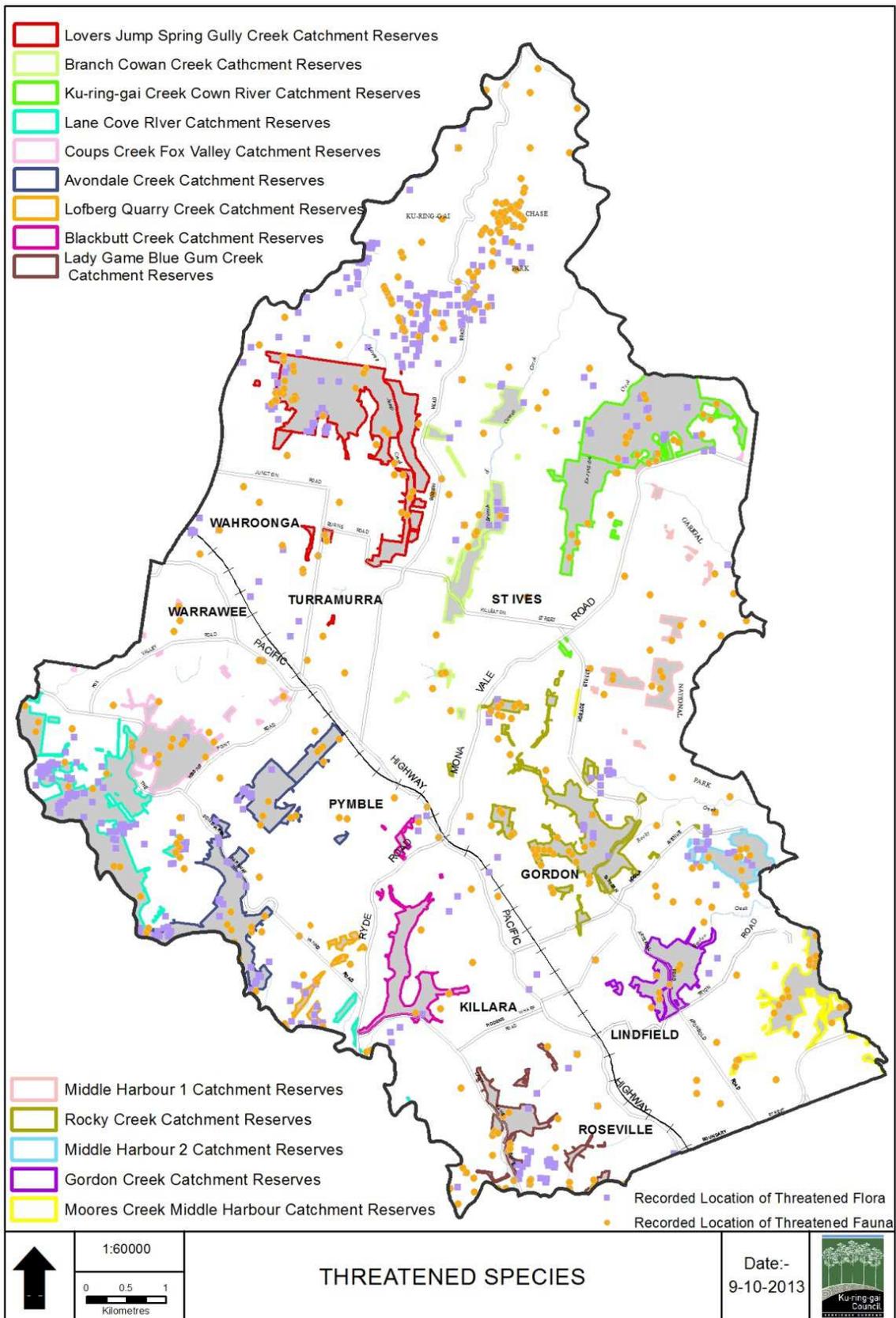
[▲] V – Vulnerable, E – Endangered

Table 3: Threatened fauna

Scientific Name	Common Name	EPBC Act Status [^]	TSC Act Status [^]	Notes [♦]
<i>Botaurus poiciloptilus</i>	Australasian Bittern		V	
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo		V	
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	E	V	
<i>Cercartetus nanus</i>	Eastern Pygmy-possum		V	
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	Not recorded for over 50 years
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	E	V	
<i>Dasyurus viverrinus</i>	Eastern Quoll		E	Not recorded for over 50 years
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle		V	
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		V	
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	
<i>Isoodon obesulus</i>	Southern Brown Bandicoot	E		
<i>Ixobrychus flavicollis</i>	Black Bittern		V	
<i>Lathamus discolor</i>	Swift Parrot	E	E	
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	M, Mg	V	Probably only a rare vagrant
<i>Melanodryas cucullata</i>	Hooded Robin	E	V	
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	Not recorded for over 10 years
<i>Miniopterus australis</i>	Little Bentwing-bat		V	
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat		V	
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat		V	
<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	Marine	E	
<i>Ninox connivens</i>	Barking Owl		V	
<i>Ninox strenua</i>	Powerful Owl		V	
<i>Pachycephala olivacea</i>	Olive Whistler		V	
<i>Phascolarctos cinereus</i>	Koala		V	Probably occasional visitor
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Likely to be an escapee.
<i>Pseudophryne australis</i>	Red-crowned Toadlet		V	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove		V	
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	M	V	
<i>Puffinus carneipes</i>	Flesh-footed Shearwater	M, Mg	V	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat		V	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat		V	
<i>Varanus rosenbergi</i>	Rosenberg's Goanna		V	

[^] V – Vulnerable, E – Endangered, M- Marine, Mg - Migratory

Figure 4: Threatened species in Ku-ring-gai LGA



4.4 Aboriginal and non-Aboriginal heritage

4.4.1 Aboriginal heritage

Since 2007 Council has been working with the Aboriginal Heritage Office to complete a study into areas that may have high potential for containing unidentified Aboriginal Heritage items. Prior to this Ku-ring-gai's Aboriginal heritage was largely guided by a heritage study completed in 1988 (Koettig, M. 1988).

The NSW OEH remains the agency charged with the responsibility for Aboriginal heritage, however local government, as land managers share this duty (AHO, 2007).

Legislation relevant to the protection of Aboriginal heritage places and values in NSW include the:

- *National Parks and Wildlife Act 1974 (NSW)*; and
- *Environmental Planning and Assessment Act 1979 (NSW)*.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* provides for the protection of Aboriginal objects and Aboriginal places. Under the Act:

An Aboriginal object is any deposit, object or material evidence (not being a handicraft made for sale) relating to Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains (as defined within the meaning of the National Parks and Wildlife Act 1974.

Aboriginal objects are confined to physical evidence and may also be referred to as 'Aboriginal sites', 'relics' or 'cultural material'. Aboriginal objects can include pre-contact features such as scarred trees, middens and artifact scatters, as well as physical evidence of post-contact use of the area such as Aboriginal built fencing or stockyards and fringe camps.

An "Aboriginal place" is a place which has been declared so by the Minister administering the National Parks and Wildlife Act because he or she believes that the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.

It should be noted that the *National Parks and Wildlife Act 1974* does not provide protection for spiritual areas or natural resource areas that have no physical evidence of Aboriginal occupation or use, unless they have been declared an 'Aboriginal place'.

Under *Section 90* of the *National Parks and Wildlife Act 1974* a person must not destroy, deface, damage or desecrate, or cause or permit the destruction, defacement, damage or

desecration of, an Aboriginal object or Aboriginal place unless the Aboriginal object or Aboriginal place is dealt with in accordance with a heritage impact permit (previously known as a Consent to Destroy) issued by the Director-General of NSW National Parks and Wildlife Service.

In considering whether to issue a *Section 90* Heritage Impact Permit (or General Terms of Approval under the *Environmental Planning and Assessment Act 1979*) OEH will take into account the:

- significance of the Aboriginal object(s) or Aboriginal place(s) subject to the proposed impacts;
- effect of the proposed impacts and the mitigation measures proposed;
- alternatives to the proposed impacts;
- conservation outcomes that will be achieved if impact is permitted; and
- outcomes of the Aboriginal community consultation regarding the proposed impact and conservation outcomes.

The *National Parks and Wildlife Act 1974* requires that reasonable precautions are taken and due diligence is exercised to determine whether an action would, or would be likely to, impact on an Aboriginal object or Aboriginal place. Without being able to demonstrate due diligence a person risks prosecution if Aboriginal objects or Aboriginal places are impacted upon and a Heritage Impact Permit has not been issued.

It is also an offence under *Section 86* of the *National Parks and Wildlife Act 1974*, to disturb or excavate land for the purpose of discovering an Aboriginal object, or disturb or move an Aboriginal object on any land, without first obtaining a permit under *Section 87* of the *Act*. In issuing a permit under *Section 87*, the OEH will take into account:

- the views of the Aboriginal community about the proposed activity;
- the objectives and justification for the proposed activity;
- the appropriateness of the methodology to achieve the objectives of the proposed activity; and
- the knowledge, skills and experience of the nominated person(s) to adequately undertake the proposed activity.

Under *Section 89A* of the *Act*, it is a requirement to notify the Director-General of the National Parks and Wildlife Service of the location of an Aboriginal object. Failure to do this within reasonable time is an offence under the *Act*.

The *Act* also provides for stop-work orders under *Section 91AA* if an action is likely to significantly affect an Aboriginal object or Aboriginal place. The order may require that an action is to cease or that no action is carried out in the vicinity of the Aboriginal object or Aboriginal place for a period of up to 40 days.

Environmental Planning and Assessment Act 1979 (NSW)

Protection of Aboriginal heritage is afforded by the NSW *Environmental Planning and Assessment Act 1979* through the Environmental Impact Assessment process. This *Act* includes requirements to consider potential impacts upon Aboriginal heritage occurring as a result of planned activities including construction and development.

This protection is only associated with specific activities rather than more general or blanket protection for Aboriginal heritage. Aboriginal heritage items or places identified during this assessment process are then managed under the provisions of the *National Parks & Wildlife Act 1974*.

4.4.2 Non-Aboriginal heritage

Ku-ring-gai Council is obliged to conserve non-indigenous assets that are more than fifty years old under the *Heritage Act 1977 (NSW)* and manage these assets according to the principles contained within the 'Burra Charter', including:

- the place itself is important;
- understand the significance of the place;
- understand the fabric;
- significance should guide decisions;
- do as much as necessary and as little as possible;
- keep records; and
- do everything in a logical order.

These places are considered worth keeping because they enrich our lives by helping us understand the past. They become part of the environment of the bushland and if conserved will be valued by future generations. The fabric of the place refers to its contextual setting and the relic content and the association between the two. The combination of the setting and the content will enable the land manager to understand and communicate the significance of the place and the importance attached to its conservation.

In 1987, a heritage study was completed with the aim of initiating a process that would see important heritage items protected (Ku-ring-gai Council 1987). This study focused primarily on identification of heritage items within bushland managed or under care control or management of Council. The study concluded that:

- Ku-ring-gai has an extraordinary wealth and range of heritage places; and
- a more comprehensive study was required to fully appreciate the value of these assets and ensure all items had been identified.

Items of non-Aboriginal historical interest within or adjacent to Ku-ring-gai Council bushland

reserves include but are not limited to:

- early walking tracks, retaining walls and bridges from pre 1920 that are now part of the extensive Middle Harbour walking track system;
- early stone structures related to industrial land use of the 1920s in Sheldon Forest and Hammond Reserve;
- World War 1 trenches built by C Company Engineers when Roseville Park (now the Golf Course) was used for military training in 1917;
- stone building ruins in East Lindfield near Middle Harbour foreshore;
- a World War II rifle range and Italian Prisoner of War Camp below St Ives Showground; and
- a cobblestone road in Fox Valley in the European Heritage items.

Some of the evidence pointing to the existence and location of non-indigenous local heritage items is largely anecdotal. It is clear that further research is required to confirm the location, significance and conservation requirements of many of these items.

4.5 Recreation, fire trail and walking track networks

Ku-ring-gai bushland reserves offer a wealth of opportunities for active and passive recreation, focused around the use and access provided by various trails. There are currently approximately 46.1 km of fire or service trails and 64.4 km of constructed walking trails in bushland areas, as part of 25 planned routes. In addition, there are many hundreds of kilometres of informal routes linking established trails in bushland.

Major walking trails include:

- The STEP Track in South Turramurra;
- Mueller Track and others within the Ku-ring-gai Wildflower Garden;
- Sheldon Forest track in Pymble;
- Two Creeks track in Middle Harbour;
- Sections of the Great North Walk; and
- Sections of the Harbour to Hawkesbury Walk.

5. Management prioritisation

Bushland is maintained against the aims and objectives as listed in Sections 2.1 and 2.2. These should not be viewed as mutually exclusive, rather they should work in collaboration to enrich the protection and use of the bushland environment. Where conflict may occur it is necessary to reflect back on to the definition and Principles of ESD.

Natural resource management in the 21st century seeks to incorporate social and economic values into strategies to support biodiversity conservation. While this sometimes requires thinking outside traditional notions of natural resource management, it is a far more effective argument for supporting natural areas than the exclusive ecological perspective. Using social and economic values to underpin conservation values seek to ensure conservation is not considered a cost to the community rather as an asset.

In order to provide a systematic approach to allocating resources for the management and use of bushland reserves a matrix rating system has been adopted by Council (Ku-ring-gai Council 2007b). This matrix ranks bushland reserves into three (3) categories according to their values across the environmental, social and financial spheres and existing pressures. Details on this are provided in **Appendix 2**.

Additional considerations for management prioritisation include:

- Federal, State and regional coordinating committees, management plans and strategies;
- asset condition rating;
- external funding; and
- presence of ecologically sensitive lands.

6. Current management issues and their consequences

A number of bushland management issues were identified through desktop analysis, literature review, consultation (with staff and residents) and site visits.

6.1 Conservation and enhancement of native flora and fauna

As summarised in Section 4, the Ku-ring-gai LGA is home to a variety of plants and animals. These contribute to the health and sustainability of the overall ecosystem, including provision of significant habitat features such as senescent and fallen trees, pollination vectors and soil aeration. Conservation and enhancement of native flora and fauna is a key issue throughout the reserve system. Some reserves have a higher degree of resilience and can buffer the impacts generated by human intervention such as recreational activity. Others are more sensitive and require tailored management to conserve the specific values of each site. For example in Ku-ring-gai Flying Fox Reserve and Browns Forest, dog walking is prohibited, under Conservation Agreements (under *NPWS Act 1974*), Browns Forest is also protected as a Wildlife Protection Area (under the *Companion Animal Act 1998*).

6.2 Corridors and connectivity

Council has identified a number of vegetation and habitat corridors within the LGA. These provide connectivity between bushland reserves and generally benefit highly mobile species such as birds, bats, insects and some terrestrial fauna, and are reliant on tree canopy as the primary linkage structure. Smaller 'pocket parks' and reserves with denser tree canopy cover, as well as private property play an important role in facilitating movement for mobile species, plant pollination and other ecological and community character functions throughout the LGA.

It is important to differentiate between canopy dominated corridors and those with greater structural vegetation, the latter enabling greater ecological function. The primary corridor areas within Ku-ring-gai, outside Ku-ring-gai bushland and National Parks estate, include well-vegetated riparian corridors. Whilst these areas may offer increased environmental services such as vegetation, habitat, water and nutrient processes, they do not necessarily provide a representation of vegetation and habitat across the landscape.

6.3 Open space and urban interfaces

Council's developed open space consists of two (2) golf courses, 71 tennis courts, an outdoor pool complex, 48 sports grounds, over 160 parks, a showground and an estimated 300,000 street trees.

There is approximately 92 km of interface between private housing areas and Council bushland reserves, with approximately 2,450 properties directly connected to Council bushland reserves and bushland reserves in National Parks and Nature Reserves. Ku-ring-gai's bushland interface areas require special attention to manage the impacts of urbanisation on bushland. Similarly, the management of these open space areas and the activities that take place on them need to minimise impacts upon adjoining lands.

Impacts to bushland along open space and urban interface areas depend on the nature of the interface, including access, type and degree of use from adjoining open space area.

Impacts may include:

- increased weed infestation;
- littering and dumping;
- changed fire regimes;
- impacts from feral or domestic animals;
- changes to microclimate;
- changed hydrological conditions due to formed and paved surfaces and loss of trees;;
- encroachment from maintenance equipment; and
- removal of woody debris and damage to plants.

The intensity of these impacts can be controlled by good design, adherence to maintenance standards, monitoring and managing encroachment issues and education of user groups. Management plans for adjoining open space areas are to include actions designed to minimise these impacts.



Figure 5: Typical urban/bushland Interface located at Maddison Reserve, Pymble.

6.4 Special uses, leases and licences

The Council is required to manage land in accordance with the *Local Government Act 1993*. The Act clearly defines restrictions and authority with which the Council can grant leases, licences and other estates over Community Land, particularly Natural Areas. The Act requires the Council to maintain the intended purpose of the land by ensuring any authorised activity is consistent with the core objectives of Natural Areas and the purpose listed in the Act.

In accordance to the *LG Act 1993*, this Plan of Management authorises the Council to:

- grant easements for authorities, organisations or individuals in favour of private lands over lands identified in the Plan of Management. Council must, however, be satisfied there is no reasonable alternative and that appropriate benefits are obtained for the community land and any adverse impacts on the bushland is remedied at the cost of the holder of the easement.
- this Plan of Management expressly authorises Council to consider and to approve or to refuse, as it deems appropriate, the granting of any easements, leases, licences, or other estate (including entering into a biobanking agreement within the meaning of Part 7A of the Threatened Species Conservation Act 1995) over community land subject to this Plan of Management:
 - which would not compromise the nature of the land as a community asset and
 - pursuant to LG Act 1993 (Sections 45, 46, 46A, 47, 47A, 47AA, 47B & 47C).
- assess potential impacts (ecological, cultural, fire hazard, built assets) and ongoing management requirements when approving special uses, leases or licences. Conditions of use may be applied to specify permissible uses and restrictions in use

in accordance with the context, ecological values, built assets and fire hazard of the area.

- adopt the 'user pays' principle for special uses, leases or licences. Where contribution (either cash or in-kind) may be required, including maintenance requirements across the full life cycle of impacts.

Currently, there are a number of Council authorised special uses of Ku-ring-gai bushland reserves, including:

- bookings for commercial / organised activities including filming, events, adventure activities, research, bushwalking and access over land for construction; and
- leases and licences for use of built assets within bushland (including Australian Scout and Girl Guide Associations).
- licences for temporary access to private dwellings.

6.5 Stormwater, sewerage and water quality

Urban stormwater systems change the quantity, quality and frequency of water flows in reserves and adjacent areas. Some problems caused by poor stormwater management include:

- weeds proliferate in reserves when seeds are introduced by stormwater and then enriched by nutrients and moisture;
- stormwater pollutants can pose a risk to human health and the environment especially during sewer overflows;
- aquatic habitats and the fauna they support are degraded; and
- degradation of bank and bed stability.

Sewer overflows have a marked impact on water quality and the adjacent riparian system. Typically, sewer overflows introduce very high concentrations of nutrients, turbidity and other pollutants that can persist for long periods.

Where these problems are identified, actions should address both the problem (eg. weed removal by bush regenerators) as well as the cause (e.g. treatment of stormwater or rectification of sewer overflow). The level of impact and type of appropriate management strategies will be influenced by a number of factors including topography, water catchment area, vegetation type and soil types.

Sewer overflows and repairs are the responsibility of Sydney Water and should be reported to Sydney Water on 13 20 90.

Many of the issues relating to stormwater, sewerage and water quality are addressed in

6.6 Erosion

While erosion is a natural process, it is accelerated by various land use activities. Most significantly, overland flow and stream flow have led to a widening and deepening of many creeks. Surface erosion also occurs on tracks and trails. Erosion can lead to:

- increased nutrient loads within bushland;
- sedimentation and silting of creeks, which can in turn affect creek health and lead to degradation or deterioration of water quality and loss of native aquatic life forms and invasion by non-native species;
- deterioration of tracks leads to increased maintenance costs, increased risk of personal injury (slips, trips and falls); and
- risk to infrastructure such as damage to sewer mains.

6.7 Heritage issues

6.7.1 Aboriginal heritage

As discussed in Section 4.3, the Ku-ring-gai Heritage Study identifies nine (9) different Aboriginal site types as having been recorded in the northern Sydney region – an area that takes in the Ku-ring-gai LGA. These include:

- middens
- grinding grooves
- scar trees
- engravings
- stone arrangements and
- rock shelters with art and/or midden and/or engravings.

It is possible that other site types exist that have been recorded since the heritage study was prepared or that are yet to be properly recorded. Possible site types falling into this category would be Aboriginal resource and gathering sites – places where traditional Aboriginal people procured foods or plant materials for fiber, medicine or other purposes and spiritual sites (which may be associated with natural features in the landscape), artifacts scatters (places where Aboriginal people manufactured stone tools) and burials. It may also be possible that there are places within the LGA that are significant to contemporary Aboriginal people for their social, associational or historic value.

Inappropriate management of these areas may result in damage from maintenance activities, development, fire and vandalism. Council has undertaken a process of staff training regarding these issues and is continuing a program of identification of potential sites.

6.7.2 Non – indigenous heritage

The following steps need to be undertaken to enable the protection of non-indigenous heritage items in bushland:

- refer the matter to Council's relevant Heritage committee and staff;
- include non-indigenous heritage identification and conservation as a matter to be considered within the comprehensive LEP process;
- encourage staff to record the GPS co-ordinates and document any potential heritage assets found in bushland and record in a register;
- engage heritage expertise to prepare a statement of heritage significance and conservation management plan incorporating documentation of the item, survey and assessment of the location, significance, condition and conservation and interpretation requirements of non-indigenous heritage items in bushland; and
- incorporate the information into the site specific sections of site management plans for regeneration areas.

6.8 Weeds

Weeds are managed to reduce displacement of native species and habitat. Some weeds may cause health issues, result in increased fuel loads or reduced stream bank stability.

The Ku-ring-gai Weed Management Policy (KC 2007a) outlines Council's weed management philosophy in respect to relevant legislation and community concerns, and outlines an appropriate response to weed control on public lands, including bushland reserves.

Within the framework of this strategy, priority will be to target weed species listed within Council's Weed Management Policy (KC 2007a) over the life of this Plan. This includes 102 noxious weeds, 31 nuisance plants and 15 environmental weeds within the Ku-ring-gai Council area (KC 2007a).



Figure 6: Riparian areas are particularly vulnerable to weed infestation

6.9 Fire management and arson

Whilst fire is an important part of our natural system processes, it also poses potential risks to life, property and native flora and fauna. Fire ignition may be natural (eg. lightning) or unnatural (eg. arson), with the responsibility for asset management shared by both council and the asset owner. To help address these issues actions within this management plan focus on fuel management, education, and enforcement.

Fire management within the LGA is undertaken in accordance with the *Ku-ring-gai Council Bushfire Management Policy* and the *Hornsby Ku-ring-gai Bushfire Risk Management Plan*.

This plan:

- identifies assets within the community at risk from bush fire (including human, economic, cultural, and natural assets);
- assesses the level of risk to those assets;
- establishes treatment options to deal with the risk, including fire management zones (asset protection zones, strategic fire advantage zones, land management zones or fire exclusion zones). Management options within each zone including where mechanical clearing or hazard reduction burns are conducted and which areas need to be targeted for community education; and
- identifies who is responsible for carrying out those treatments.

Ku-ring-gai Council obligations

Under *section 63* of the *Rural Fires Act 1997*, Ku-ring-gai Council has the responsibility of mitigating the bushfire hazard on property under its management.

In order for Council to meet the responsibilities detailed in *section 63* of the *Act*, a proactive fuel management programme has been established. This includes maintenance of 26.1 kilometres of firebreaks on the urban-bushland interface. There are 44.6 kilometres of fire trails and a rigorous hazard reduction burn programme which is renewed and endorsed by the Hornsby Ku-ring-gai Bush Fire Management Committee annually.

Private properties are also responsible to undertake hazard reduction clearing on their properties only in bushfire prone lands. Approval for any hazard reduction work on private property needs to be issued by the NSW Rural Fire Service. Council may assist where the private hazard reduction works complements other works in adjacent bushland reserves.

6.10 Community participation and education.

Council supports a variety of community groups that use, work in or support the reserves in many different ways. These include the variety of bushcare, and environmental groups, dog

walkers, bush walkers, rock climbing clubs, bicycle riders and many others.

Many people using the reserves for recreational purposes do not belong to a group but may be interested in becoming involved in management projects, community stewardship and projects that are occurring throughout the reserves. There are already mechanisms in place to make the community aware of activities undertaken in reserves, including newsletters, signage near the activity or by letterbox notification.

Community education campaigns build relationships between the community and Council and provide the community with an opportunity to learn more about natural areas and their management (such as no mow areas, no dog walking) whilst participating in the management of a bushland reserve.

Material that may be considered by Council include, information displays in Council Chambers and libraries, species profile sheets, bird identification pamphlets, weed information and identification as well as guides on planting native plants, appropriate approaches to weed control and looking after wildlife. Important educational information regarding dog walking, encroachment, littering and dumping have been mentioned elsewhere in this plan and are regarded as primary actions for the specific issues.

This Plan of Management seeks to continue and expand existing community participation activities. Existing community involvement projects scheduled under the Environmental Levy Funding include Bushcare, Streetcare and Parkcare (currently 789 active participants with 133 groups and 171 active sites).



Figure 7: Bush regeneration in a Ku-ring-gai Council bushland reserve

6.11 Vehicle access

Authorised vehicles gain access to the reserves for fire management works, service and maintenance of infrastructure (eg. sewer and stormwater pipes) and bushland. Locked security gates control vehicular access to the fire trails. Under the *Local Government Act 1993*, Council may grant access for legitimate purposes over bushland reserves where there is no alternative and no environmental damage will be caused (KC 2007c).

Use of motorised trail bikes and 4WD vehicles for recreation is an unauthorised activity within Council's bushland reserves. Inappropriate use of these vehicles have the potential to cause erosion, soil compaction, damage vegetation, disturb fauna and other reserve users. As well, as cause injury to themselves and other reserves users.

Access by trail bikes is difficult to control and relies on a co-operative effort by Council, Police and adjoining landholders. Barriers and signs are present to discourage trail bike access to the reserves though these require regular maintenance due to damage and vandalism.

6.12 *Phytophthora cinnamomi*

Phytophthora (*Phytophthora cinnamomi*) is a soil borne pathogen, which can lead to root rot in many plant species, potentially affecting entire habitats (DEH 2004). *Phytophthora* prevents the plants from absorbing nutrients and water from the soil, leading to dieback, including foliage yellowing, wilting and eventually death, though not in all species. It is found across Australia and is believed to have been introduced during European settlement, with humans still playing a significant role in the spread of the disease.

A number of suspected *Phytophthora cinnamomi* areas have been identified within the reserves system. Council is monitoring known occurrences, incorporating appropriate community education, and implementing appropriate hygiene protocols with staff and volunteers.

6.13 Recreation

The Ku-ring-gai Open Space Strategy (KC 2005d) recognises the need to increase recreational opportunities and facilities, for all user groups in the LGA. There is a broad range of recreational uses that take place in Ku-ring-gai bushland reserves. These include but are not limited to:

- walking (informal and organised programs);
- community group activities (Australian Plant Society, South Turramurra Environmental Protection group [STEP Inc.], Oxfam);
- sporting / recreational activities (orienteeing, bike riding);

- BBQ's and picnics;
- abseiling and rock climbing;
- bird watching; and
- horse riding (limited).

Whilst providing a social and education function, recreation in bushland has the potential to negatively affect bushland unless managed appropriately. Council's Recreation in Bushland Policy (KC 1997) and the Unstructured Recreational Strategy for the Ku-ring-gai Community Land (2010) allows for appropriate, non-commercial recreation in bushland and outlines limitations and inappropriate uses. **Table 4** outlines the policies approach to different recreational uses in bushland reserves.

Table 4: Recreational use in reserves

Appropriate use
<ul style="list-style-type: none"> • Bushwalking, running and nature based activities on designated walking trails • Walking of dogs with leashes on designated walking trails (with the exception of Conservation Agreements and Wildlife Protection Areas). • Bicycle use on designated service trails • Abseiling and rock climbing in designated areas and with conditions
Use with limitations
<ul style="list-style-type: none"> • Recreation based trade or business activities with permit, conditions and restrictions applying • Horse riding on designated service trails subject to compliance with conditions and restrictions • Orienteering, rogaining and tourism activities on designated service or walking trails subject to compliance with conditions and restrictions
Inappropriate use
<ul style="list-style-type: none"> • Walking of dogs when not effectively controlled on a leash or within Conservation Agreement or Wildlife Protection Areas. • Unattended free ranging dogs in natural areas. • Leaving dog faeces in bushland. • Any act or thing that will disturb or endanger any person or native fauna or flora e.g. discharging of firearms, damage or removal of plants, animals, rocks, soil or timber • Wilfully or negligently injure or unnecessarily disturb plant, animal, rock or soil • Wilfully remove, destroy, deface, damage or otherwise interfere with any item, notice or sign • Camping or staying overnight • Lighting fires anywhere in other than a designated constructed barbecue or fireplace

Inappropriate use (continued)

- Any activity conducted by persons under the influence of drugs or alcohol
- Drive, ride or park any unauthorised motor vehicle in other than designated driving, riding or parking areas
- Informal bike tracks and illegally constructed jumps
- Engage in unauthorised trade or business
- Create a public nuisance or do anything likely to endanger the safety of or cause injury to any person, animal or bird
- The lighting of fireworks
- Wilfully break, throw, place or leave any bottle, glass, glass receptacle or syringe, foreign material or litter
- Dump waste, including items such as garden waste, grass clippings and building materials



Figure 8: Steps on Mueller Track

6.14 Unauthorised use

Where reserves are situated on the interface between urban development and bushland there is a greater likelihood of unauthorised use, including encroachment by adjoining properties into reserves, dumping, littering, arson and anti-social activities.

Dumping of garden refuse and minor building materials may contain potentially hazardous materials (eg. asbestos etc), which can increase fire risk and can lead to weed invasion and an influx of nutrients and pollutants.

Encroachment into bushland, particularly at the interface with urban development is a

significant issue, from the perspective of maintaining the integrity of natural and cultural values, fire, aesthetic appearance, use of Council resources and assets, public safety and legal liability.

Removal of bush rock and logs from within bushland is an unauthorised use, listed as a key threatening process under the *Threatened Species Conservation Act 1995*. This activity has the potential to impact native flora and fauna and contribute to soil erosion.

Informal bike tracks and illegally constructed jumps cause damage and erosion to bushland reserves, and conflict with passive recreational use. Located mostly along urban edges and on fire trails, Council has identified specific periods of activity (eg. often constructed in school holidays) and works towards the remediation of impacts caused by such activities. It is acknowledged however, that a balance must be found between protecting the bushland and providing a “positive” experience of bushland for people from a variety of demographics and different interests and backgrounds, particularly youth.

This Plan of Management incorporates a combined management strategy, including education, barriers to access, signage, monitoring and regulatory action, in order to address the issue of unauthorised use and their associated impacts. It also includes measures to investigate options to restrict access at current key locations as well as working with key recreation groups and others to manage use and maintenance of bushland areas, tracks and other infrastructure.

Unauthorised use may be reported to Council by general public via Council’s Call Centre on (02) 9424 0000.

6.15 Authorised activities in the reserves

The following activities are authorised by this Plan of Management. Exceptions may be in place for certain reserves, as indicated:

- passive recreation activities such as bushwalking and picnicking, and specific community orientated non-commercial events that do not compromise the core objectives of “natural areas”;
- regulated commercial, cultural or active recreation activities that are compatible with the principles of this Plan and consistent with specific reserve management such as filming or mountain bike riding on designated tracks (Council permission may be required and fees may also apply for certain activities – for example filming);
- replacement/upgrading of facilities in their current locality;
- activities consistent with the management requirements of the various NSW OEH

recovery plans;

- bushland restoration and regeneration works and activities by Council or contractors or community groups authorised by Council;
- reduction of fire hazard in accordance with Council's annual fuel management program approved by the Hornsby Ku-ring-gai Bush Fire Management Coordinating Committee;
- maintenance of existing roads, tracks and trails, including drainage, stormwater and track works on existing infrastructure;
- construction of new strategic tracks and trails, or asset protection zones (firebreaks), for recreation and or hazard reduction purposes (pursuant to the *Environmental Planning and Assessment Act 1979*);
- maintenance of existing signage and passive recreation facilities;
- construction and maintenance of strategic sediment and pollution control devices in waterways to improve water quality and aquatic habitats pursuant to the *Environmental Planning and Assessment Act 1979*) or NSW Department of Primary Industries (fisheries) requirements and to Council's Integrated Water Management Policy (2008);
- collection of seeds and other plant propagules for Council's plant nursery, or by other bodies or persons who have Council approval and appropriate permits or licences where necessary. Collection of seeds and propagules will be carried out according to industry best practice guidelines in relation to biodiversity, provenance and in sustainable quantities;
- scientific research and specimen collection with appropriate ethics approval, permits or licences where necessary and with Council approval;
- pest animal control and management pursuant to relevant acts or off label permits; and
- the grant of a lease or licence or other estate (including entering into a biobanking agreement within the meaning of Part 7A of the *Threatened Species Conservation Act 1995*) in respect of the land to which this plan applies is expressly authorised for any purpose for which the land was used at the date of adoption of this plan. This does not exempt future use review and modifications.

7. Past and ongoing works

Tables 5 lists past and ongoing works that are occurring across Ku-ring-gai bushland reserves.

Table 5: Past and ongoing works in reserves

Program	Frequency	Outputs
Bush regeneration at nine sites in environmentally sensitive lands	Annually	Monthly and annual reports; Decrease in % of weed cover; Decrease in maintenance required for sustainable outcome; A comprehensive vegetation transect at each site; The current Environmental Levy is funding a number of bushland restoration projects over the next seven years (to 2011). Includes sites at Sheldon Forest, Browns Field and Browns Forest, St Ives Showground, The Glade Reserve and Turiban Reserve.
Recurrent regeneration	Ongoing	17 sites monitored and worked by operation staff to reduce weed regrowth and for protection of threatened plant species for example Ku-ring-gai Flying Fox Reserve, Wombin Reserve, Killara Park, Lofberg Park
Ongoing volunteer bushcare program	Annually	Volunteer program for residents to participate in bushcare activities such as weed removal, training, and education programs; Currently 83 individual and 80 group sites with a total of over 700 volunteers participating.
Bush regeneration through external grant funding	Annually	Current approved grants include: <ul style="list-style-type: none"> • Department of Primary Industry - noxious weed control; • Environmental Trust –bush regeneration at Barra Brui Oval and The Glade; • Green Style Program; • Sydney Metropolitan - Green Web Program 09/10; • Paddy Pallin Foundation – bush regeneration in Paddy Pallin Reserve since 2000.

Program	Frequency	Outputs
Vegetation condition surveys	Ongoing	As a means to measure vegetation change and regeneration success, vegetation condition surveys are periodically undertaken within selected reserves. Surveys include: <ul style="list-style-type: none"> • 0.04ha quadrats of flora structure, presence and abundance; • tree diameters.
Noxious weed program	Annually	Weed species target in accordance with regional programs and funding (eg. Sydney North Noxious Weed Committee).
Education.	Ongoing.	Delivery of Bush Neighbours program; Informative open days; One on one consultation on a needs basis; Delivery of internal staff training-threatened plant communities, water sensitive urban design, catchment management.
Encroachments.	Ongoing.	The program aims to identify / manage / resolve interface issues affecting council bushland reserves, including noxious weeds and encroachments such as fences, outdoor furniture and exotic gardens.
Track improvement.	Annually.	Improved access opportunities within bushland; Construction of new trails and repair of degraded walking tracks; External grants from Sydney Harbour Foreshore Authority (eg Seven Little Australian).
Track and trail maintenance program.	Annually	General maintenance of walking tracks and service trails to maintain access and drainage. Reactive program deals with incidental issues such as blockages by fallen trees.
Mapping tracks and trails	Ongoing.	Mapping of tracks and trails, including new additions and closures to the tracks and trail system within the LGA.

Program	Frequency	Outputs
Bushfire hazard management program.	Annual program set by Council and Hornsby Ku-ring-gai District Bushfire Committee.	Strategic bushfire hazard reduction, includes maintenance of fuel reduced zones around assets such as houses and service trail maintenance.
Covenants and Wildlife protection areas	Ongoing management.	Voluntary Conservation Agreements (VCAs) and Wildlife Protection Areas have been created over the Flying Fox Reserve and Browns Forest.
Fauna condition surveys.	All catchments.	
Water sensitive urban design.	Annually.	Construction of projects to compliment roads infrastructure program -rain gardens/ biofiltration system Normurra Street, Karuah Street and Kooloona Crescent; Construction of projects to compliment sports field program - stormwater harvesting system. Barra Brui Oval, Lindfield Soldiers Memorial Oval, Edenborough Oval, Comenarra Playing Fields and Lofberg Oval.
Catchment remediation	Annually	Creek stabilisation and re-vegetation projects. Glade creek stabilisation, Maddison Reserve riparian revegetation; Stormwater outlet protection. Dunoon/Kiparra outlet, Windsor Street outlet, Darri track outlet protection.
Aquatic macro invertebrate/water quality survey.	Annually.	Continued participation in regional AUSRIVAS* sampling at selected creeks (sampled on a rotational basis); Water quality sampled for specific investigations; for example the impact of stormwater harvesting on local creek systems; Interpretation of data that has been collected through the various sampling programs.

* AUSRIVAS – Australian River Assessment System

Program	Frequency	Outputs
Terrestrial macro-invertebrate biodiversity survey.	2005-2007.	A Master's student from Macquarie University is currently researching the value of terrestrial macro-invertebrates as a biodiversity condition indicator. The results of this study will be available in late 2009.
<i>Phytophthora cinnamomi</i> control and mapping.	On going.	<p>In 2007, Ku-ring-gai Council participated in the Sydney CMA/Botanic Gardens <i>Phytophthora</i> Mapping Project.</p> <p>Council staff:</p> <ul style="list-style-type: none"> • were trained in the detection of possible <i>Phytophthora</i> affected areas and the collection of soil samples for testing; and • attended workshops covering hygiene protocols to effectively prevent the spread of <i>Phytophthora</i> <p>Suspected <i>Phytophthora</i> locations were tested and mapped.</p> <p>Equipment to implement hygiene protocols is provided to Bushcare volunteers working on more than one site.</p>
Pest animal program.	Ongoing as dictated by the Sydney North Regional Fox Control Program and the Sydney North Regional Rabbit Control Program.	<p>Reduction in population of foxes over the northern Sydney area, conducted within several strategic reserves to assist in recovery of native fauna such as wallabies, bandicoots and birds that feed on or near the ground such as quail, wrens, finches and rails.</p> <p>Collaborative approach in rabbit control through the Urban Feral Animal Action Group is a regional land management group.</p>

8. Prescribed actions for management of reserve features

Table 6 contains the prescribed actions to protect reserve features. These relate to reserve features and management issues (see Section 4 and Section 6). Actions and proposed timeframes have been assigned to respective Council departments and officers. Additional actions effecting biodiversity within the LGA may be found within the Ku-ring-gai Biodiversity Strategy (KC 2006).

Table 6: Prescribed actions to protect reserve features and manage identified issues

BUSH REGENERATION / WEED CONTROL / VEGETATION MANAGEMENT

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
1) Identify sites where mowing can be limited or reduced within or adjacent to bushland and implement those with potential for natural regeneration first.	Bushland Maintenance Program	Ongoing	Operations	Bushland Operations Coordinator
2) Ensure Councils mowing activities and contracts within and along the bushland interface, does not contradict with the management of adjoining bushland. Including: - prevention / removal of grass clipping from bushland - mowing within defined boundaries key sites requiring physical boundaries between mown and bushland areas to be identified and addressed by Council	Bushland Maintenance Program	Ongoing	Operations	Bushland Operations Coordinator
	Bush Regeneration Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
3) Continue to assess Council bush regeneration and volunteer Bushcare programs on an annual basis to: - help ensure a strategic approach - meet OEH requirements - review works undertaken and success / issues identified	Bush Regeneration Operations	Annual	Operations	Bushland Operations Coordinator
	Bush Regeneration Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader
	Bushcare	Annual	Strategy and Environment	Bushcare Trainer
	NSW Scientific licence renewal	Annual	Strategy and Environment	Team Leader Natural Areas
4) Use of registered, low impact, non-residual, organic rather than chemical fertilisers.	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
			Strategy and Environment	Director Strategy and Environment
5) Assess requirement for planting with regard to site viability prior to planting and use local native species.	General	Ongoing	Operations	Director Operations

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
Consideration of species provenance should be given, particularly in light of potential future climate change impacts.			Strategy and Environment	Director Strategy and Environment
6) Ensure that staff or contractors that undertake works within natural area reserves have relevant qualifications, experience or training in bush regeneration	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
7) Undertake bush regeneration and weed management programs in line with relevant best practice guidelines and Council policies, particularly Council's Weed Management Policy (KC 2007).	Bush regeneration - operations	Annual	Operations	Bushland Operations Coordinator
	Bush regeneration - Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader
	Bushcare	Annual	Strategy and Environment	Bushcare Trainer
	Weed control - bushland and parks operations	Ongoing	Operations	Bushland Operations Coordinator
8) Continue removal of targeted noxious weeds as a high priority and environmental weeds within existing Council programs supplemented by external funding and volunteer groups.	Weed control - bushland and parks operations	Ongoing	Operations	Bushland Operations Coordinator
	Bush Regeneration - operations	Ongoing	Operations	Bushland Operations Coordinator

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	Bush Regeneration Environmental Levy	Ongoing	Strategy and Environment	Environmental Levy Program Leader
	Bushcare	Ongoing	Strategy and Environment	Bushcare Trainer
9) Develop a strategy for pre and post fire weeding treatments, including consideration of site values, weeds and type of proposed fire treatment.	Bush Regeneration - operations	Ongoing	Operations	Bushland Operations Coordinator
	Bush Regeneration Environmental Levy	Ongoing	Strategy and Environment	Environmental Levy Program Leader
10) Periodically evaluate the efficiency and effectiveness of current weed management activities.	Weed control - bushland and parks operations	Ongoing	Operations	Bushland Operations Coordinator
	Weed monitoring	Not planned	Strategy and Environment	Team Leader Natural Areas
11) Work with regional Council's and landholders to coordinate weed control, mitigation and education.	Weed control - bushland and parks operations	Ongoing	Operations	Bushland Operations Coordinator
12) Develop vegetation management strategies specific to areas and sites.	Ecologically Sensitive Lands policy / management	Ongoing	Strategy and Environment	Team Leader Natural Areas

CATCHMENT MANAGEMENT / STORM WATER / EROSION CONTROL

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
<p>13) Where appropriate develop and design site strategies at the bushland interface that will minimise impacts from stormwater entering the reserves.</p> <p>Consideration should be given to water quality, quantity and peak flows. Including:</p> <ul style="list-style-type: none"> - water sensitive urban design approaches (such as use of vegetation lined drainage channels instead of concrete); - appropriate landscaping; - appropriate pollution control devices (sediment detention basins, litter baskets and filter gardens); - Erosion control devices (swales, low flow pipes); and - storm water harvesting where feasible <p>Threatened ecological communities will be priority for sustainable water management and pollutant reductions.</p>	General	Ongoing	Operations	Director Operations
			Development and Regulations	Director Development and Regulations
			Strategy and Environment	Director Strategy and Environment
<p>14) Use of appropriate pollution control devices for activities within and adjacent to Council reserves (sediment and nutrient control devices during works).</p>	General	Ongoing	Operations	Director Operations
			Development and Regulations	Director Development and Regulations
			Strategy and Environment	Director Strategy and Environment

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
15) Continue to record, monitor and ameliorate locations of high erosion and soil compaction in areas of major concern. Existing monitoring includes sites identified within the: - Rapid Riparian Assessment, - Track and trail maintenance program, and. - Ku-ring-gai catchment action plans.	Catchment remediation	Ongoing	Strategy and Environment	Water and Catchments Program Leader
	Fire trail and walking track maintenance program	Ongoing	Operations	Bushland Operations Coordinator
16) Encourage the adoption of practices that will minimise stormwater impacts from properties that drain to the reserves and watercourses with particular emphasis on protecting threatened species and endangered ecological communities. Practices should be relevant to the subject site and may include filtration, capture and re-use strategies, such as water tanks and increased use of permeable surfaces.	General	Ongoing	Operations	Director Operations
			Development and Regulations	Director Development and Regulations
			Strategy and Environment	Director Strategy and Environment

EDUCATION / SIGNAGE

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
17) Install co-ordinated signage (interpretative, educational, advisory) in accordance with a proposed Signage Policy, including: <ul style="list-style-type: none"> - vegetation type; - wildlife and habitat; - permissible recreational use; - prohibited activities (regulatory signage); and - signs for remote supervision (danger, warning and advice signs). 	Environmental Levy - signage	Ongoing	Strategy and Environment	Environmental Levy Program Leader
	Bushland Access Program	Ongoing	Operations	Bushland Operations Coordinator
18) Continue promotion / education programs for targeted stakeholders and the general public regarding: <ul style="list-style-type: none"> - weeds and appropriate removal techniques for private lands; - flora and fauna values of the reserves; - threats to native wildlife (including hollow and rock removal, and domestic cats and dogs); - feeding of native wildlife; - protection from threats such as urban stormwater runoff, illegal dumping; - community stewardship; - providing clean waterways; - walking track network; - appropriate recreational use of Council reserves; and - specific information for dog walking, horse riding, mountain bike riding. 	Environmental Levy	Ongoing	Strategy and Environment	Environmental Levy Program Leader
	Bush neighbours	Ongoing	Strategy and Environment	Environment Officer
	Greenstyle	Once off: 2009-2011	Strategy and Environment	Greenstyle Advisor
	Bushcare	Ongoing	Strategy and Environment	Bushcare Officer
	Catchment remediation	Ongoing	Strategy and Environment	Water and Catchments Program Leader

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	Fire trail and walking track maintenance program / bushland maintenance program	Ongoing	Operations	Bushland Operations Coordinator
	WildThings	Ongoing	Strategy and Environment	Community Volunteer Program Co-Coordinator
19) Periodically review brochures and update relevant information where necessary, including but not limited to: <ul style="list-style-type: none"> - walking tracks and recreational links; - permissible recreational use; and - identified ecological assets / values and cultural heritage items. 	Environmental education - Levy	Ongoing	Strategy and Environment	Environmental Levy Program Leader
20) Continue to educate and assist residents living adjacent to bushland reserves, including: <ul style="list-style-type: none"> - weed education; - ecologically sensitive lands; - promotion of fauna and flora habitat; - appropriate plantings (local natives, water wise gardens, fire considerations including species selection, location, ongoing maintenance) - encroachment; and - water cycle management, including stormwater quality, quantity and flow rates. Target properties that drain to reserves. 	Catchment remediation (education)	Ongoing	Strategy & Environment	Water and Catchments Program Leader
	Greenstyle	Once off: 2009-2011	Strategy & Environment	Greenstyle Advisor
	Bushcare	Ongoing	Strategy & Environment	Bushcare Officer
	Ecologically Sensitive Lands training	Ongoing	Strategy & Environment	Natural Areas Officer

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	Encroachments	Ongoing	Strategy and Environment	Environment Officer
21) Work with local vets and pet shop owners to develop an awareness program on responsible pet ownership for bushlands.	Responsible pet ownership education	Ongoing	Development and Regulation	Companion Animal Management Officer
22) Seek opportunities to engage educational institutions in research and educational programs related to Council reserves.	Research	Ongoing	Strategy and Environment	Team Leader Natural Areas
	Environmental Levy	Ongoing	Strategy and Environment	Environmental Levy Program Leader
23) Seek opportunities to undertake co-operative arrangements with school groups and other educational institutions in the management of the reserves.	Environmental education - Wildflower Garden	Ongoing	Operations	Bushland Education Centre Coordinator
	Environmental Levy	Ongoing	Strategy and Environment	Environmental Levy Program Leader
24) Continue to deliver education and awareness programs regarding management of feral and native animals, including mynah birds, brush turkeys, rabbits, foxes, <i>Gambusia holbrooki</i> (Mosquito fish).	Feral animal education	Ongoing	Strategy and Environment	Environment Officer

FERAL ANIMAL

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
25) Manage feral and domestic animals in accordance with <i>the fauna Management Policy</i> (KC 1998) and the objectives specified in the OEH Threat Abatement Plan for Predation by the Red Fox (<i>Vulpes vulpes</i>).	Feral animal control Program	Ongoing	Operations	Bushland Operations Coordinator
	Review Fauna Management Policy (KC 1998)	To be incorporated within development of an environmentally sensitive lands policy 2009	Strategy and Environment	Team Leader Natural Areas

FIRE

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
26) Participate in Hornsby – Ku-ring-gai District Bushfire Management Committee and sub-committee meetings and assist in the creation of the 2009 District Bushfire Risk Management Plan.	Ku-ring-gai Hornsby Bushfire Management Committee	Ongoing	Strategy and Environment	Technical Officer - Bushfire
			Strategy and Environment	Technical Officer - Bushfire
			Operations	Bushland Operations Coordinator

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
27) Maintain adequate asset protection zones and strategic fire advantage zones in accordance with the <i>Bush Fire Environmental Assessment Code</i> and Part 5A of the <i>Environmental Planning and Assessment Act 1979</i> .	Fuel management program	Ongoing	Strategy and Environment	Technical Officer - Bushfire
			Strategy and Environment	Technical Officer - Bushfire
			Operations	Bushland Operations Coordinator
28) Develop community education programs targeting bush fire management on urban interface properties within the LGA in conjunction with those identified within <i>the Bushfire Risk Management Plan</i> .	Environmental Levy – Fire education	Grant related - 2006, 2009	Strategy and Environment	Environmental Levy Program Leader
	Fire education	Ongoing	Strategy and Environment	Technical Officer - Bushfire
29) Continue to liaise and notify relevant residents and bushcare groups regarding proposed hazard reduction or fire-trail works.	Fuel management program	Ongoing	Strategy and Environment	Technical Officer - Bushfire
			Operations	Bushland Operations Coordinator
30) Incorporate best knowledge regarding appropriate fire regime into land management practices.	Fuel management Program	Ongoing	Strategy and Environment	Technical Officer - Bushfire
			Operations	Bushland Operations Coordinator
31) Review past fire history and species / community fire requirements to determine current fire threshold and to help inform future burn proposals.	Ecologically Sensitive Lands management	Not planned	Strategy and Environment	Team Leader Natural Areas

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
32) Where possible monitor impact of fire on threatened species populations to inform OEH/ RFS/ local government planning.	Strategic Fire Advantage Zone General Bushland (different fire regimes)	Not planned	Strategy and Environment	Technical Officer - Bushfire

FLORA AND FAUNA

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
33) Review and implement relevant actions from “Reviewing and Restoring Fish Passage in Urbanised Waterways Sydney Catchments) (Sydney Metropolitan Catchment Management Authority).	Catchment remediation	Ongoing	Strategy and Environment	Water and Catchments Program Leader
34) Maintain and update Biobase – Council’s flora and fauna database.	Biobase	Biannual	Strategy and Environment	Team Leader Natural Areas
	Wildlife Watch	Ongoing	Strategy and Environment	Community Volunteer Program Coordinator
35) Expand and continue to utilise fauna survey and monitoring within and adjacent to bushland reserves to update status of bushland in reserves.	Bird surveys	Course of the 1st Environmental levy	Strategy and Environment	Environmental Levy Program Leader

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	Wildlife Watch	Ongoing	Strategy and Environment	Community Volunteer Program Coordinator
	Additional fauna surveys	Not planned	Strategy and Environment	Team Leader Natural Areas
			Strategy and Environment	Environmental Levy Program Leader
36) Identify key habitat features and location of significant flora and fauna within the Reserves and ensure they are protected from recreation and management activities.	Operations			Bushland Operations Coordinator
	Habitat mapping	Not planned	Strategy and Environment	Team Leader Natural Areas
	Unstructured Recreational Strategy for Ku-ring-gai Bushland Reserve System	2010	Strategy and Environment	Team Leader Natural Areas
Strategy and Environment			Environmental Levy Program Leader	
37) Liaise with OEH officers regarding identified threatened species, communities and populations and their ongoing management and conservation.	Threatened species, communities	Ongoing	Strategy and Environment	Team Leader Natural Areas

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	and populations management		Operations	Bushland Operations Coordinator
38) Ensure staff undertaking construction or management activities (road; trail; or easement maintenance activities) are aware of Ecological Sensitive Lands and the processes in place to avoid, mitigate, ameliorate impacts.	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
39) Restrict access to threatened species sites where necessary (fencing).	Environmental Levy – Fire education	Ongoing	Strategy and Environment	Environmental Levy Program Leader
	Bushland Maintenance Program	Ongoing	Operations	Bushland Operations Coordinator
40) Undertake best management practices in line with threat abatement and Recovery strategies for threatened species.	General	Ongoing	Development and Regulations	Director Development and Regulations
			Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
41) Provide supplementary hollows/nest boxes where opportunities arise. This should include guidance on maintenance and monitoring of use.	WildThings	Ongoing	Strategy and Environment	Community Volunteer Program Coordinator

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
42) Continue to manage and investigate options for expansion of Conservation Agreement and Wildlife Protection Areas.	CA / Wildlife protection areas	Ongoing	Strategy and Environment	Natural Areas Officer
43) Council staff and volunteers are to be aware of and comply with <i>Phytophthora cinnamomi</i> hygiene protocols.	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
			Development and Regulations	Director Development and Regulations
			Community	Director Community
44) Council prepare a site management statement for <i>Melaleuca deanei</i> populations in liaison with OEH. Statement to be incorporated in the Council's relevant projects, services and bushland programs.	Ecologically Sensitive Lands management	Not planned	Strategy and Environment	Team Leader Natural Areas
45) Review the classification of <i>Melaleuca deanei</i> sites and consider the reclassification of such land as community land where appropriate.	Ecologically Sensitive Lands management	Not planned	Strategy and Environment	Team Leader Natural Areas
46) Manage lands in accordance with the Ku-ring-gai Flying-fox Reserve Management Plan (1999) (to be revised 2010/11).	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
			Development and Regulations	Director Development and Regulations

FUNDING / MANAGEMENT PRIORITIES

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
47) Seek funding for restoration and rehabilitation works within reserves.	Grant applications	Ongoing	Strategy and Environment	Environmental Levy Program Leader
			Operations	Bushland Operations Coordinator
			Strategy and Environment	Water and Catchments Program Leader

HERITAGE (ABORIGINAL AND NON-ABORIGINAL)

Action	Services, Projects and Programs	Planned Time Frame	Department	Responsible Officer
48) Protect Aboriginal object(s) or Aboriginal place(s) from activities within bush land areas, including assessing: <ul style="list-style-type: none"> - significance of artefacts; - level of impact; - measures to avoid, minimise and mitigate; - requirement, conduct and results of Aboriginal community consultation (through the AHO); and - the knowledge, skills and experience of the nominated person(s) to adequately undertake the proposed activity. 	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
			Development and Regulations	Director Development and Regulations
49) Refer relevant matters to Council's Heritage committee and staff for action and potential Aboriginal Heritage sites to the AHO for assessment.	Aboriginal heritage	On going	Strategy and Environment	Technical Officer - Bushfire
50) Expand Council's Bushland Asset Register to address European heritage assets within bushland and record potential heritage assets.	Asset management	Not planned	Operations	Open Space Asset Supervisor
	Bushland Maintenance Program	Not planned	Operations	Bushland Operations Coordinator

Action	Services, Projects and Programs	Planned Time Frame	Department	Responsible Officer
51) Statement of heritage significance and conservation management plans to be prepared by relevant heritage experts for key heritage areas, where required. Plans should include documentation of the item, survey and assessment of the location, significance, condition and conservation and interpretation requirements of non-indigenous heritage items in bushland, to be prepared by heritage expertise for relevant heritage areas.	Preparation of heritage management statements	Ongoing	Development and Regulation	Heritage Specialist Planner
52) Relevant Council staff to be trained in the protection and importance of Aboriginal Heritage within Ku-ring-gai. Undertaken in conjunction with the Aboriginal Heritage Office.	Ecologically Sensitive Lands management	Not planned	Strategy and Environment	Team Leader Natural Areas

INTERFACE / ACCESS

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
53) Ensure that applications for temporary access across bushland reserves are in accordance with the objectives set out in this Plan of Management and comply with Council's Temporary Access over Community Land Policy (KC 2007c).	Bush regeneration - operations	Ongoing	Operations	Bushland Operations Coordinator
	Temporary Access over Community Land Permit	Ongoing	Community	Property Officer Community Recreational Facilities
54) Where relevant landscape native plants of site specific provenance should be used as a buffer or 'exclusion zone' to delineate a boundary and protect natural bushland at the periphery of open spaces areas such as sports grounds and parks.	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
55) Use of physical barriers such as retaining walls, logs or rocks as a physical barrier to invasive turf.	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
56) Investigate the effective use of fencing or bollards at: - bushland interfaces; and - trouble spots (e.g. sites where littering and dumping have become a problem, unauthorised access tracks).	Bush regeneration - operations	Annual	Operations	Bushland Operations Coordinator
	Bush regeneration - Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	Bushcare	Annual	Strategy and Environment	Bushcare Trainer
	Encroachments	Ongoing	Strategy and Environment	Environment Officer
	Bushland Maintenance Program	Ongoing	Operations	Bushland Operations Coordinator
57) Continue and investigate the expansion of the existing programs relating to the prevention of illegal access, dumping, and illegal construction in the reserves.	Bush regeneration - operations	Annual	Operations	Bushland Operations Coordinator
	Bush regeneration - Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader
58) Reduce/limit access points into surrounding bushland to minimise physical damage.	General	Ongoing	Operations	Director Operations
			Strategy and Environment	Director Strategy and Environment
			Development and Regulations	Director Development and Regulations
59) Identify where the interface between reserves and biolinkages occur, and where relevant ensure that reserve edges at these locations are given priority for management and rehabilitation from disturbance.	Bush regeneration - operations	Annual	Operations	Bushland Operations Coordinator

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
	Bush regeneration - Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader
	Bush neighbours	Ongoing	Strategy and Environment	Environment Officer
	Greenstyle	One off: 2009-2011	Strategy and Environment	Greenstyle Advisor
	Weed control - bushland & parks operations	Ongoing	Operations	Bushland Operations Coordinator
60) Target new residents adjoining bushland in order to provide opportunities to join backyard bush friendly programs (ie. Greenstyle)	Backyard bush friendly programs	Ongoing	Strategy and Environment	Community Volunteer Program Coordinator

LEASES / LICENCE

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
61) Develop standard and contextualised guidelines for lease agreements that require lessees in bushland to minimise the physical impact on each site and its surrounds.	Ecologically Sensitive Lands lease review	Ongoing	Strategy and Environment	Team Leader Natural Areas
	Scout lease review	2009-2010	Strategy and Environment	Team Leader Natural Areas
			Community	Property Officer Community Recreational Facilities
62) Develop an information package for user groups providing advice on the requirements of their permits/lease and how to minimise impact on surrounding bushland.	Environmental Levy	Not planned	Strategy and Environment	Environmental Levy Program Leader
63) Where bushland maintenance is required, leases / license should include an annual reporting requirement, including location of and actions undertaken (eg. regeneration, planting, mulching, rectification of building/tracks). Where appropriate, stimulating natural regeneration should be the first priority over planting.	Lease and licences preparation and management	Ongoing	Community	Property Officer Community Recreational Facilities
		Ongoing	Operations	Bushland Operations Coordinator
64) Enforce a two year compliance inspection program between Council and lessee / licence, if not compliant then financial penalties may apply to rectify issues and / or termination of lease may occur if Council considers breach to have been foreseeable and preventable.	Lease and licences preparation and management	Ongoing	Community	Property Officer Community Recreational Facilities

PLANNING / DEVELOPMENT

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
65) Inclusion of appropriate biodiversity controls within existing and future environmental planning instruments and policies to mitigate adverse impacts to reserves from development on properties adjacent to or impacting on bushland reserves.	Development Applications and compliance	Ongoing	Development & Regulation	All relevant staff
	Planning instruments	Ongoing	Strategy and Environment	All relevant staff
66) Developments adjacent to bushland reserves incorporate adequate control measures to mitigate adverse impacts, while considering relevant Council, federal and state legislation, policies, strategies and plans.	Development Applications and compliance	Ongoing	Development & Regulation	All relevant staff
	Planning instruments	Ongoing	Strategy and Environment	All relevant staff
67) Ensure that the design of built areas, access roads and paths, within and adjoining bushland, include water sensitive urban design and consist of sympathetic construction materials where feasible (eg. avoid construction materials that weather to release phosphorus such as crushed basalt within sensitive areas).	Development Applications and compliance	Ongoing	Development and Regulation	All relevant staff
	Planning instruments	Ongoing	Strategy and Environment	All relevant staff
68) Ensure that, new and where possible renovated buildings in bushland reserves are assessed and if approved, are consistent with the requirements of Planning for Bushfire Protection 2006 as well as other regulatory building codes and sustainable building practices.	Development Applications and compliance	Ongoing	Development and Regulation	All relevant staff
	Planning instruments	Ongoing	Strategy and Environment	All relevant staff

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
69) Where appropriate consideration to relocation of built assets to areas outside bushland should be considered.	Development Applications and compliance	Ongoing	Strategy and Environment	All relevant staff
70) Where new development occurs adjacent to bushland reserves, investigate the following options as part of conditions of consent: - require identification and removal of existing weeds; - require an integrated weed management strategy for treatment of weeds on the site in perpetuity; - auditing and reporting to Council of sites after a number of years post development; and - provision of training and education by Council for property owners.	Development Applications and compliance	Ongoing	Development and Regulation	All relevant staff
	Planning instruments	Ongoing	Strategy and Environment	All relevant staff
71) Ensure compliance of development adjacent to reserves with relation to landscaping and pollution / erosion control measures	Development Applications and compliance	Ongoing	Development and Regulation	All relevant staff

RECREATION

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
72) Booking procedures for bushland activities to be undertaken in accordance with the proposed Unstructured Recreational Strategy for Ku-ring-gai Bushland Reserve System (see action 69) In the interim, all bushland activity bookings to be referred to the Strategy & Environment Department for comment.	Ecologically Sensitive Lands policy / management	On going	Community	Manager of Community and Recreation Property
			Strategy and Environment	Team Leader Natural Areas
73) Review Ku-ring-gai Council Filming Policy in relation to bushland regarding SEPP 4 and <i>the Filming Related Legislation Amendment Act 2008</i>	Filming policy review	Once off: 2009	Strategy and Environment	Team Leader Natural Areas
			Community	Administrator
74) Develop an Unstructured Recreational Strategy for Ku-ring-gai Bushland Reserve System. To address multi-use activities in reserves such as dog walking, horse and bike riding, rock climbing, abseiling, bush walking and orienteering. The strategy will: <ul style="list-style-type: none"> - include clear restrictions, permissible uses and guidelines for activities - provide guidance to bushland management and booked activities 	Unstructured Recreational Strategy for Ku-Ring-Gai Bushland Reserve System	2010	Strategy and Environment	Team Leader Natural Areas
			Strategy and Environment	Environmental Levy Program Leader
75) Review and create commercial guidelines for commonly used Ecologically Sensitive Lands. Plans under construction for: <ul style="list-style-type: none"> - Cliff Oval (rock climbing); and - Hermits Retreat (rock climbing). 	Ecologically Sensitive Lands policy / management	Not planned	Strategy and Environment	Team Leader Natural Areas

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
76) Continue a long term strategy for bicycle use in the LGA, which incorporates a survey of bicycle use, and if appropriate, allocation of designated on and off road riding areas, rider education, opening and closure of tracks for recovery and user participation in track maintenance.	2009-2012 draft Management Plan as part of an action plan for LGA-wide integrated transport and access (including strategic bike plan and pedestrians).	2009 - 2010	Strategy and Environment	Strategic Traffic Engineer
	Mountain bikes community investigation	2009	Environmental Levy	Environmental Levy Program Leader
	Fire trail and walking track maintenance program	Ongoing	Operations	Bushland Operations Coordinator

TRACKS AND TRAIL

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
77) All new tracks, trails and relevant maintenance activities comply with: <ul style="list-style-type: none"> • Ku-ring-gai Council (1998) Bushland Service Trail Maintenance Standards; and • Draft Ku-ring-gai Council (2009) Bushland Walking Track Maintenance Standards. These standards have been created to incorporate: <ul style="list-style-type: none"> • The Recreational Trail Guide (Epacris Consulting 2005); • Australian Standard on Walking Track Classification and Signage ; • Standard for Fire Trails; • Walking Track Construction Guidelines (NPWS 1985); and • Bushfire Co-ordinating Committee fire trail policy (policy no. 2/2007). 	Cultural Heritage interpretation	Ongoing	Strategy and Environment	Principal Landscape Architect
	Tracks and trails - Environmental Levy	Annual	Strategy and Environment	Environmental Levy Program Leader
	Fire trail and walking track maintenance program	Ongoing	Strategy and Environment	Technical Officer - Bushfire
			Operations	Bushland Operations Coordinator
78) Maintain tracks to required minimum width and condition. Close tracks not included in the proposed walking or recreation track network and not required for strategic bushfire management purposes. Regenerate native vegetation on closed tracks.	Fire trail and walking track maintenance program	Ongoing	Operations	Bushland Operations Coordinator

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
79) Restricted vehicular access on fire trails to service, maintenance and emergency vehicles only and install signage to this effect.	Environmental Levy - signage	Ongoing	Strategy and Environment	Environmental Levy Program Leader
	Fire trail and walking track maintenance program	Ongoing	Operations	Bushland Operations Coordinator
	Fire trail use compliance	Ongoing	Development and Regulation	
80) Form co-operative arrangements with local police, OEH, Sydney Water, and the community to report and prevent illegal trail bike access.	Fire trail use compliance	Not planned	Development and Regulations	Manager - Compliance and Regulation
81) Maintain Council's trail asset register (linked to Council's GIS) including locations, permissible use and condition.	Fire trail and walking track maintenance program	Ongoing	Operations	Bushland Operations Coordinator
			Strategy and Environment	Environmental Levy Program Leader
82) Monitor erosion around tracks and roads and implement control measures when required.	Fire trail and walking track maintenance program	Ongoing	Operations	Bushland Operations Coordinator

UNAUTHORISED ACTIVITIES

Action	Services and Projects	Proposed Time Frame	Department	Responsible Officer
83) Monitor for and remove/close any dumped material, constructions, unauthorised tracks and jumps as soon as practically possible from the reserve to discourage further activity.	Encroachments	Ongoing	Strategy and Environment	Environment Officer
	Bushland Maintenance Program	Ongoing	Operations	Bushland Operations Coordinator
84) Where necessary, undertake regulatory action to address unauthorised activities in bushland reserves, including: <ul style="list-style-type: none"> - unauthorised recreational activities (eg. mountain bikes, dog walking); - dumping; and - constructions (unauthorised tracks and jumps within Council reserve). 	Compliance	Ongoing	Development and Regulation	Manager - Compliance and Regulation
85) Continue regular patrols of the reserves to maintain a deterrent for regular offenders. Incorporate arrangements with local Police, NSW Rural Fire Service, OEH officers and general community groups.	Compliance	Not planned	Development and Regulation	Manager - Compliance and Regulation

9. Glossary

Active Recreation – Active recreation refers to a mix of uses that includes the following facilities or facility types: building or structures for recreational activities, concession, community garden, courses or courts, children's play area, dog play area, or a bike.

Biodiversity is “the variety of life forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. It is usually considered at three (3) levels: genetic diversity, species diversity and ecosystem diversity (Commonwealth of Australia 1996).

Corridors are zones or areas that form a habitat link between two (2) or more natural areas. In this case, they may be contiguous bands of habitat or vegetation and will generally contain all structural layers of plant communities. In a wider sense, they can be areas or zones that form, or may be enhanced to form, links to other intact habitats via a series of smaller corridors or biolinks.

Endemic a species of organism that are confined to a particular geographic region.

Ecologically sensitive lands include lands containing:

- national or state significant communities, populations or species;
- areas of particular local significance;
- cultural heritage items;
- riparian zones;
- slopes over 18 degrees ;and
- known and suspected *phytophthora cinnamomi* locations.

Nutrients in this context are substances that negatively affect bushland such as phosphates and nitrates from sources including garden fertilisers, detergents and organic materials such as sewage, garden clippings and dog faeces.

Passive Recreation means recreation activities that require limited physical exertion on behalf of the participant. Examples of passive recreation activities include bird watching, walking or photography.

Provenance (plant stock) is a term used to describe something's origin or source and in the

case of seed as its "geographic place of origin or seed" (Loch and Whalley 1997). This term is broadened to describe the patterns of variation exhibited by a species over its range reflecting its evolutionary history (Coates and van Leeuwen 1996).

Threatened Ecological Communities in NSW are ecological communities listed under the *Threatened Species Conservation Act (NSW) 1995*; in the categories of, Critically Endangered, Endangered or Vulnerable, depending on their risk of extinction. Ecological communities can also be listed as nationally threatened under the Commonwealth's *Environment Protection and Biodiversity Conservation Act, 1999*.

Vegetation and habitat corridors are areas designated to facilitate connection and maintenance of flora and fauna habitats within the urban landscape. Vegetation and habitat corridors provide an opportunity for a variety of local, migratory and transient species to exist, pollinate, move, forage, breed, roost and shelter. Within the urban environment Vegetation and habitat corridors may not necessarily form a direct physical connection between areas of fauna or flora habitat and may consist of remnant trees and associated native and exotic vegetation.

10. References

- Australian Heritage Office (AHO) 2007. 'Aboriginal Heritage Office Annual Report 2007-2008' a report on the activities of the Aboriginal Heritage Office.
- Allen C.B., D.B Benson, T. James, J. Kelleway 2006. *Vegetation Map of the Sydney Harbour Foreshore*, prepared for NSW Maritime, Royal Botanical Gardens Sydney, Sydney Metropolitan CMA. Unpublished report.
- Coates D.J and van Leeuwen S.J. 1996. Delineating seed provenance areas for revegetation from patterns of genetic variation. *In: Proceedings of the second Australian workshop on Native Seed Biology for Revegetation*. Eds. S.M.Bellairs and J.M. Osborne, 11-12 October, 1996, Newcastle. Australian Centre for Minesite Rehabilitation Research. pp 3-14.
- Commonwealth of Australia 1996. *The National Strategy for the Conservation of Australia's Biological Diversity*, Canberra: DEST.
- Biosecurity Queensland on behalf of the National Lantana Management Group 2010. *Plan to Protect Environmental Assets from Lantana*. Department of Employment, Economic Development and Innovation, Yeerongpilly, Queensland.
- Conacher Travers 2000. *Environmental; Baseline Study for Ku-ring-gai Municipal Council Local Government Area*, Report prepared for Council.
- Department of the Environment and Heritage (DEH) 2004. *Phytophthora root rot Invasive species fact sheet*. [Available at: <http://www.environment.gov.au/biodiversity/invasive/publications/p-root-rot/pubs/p-root-rot.pdf>] (22 May 2009) Canberra, Australia.
- Department of Environment, Climate Change and Water NSW. (DECCW) 2009. Draft National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus*. Prepared by Dr Peggy Eby. Department of Environment, Climate Change and Water NSW, Sydney.
- Department of Environment and Conservation NSW (2005) Draft Recovery Plan for the Green and Golden Bell Frog (*Litoria aurea*). DEC NSW, Hurstville, NSW.
- Department of the Environment, Sport and Territories (DEST) 1996. *National Strategy for the Conservation of Australia's Biological Diversity*.
- Department of Mines 1966. *Sydney 1:250,000 Geological Series Sheet S1 56-5*. Third Edition. V C N Blight - Government Printer, NSW.
- Epacris Consulting 2005. *Ku-ring-gai Council recreational trail guidelines*.
- Hodgson, P.R. 2005, *Characteristics of Urbanisation that Influence Bird Communities in Suburban Remnant vegetation*, University of Wollongong.
- Hodgson, P.R., French, K. & Major, R. E. 2007, 'Avian Movement Across Abrupt Ecological Edges: Differential Responses to Housing Density in an Urban Matrix'. *Landscape and Urban Planning*, vol. 79, no. 3-4, pp. 266-272.

Hornsby – Ku-ring-gai Bush Fire Management Committee 1999. *'Bush Fire Risk Management Plan'*. Unpublished document.

James, T. 1997, *Native Flora in Western Sydney: Urban Bushland Biodiversity Survey*, New South Wales National Parks & Wildlife Service.

Koettig, M. 1988. *Ku-ring-gai Municipality Heritage Study: Aboriginal Sites*. Report to Ku-ring-gai Council.

Ku-ring-gai Council 1984. *Plan of Management for Bushland Areas*.

Ku-ring-gai Council (KC) 1987. *Heritage Study*

Ku-ring-gai Council 1989. *Ku-ring-gai Urban Bushland State Environmental Planning Policy No.19 - Bushland in Urban Areas Plan of Management*.

Ku-ring-gai Council (KC) 1995. *Bushland Weed Assessment Guidelines*.

Ku-ring-gai Council (KC) 1995a. *Bushland Weed Eradication Standards*

Ku-ring-gai Council (KC) 1996. *Ku-ring-gai Council Bushland Plan of Management*.

Ku-ring-gai Council (KC) 1997. *Bushland fire break Maintenance Standards*.

Ku-ring-gai Council (KC) 2006. *Bushcare Policy*.

Ku-ring-gai Council (KC) 1997b. *Recreation in Bushland Policy*.

Ku-ring-gai Council 1998. *Bushland Service Trail Maintenance Standards*.

Ku-ring-gai Council (KC) 1998. *Fauna Management Policy*.

Ku-ring-gai Council (KC) 1999. *Bushland Fauna Assessment Guidelines*.

Ku-ring-gai Council (KC) 1999a. *Tree Management Policy*.

Ku-ring-gai Council (KC) 2003. *Generic Sportsgrounds Plan of Management*.

Ku-ring-gai Council (KC) 2003a. *Temporary Access over Community Land Policy*.

Ku-ring-gai Council (KC) 2004. *Riparian Policy*.

Ku-ring-gai Council (KC) 2005. *People, parks and bushland, Open Space Strategy for Ku-ring-gai*.

Ku-ring-gai Council 2005a. *About your Local area*.

<http://www.kmc.nsw.gov.au/go/about-Council/about-your-local-area>

Ku-ring-gai Council 2005c. *Environmental Levy*.

Ku-ring-gai Council 2005d. 'People Parks and Bushland - Open Space Strategy for Ku-ring-gai

Ku-ring-gai Council (KC) 2005e. *Ku-ring-gai Council Development Control Plan No 47 Water Management*

Ku-ring-gai Council (KC) 2006. *Biodiversity Strategy*.

Ku-ring-gai Council 2006. *Ku-ring-gai Bushland Reserves Plan of Management*. Report created for Ku-ring-gai Council by Eco Logical Australia, unpublished report.

Ku-ring-gai Council (KC) 2006a. *Ku-ring-gai Council Development Control Plan No 38, The Ku-ring-gai Residential Design Manual*.

Ku-ring-gai Council (KC) 2007. Tree Preservation Order.

Ku-ring-gai Council (KC) 2007a. Weed Management Policy.

Ku-ring-gai Council (KC) 2007b. *Technical Methods supporting the development of a bushland rating matrix and decision support tool: Ku-ring-gai Council, NSW*.

Ku-ring-gai Council (KC) 2007c. *Council's Temporary Access over Community Land Policy*.

Ku-ring-gai Council (KC) 2007d. *Ku-ring-gai Council Bushfire Management Policy*.

Ku-ring-gai Council (KC) 2007e. *Bushfire Plan of Management - Hazard Reduction Burn Compartments*.

Ku-ring-gai Council (KC) 2008. *Threatened Flora Validation*. *Ku-ring-gai Council unpublished report*.

Ku-ring-gai Council (KC) 2008a. *Ku-ring-gai Bushfire Prone Land Map and Bushfire Evacuation Risk Map*.

Ku-ring-gai Council (KC) 2008b. *Integrated Water Cycle Management Strategy*.

Ku-ring-gai Council (KC) 2009. *DRAFT Threatened Ecological Community Mapping*. [Ku-ring-gai Council unpublished report](#).

Ku-ring-gai Council (KC) 2009b. *Draft Bushland Walking Track Maintenance Standards*

Ku-ring-gai Council (KC) 2010. *Unstructured Recreational Strategy for the Ku-ring-gai community land*.

Loch D. and Whalley R.D.B. 1997. Native Grassland Rehabilitation: The Place of Provenance Seed. *In: Proceedings of the First workshop of the Australian Native Grass and Legume Seed Industry Association Inc.*, 22 Oct 1997. Brisbane. pp 59-69.

Natural Resource Management Ministerial Council (NRMCC) (2009). *Australia's Biodiversity Conservation Strategy 2010-2020 - Consultation draft*.

- NSW Bushfire Co-ordinating Committee 2007. *Fire Trail Policy (policy no. 2/2007)*.
- NSW Department of Environment and Conservation (DEC) 2001. *Threat Abatement Plan for Predation by the Red Fox Source*. [Available online: http://www.nationalparks.nsw.gov.au/PDFs/Redfox_approved.pdf]
- NSW Department of Environment and Conservation (DEC) 2004. *Darwinia biflora Recovery Plan*. NSW Department of Environment and Conservation, Hurstville.
- NSW Department of Environment and Conservation (DEC) 2004a. *Grevillea caleyi R. Br. (Proteaceae) Recovery Plan*. Department of Environment and Conservation (NSW), Hurstville.
- NSW Department of Environment and Conservation (DEC) 2006. *NSW Recovery Plan for the Large Forest Owls: Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebricosa) and Masked Owl (Tyto novaehollandiae)*. Department of Environment and Conservation, Sydney.
- NSW Department of Environment and Conservation (DEC) 2006a. Southern Brown Bandicoot (*Isoodon obesulus*) Recovery Plan. NSW DEC, Hurstville NSW
- NSW Department of Environment and Conservation (DEC) 2006b. *NSW Threat Abatement Plan - Invasion of native plant communities by Chrysanthemoides monilifera* (bitou bush and boneseed). Department of Environment and Conservation (NSW), Hurstville.
- NSW Department of Environment and Climate Change (DECC) 2008. *Draft Recovery Plan for Melaleuca deanei*. Department of Environment and Climate Change (NSW), Sydney.
- NSW Department of Environment and Climate Change (DECC) 2008a. *Recovery Plan for the Koala (Phascolarctos cinereus)*. Department of Environment and Climate Change, Sydney, NSW.
- NSW Department of Environment and Climate Change (DECC) 2009. *Draft Vegetation mapping of the Sydney Catchment Management Authority Area (working title)*. Unpublished.
- NSW Department of Environment and Heritage (DEH) (2005). *Blue Gum High Forest of the Sydney Basin Bioregion, Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on amendments to the List of Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999*. [Available online: <http://www.deh.gov.au/biodiversity/threatened/communities/sydney-blue-gum.html> 9/06/2009]
- NSW Department of Environment and Heritage (DEH) (2005a). *Turpentine–Ironbark Forest of the Sydney Basin Bioregion Nationally threatened species and ecological communities information sheet*. [Available online: <http://www.deh.gov.au/biodiversity/threatened/publications/sydney-turpentine-ironbark.html> 9/06/2009]
- NSW Department of Environment and Conservation (DECC) June 2005. *Recovering bushland on the Cumberland Plain: best practice guidelines for the management and restoration of bushland. Recovering bushland of the Cumberland Plain*.
- NSW National Parks and Wildlife Service (NPWS) 2001. *NSW Threat Abatement Plan -*

Predation by the European Fox (Vulpes vulpes). NSW National Parks and Wildlife Service: Hurstville, Sydney.

NSW National Parks & Wildlife Service (NPWS) 2000. *Personia mollis* subspecies *maxima* Recovery Plan. NSW National Parks and Wildlife Service: Hurstville, Sydney.

NSW National Parks and Wildlife Service (NPWS) 2002. *Native vegetation maps of the Cumberland Plain, Western Sydney: Technical report*. NSW National Parks and Wildlife Service: Hurstville, Sydney.

NSW National Parks and Wildlife Service (NPWS) 2003. *NSW Threat Abatement Plan - Predation by the Plague Minnow (Gambusia holbrooki)*. NSW National Parks and Wildlife Service: Hurstville, Sydney.

NSW National Parks and Wildlife Service (NPWS) 1985. *Walking Track Construction Guidelines*.

NSW National Parks and Wildlife Service (NPWS) 2003. *Draft Recovery Plan for the Barking Owl*. New South Wales National Parks and Wildlife Service, Hurstville, NSW.

NSW National Parks and Wildlife Service (NPWS). Threatened Species:
<http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10254>

NSW Rural Fire Service (RFS) 2001. *Planning for Bushfire Protection: a guide for Councils, Planners, Fire Authorities, Developers and Home Owners*. NSW Rural Fire Service,

NSW Rural Fire Service (RFS) 2006. *Planning for Bushfire Protection: a guide for Councils, Planners, Fire Authorities and Developers*. NSW Rural Fire Service.

NSW Rural Fire Service (RFS) February 2006a. *Bush Fire Environmental Assessment Code for New South Wales*. NSW Rural Fire Service.

P & J Smith Ecological Consultants 2003. *Warringah Natural Area Survey: Vegetation Communities and Plant Species*. Unpublished report for Warringah Council.

NSW Scientific Committee (NSW SC) (20 April 2007). *Blue Gum High Forest in the Sydney Basin Bioregion - critically endangered ecological community listing, NSW Scientific Committee - final determination*. [Available online:
http://www.nationalparks.nsw.gov.au/npws.nsf/Content/blue_gum_high_forest_endangered_30/01/2008]

NSW Scientific Committee (NSW SC) (16 October 1998). *Sydney turpentine-ironbark forest - endangered ecological community listing, NSW Scientific Committee - final determination*. [Available online:
http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Sydney+turpentine+ironbark+forest+endangered+ecological+community+listing_30/01/2008]

NSW Scientific Committee (NSW SC) (2004). *Genoplesium baueri* (an orchid) - vulnerable species listing - final determination. [Available online:
<http://www.environment.nsw.gov.au/determinations/GenoplesiumBaueriVulSpListing.htm>]

Suddaby T, Liew E 2008. *Phytophthora cinnamomi* – Best Practice Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area.

Surgeon City Council California: http://www.sturgeoncounty.ab.ca/heartland/may_4glos.html

Swift Parrot Recovery Team (2001). Swift Parrot Recovery Plan. Department of Primary Industries, Water and Environment, Hobart

Thorp J.R, National Weeds Strategy, Lynch R, Agriculture Fisheries and Forestry – Australia (Thorp & Lynch) 2000. *The Determination of Weeds of National Significance*. Available online [<http://www.weeds.org.au/docs/WoNS/>] (25 May 2009).

Appendix 1 Ku-ring-gai bushland reserves

Table A.1: Ku-ring-gai bushland reserves owned or under care control and management by Council

LMU Name	LMU NO
Lovers Jump Creek Reserve	1
Du Faur Reserve	8
Bobbin Head Road Bushland	9
Ku-ring-gai Wildflower Garden	20
Ku-ring-gai Wildflower Garden	22
Ku-ring-gai Creek Reserve	27
Cowan Creek Reserve	35
Milkmaids Reserve	37
Clive Evatt Reserve	49
Turiban Reserve (south)	50
Turiban Reserve (north)	51
(Billy) Hughes Park	63
Derwent Reserve	64
Travis Park	66
Merrivale Bush	68
Bannockburn Bush	72
Florey Avenue Reserve	75
Poa Park	77
Blackbutt Park	78
Orana Reserve	79
McIntosh Park	83
Linigen Reserve	84
Cambourne North Reserve	87
Hayle Street Reserve	88
Cambourne East Reserve	89
Douglas Street Reserve	93
Ivor Wyatt Reserve	96
Turpentine Forest	97
Seven Wives Wood	100
Dingly Dell	101
Surgeon White Reserve	102
Barra Wood	104
Shinfields End	106
Huntleys Forest	108
Lynbara Avenue Reserve	109
Mashmans Quarry Reserve	110

LMU Name	LMU NO
Browns End	219
Browns Bush	220
Upper Campbell Reserve	221
South Campbell Reserve	222
Middle Campbell Reserve	223
Lower Campbell Reserve	224
Holmes Street Reserve	226
Grannys Springs	227
Duff Reserve	229
Sheldon Forest	231
Twin Creek Reserve	233
Airman's Bush	234
Bradley Park	236
The Broadway	238
Rofe Park	248
Troon Creek Reserve	249
Comenarra Bush	253
Sir David Martin Reserve	257
Kissing Park	260
Comenarra Creek Reserve	261
Lower Dam Forest	264
Golfers Glen	267
Randy Reserve	269
Hammond Reserve	270
Yarra Street Reserve	272
Shoppers Wood	276
Bicentennial Park Bushland	286
Quarry Creek Reserve	292
Hampshire Bush	293
Rudder Creek Reserve	295
Deburghs Drop	297
Blackbutt Reserve	299
Spurwood Forest	302
Burraneer Avenue	303
Gordon Glen Bush	306
Albert's Bush	312

LMU Name	LMU NO
Browns Forest	111
Gibran Place Reserve	117
Bryce Bush	119
Waipori Street Reserve	121
Founders Way	122
Vista Street Reserve	125
Vista Street Reserve	126
Vista Street Reserve	127
Governor Phillip Reserve - East Gordon Park	132
Barra Brui Bush	135
London Reserve	136
Bushranger Reserve	137
Illeroy Forest	141
Richmond Park	143
Gearys Way	149
Warrington Avenue Reserve	153
Old She Oak Reserve	156
Redfield Bush	159
Kimberly's Way	160
Lindfield Soldiers' Memorial Park	162
Seven Little Australians	165
Wombin Reserve	167
Upper Moores Creek	180
Nungara Reserve	181
Moores Creek Reserve	183
Neil Place	186
Follies Park	188
Amarna Reserve	189
Roseville Bridge Bush	194
Upper Echo	196
Echo Point Park	200
Boatshed Bush	204
The Glade Reserve	212
Loggers Retreat	213
Mt Pleasant Reserve	215
Laura Houison Osborne Sanctuary	217

LMU Name	LMU NO
Sir Phillip Game Reserve North	320
Sir Phillip Game Reserve South	324
Lower UTS Bush	325
Paddy Pallin Reserve	328
Lower Paddys Forest	329
Sugarbag Creek Reserve	331
Upper Cardigan Reserve	332
Blue Gum Creek Reserve	334
Blue Gum Creek Reserve	335
Aleta End	337
Upper Minnamurra Reserve	338
Princes Park	340
Lower CSIRO Bush	341
Glengarry Annexe	342
Ashley Grove Reserve	343
Delaneys Island	348
Vacant Land	352
Lennox Street Reserve	356
Kylie Walk	357
Cardigan Reserve	359
Fraser Park	362
Ku-ring-gai Flying Fox Reserve / Gordon Park	364
Gwydir Trail	458
Linigen Trail	481
Kimberley Trail	532
Bell's Path	543
Holt Avenue Reserve	709
Lady Blaxland Reserve	785
Loyal Henry Park	786
Hassall Bush North	868
Hassall Bush South	869
William Lewis Bush	873
Upper Lovers Jump Creek	876
Harry Seidler Reserve	965

Appendix 2 Bushland Rating Matrix and Decision Support Tool

In the past council completed an assessment of each Council bushland reserve according to contextual values ascribed (environmental, social and economic) and pressures exerted. This research produced a matrix that allows the condition of each reserve to be ranked against its value. The information matrix produced a priority list for maintenance investment for every reserve in the municipality*. The criteria listed in the tables in this appendix show the parameters taken into account within that study and the development of the priority ranking of the bushland reserves.

Ku-ring-gai bushland contains a range of values. Which values are ascribed to an area depends very much on an individual's perspective. Below is a list of some of the more common values cited by Ku-ring-gai residents for bushland in their area.

Biodiversity and Environment Values

- Vegetation Communities
- Threatened species
- Flora Diversity
- Connectivity
- Core size
- Council investment
- Riparian Condition
- Climate Change/Global warming
- Water Quality
- Air Quality
- Habitat

Economic Values

- Track condition
- Property value
- Amenity value
- Bequest value

Social Values

- Childhood experience
- Visual quality
- Community health
- Recreational asset

Pressures

- Dumping
- Stormwater
- Sewage overflows
- Recreation activity (Bike riding, Bush walking)
- Weeds
- Feral animals
- Removal of plants, rocks and wood
- Bushfire management
- Erosion
- Dog walking
- Safety infrastructure
- Infrastructure (powerlines, sewer)
- Fencing

Pressures were also determined to estimate the current impact from local catchments and activities on the values within each individual reserve.

This information allows Council staff to determine which reserves to focus on first and provides an improved understanding of the values of each reserve and magnitude of the pressures that need to be controlled in order to maintain those values.

The results of this research as seen below, was a matrix that allowed the results to be ranked according to the ratio between values and pressures. The results are divided into three tables:

- Table A – those reserves that are a high priority for funding,
- Table B – those reserves that are moderate priority for funding, and
- Table C- those reserves that are low priority for funding.

A: High Priority Reserve List

High Value / High Pressure			
LMU	Reserve Name	LMU	Reserve Name
189	Amarna Reserve	224	Lower Campbell Reserve
135	Barra Brui Bush	264	Lower Dam Forest
286	Bicentennial Park Bushland	68	Merrivale Bush
299	Blackbutt Reserve	156	Old She Oak Reserve
111	Browns Forest	143	Richmond Park
35	Cowan Creek Reserve	248	Sheldon Forest
364	Flying Fox Reserve	320	Sir Phillip Game Reserve North
362	Fraser Park	212	The Glade Reserve
132	Governor Phillip Reserve- East Gordon Park	51	Turiban Reserve North
20	Ku-ring-gai Creek Reserve	233	Twin Creek Reserve
1	Lovers Jump Creek Reserve	167	Wombin Reserve
356	Lennox Street Reserve		

B: Medium Priority Reserve List

Low Value / High Pressure			
LMU	Reserve Name	LMU	Reserve Name
343	Ashley Grove Reserve	217	Laura Houison Osborne Sanctuary
72	Bannockburn Bush	125	Lower Vista Bush
104	Barra Wood	109	Lymbarra Avenue Reserve
543	Bell's Path	223	Middle Campbell Reserve
204	Boatshed Bush	215	Mt Pleasant Reserve
119	Bryce Bush	79	Orana Reserve
303	Burraneer Avenue	65	Paddys Forest
297	Deburghs Drop	77	Poa Park
348	Delaneys Island	269	Randy Reserve
64	Derwent Reserve	159	Redfield Bush

Low Value / High Pressure			
LMU	Reserve Name	LMU	Reserve Name
8	Du Faur Reserve	106	Shinfields End
213	Exeter End	127	South Vista Bush
149	Gearys Way	50	Turiban Reserve South
267	Golfers Glen	227	Turramurra Forest
41	Halls Bush	332	Upper Cardigan Reserve
869	Hassel Bush South	338	Upper Minnamurra Reserve
160	Kimberly's Way	126	Upper Vista Bush
357	Kylie Walk	786	West Roseville Park
785	Lady Blaxland Reserve	272	Yarra Street Reserve
965	Harry Seidler Reserve	334	Lower Blue Gum Creek Bush
331	Kimo Street Bush	328	Paddy Pallin Reserve

High Value / Low Pressure			
LMU	Reserve Name	LMU	Reserve Name
234	Airmens Bush	885	Mars 4
236	Bradley Reserve	83	McIntosh Park
219	Browns End	165	Seven Little Australians
137	Bushranger Reserve	257	Sir David Martin Reserve
261	Comenarra Creek Reserve	324	Sir Phillip Game Reserve South
101	Dingly Dell	102	Surgeon White Reserve
93	Douglas Street Reserve	141	Illeroy Forest
293	Hampshire Bush	249	Troon Creek
162	Hermits Retreat	66	Upper Cowan Creek Reserve
341	Lower CSIRO Bush	183	Moore's Creek Reserve
220	Browns Bush		

C: Low Priority Reserve List

Low Value / Low Pressure			
LMU	Reserve Name	LMU	Reserve Name
63	(Billy) Hughes Park	295	Kooloona Bush
302	62 Spurwood Road	84	Linigen Reserve
312	Albert's Bush	481	Linigen Trail
78	Blackbutt Park	136	London Reserve
9	Bobbin Head Road Bushland	329	Lower Paddys Forest
270	Bullock Park	325	Lower UTS Bush
89	Cambourne East Reserve	883	Mars 2-1
87	Cambourne North Reserve	886	Mars 5
188	Canberra Crescent Scrub	186	Neil Place
359	Cardigan Reserve	181	Nungara Reserve
49	Clive Evatt Reserve	340	Princes Park
253	Comenarra Bush	292	Quarry Creek Reserve
110	Cutting Forest	194	Roseville Bridge Bush
229	Duff Street Reserve	276	Shoppers Wood
200	Echo Point Park	222	South Campbell Reserve
117	Gibran Place Reserve	238	The Broadway
342	Glengarry Annexe	97	Turpentine Forest

Low Value / Low Pressure			
LMU	Reserve Name	LMU	Reserve Name
306	Gordon Glen Bush	221	Upper Campbell Reserve
458	Gwydir Trail	196	Upper Echo
868	Hassel Bush North	876	Upper Lovers Jump Creek
88	Hayle Street Reserve	180	Upper Morres Creek
226	Holmes Street Reserve	121	Waipori Street Reserve
96	Ivor Wyatt Reserve	153	Warrington Avenue Reserve
532	Kimberley Trail	873	William Lewis Bush

Note:

The following reserves have been omitted from the matrix due to survey access difficulties; Mars 2-2(LMU 884), Upper Blue Gum Creek Bush (LMU 335).

***This matrix has not been updated to include lands added since 2009.**

Appendix 3 Recovery and threat abatement strategies and plans

A1 Recovery Plans

A1.1 Recovery Plan: *Darwinia biflora* (Cheel) Briggs (DEC 2004)

Aims/Objectives:

- to ensure that a representative sample of *D. biflora* populations occurring on public and private lands are protected from habitat loss and managed for conservation;
- to increase knowledge of the biology, ecology and distribution of the species to assist management decisions;
- to reduce the impacts of threats at sites and to ensure that any planning and management decisions that are made that may affect the species, are based on information within this recovery plan; and
- to raise awareness about the conservation status of the species and involve the community in the recovery program.

Recovery actions:

- identify sites in the reserves that are a high priority to protect;
- implement threat and habitat management programs on public lands;
- undertake sensitive easement maintenance activities;
- undertake informed assessment and planning decisions;
- investigate aspects of the ecology;
- identify and survey potential habitat;
- encourage community involvement;
- provide advice and assistance to private landholders; and
- DEC advised of decisions that affect species.

A1.2 Recovery Plan: *Grevillea caleyi* R. Br. (DEC) 2004a)

Aims/Objectives:

The overall objective of the recovery plan is to minimise human imposed disturbance to *Grevillea caleyi* populations and to maintain viable wild populations into the foreseeable future. The objective is to minimise the risk of local extinction, not necessarily to maximise the number of aboveground *G. caleyi* plants.

Specific Objectives:

- to ensure conservation of all sites by appropriate fire management practices;

- to ensure the conservation of all sites by appropriate management practices;
- to ensure and increased level of protection is provided to sites currently outside existing National Parks;
- to increase our knowledge of the biology of *Grevillea caleyi* for management of the species; and
- to locate and protect any new sites of *Grevillea caleyi*.

Recovery actions:

- implement appropriate fire management;
- monitoring survival of *Grevillea caleyi* after fire;
- fencing;
- weed control and bush regeneration;
- Pathogen Control;
- rubbish removal;
- runoff control;
- discourage inappropriate plantings of *Grevillea* species; and
- DEC will liaise with land managers and relevant Councils to increase the protection status of land where *Grevillea caleyi* occurs.

A1.3 Draft Recovery Plan: *Melaleuca Deanei* (DECC 2008)

Goals:

- to summarise the present-state knowledge regarding the conservation and ecology of this species;
- to identify the actions to be taken to ensure the long-term viability of the species in nature;
- to identify the stakeholders involved in undertaking these actions; and
- to reduce the further loss of populations across the species' natural range.

Specific objectives:

- to protect known occurrences of *M. deanei*;
- to identify and minimise the threats at *M. deanei* sites;
- to improve awareness of *M. deanei* amongst land managers and the community; and
- to encourage research projects that will contribute to adaptive management decisions.

Relevant recovery actions:

- Councils will review the classification of *M. deanei* sites and consider the reclassification of such land as community land where appropriate;

- Councils and the Department of Planning (DoP) will ensure that all relevant Environmental Planning Instruments (prepared under Part 3 of the EP&A Act) are prepared, or reviewed, with reference to this recovery plan and any further advice from the DECCW regarding this species;
- All relevant consent and determining authorities will assess developments and activities with reference to this Plan, environmental impact assessment guidelines and any further advice from the DECCW regarding the species. Assessments will be carried out under Part 4 & 5 of the EP&A Act. Environmental impact assessment guidelines are provided in Appendix 1 of the recovery plan;
- Site management statements for populations of *M. deanei* will be prepared by the relevant authority in liaison with DECCW and incorporated into any relevant Plans of Management for the area, including fire management plans; and
- Threat abatement measures in accordance with the site management statements will be implemented, including fire management.

A1.4 Recovery Plan: *Persoonia mollis* subspecies *maxima* (NPWS 2000)

Aims/Objectives:

The broad objective of this recovery plan is to protect the populations of *Persoonia mollis* subspecies *maxima* from decline, and to implement a management regime, based on current knowledge, designed to promote the plant's conservation and evolutionary potential in nature.

Specific objectives:

- minimise the risk of *P. mollis* ssp. *maxima* from declining in the long term;
- establish the full extent of the taxon's distribution;
- improve management of *P. mollis* ssp. *maxima* and its habitat based on biological understanding of the taxon; and
- safeguard populations against extinction in nature as a result of catastrophic disturbance events.

Recovery actions:

In order to achieve these objectives, a number of specific actions are identified by this recovery plan. Recovery actions will be broadly directed towards:

- habitat management to ameliorate threatening processes, and thorough assessment of activities which may impact on the taxon;
- targeted survey to determine the extent of known populations and whether new populations exist;
- undertaking a monitoring program and facilitating research which investigates key attributes of the taxon's biology; and

- ensuring that appropriate contingency arrangements are implemented to protect populations from imminent extinction.

A1.5 Draft Recovery Plan: Barking Owl (*Ninox connivens*) (NPWS 2003)

Aims/Objectives:

- increase understanding of the biology, ecology and management of the Barking Owl;
- increase education and awareness of and involvement in the conservation of the Barking Owl and its habitat in NSW; and
- undertake threat abatement and mitigation.

Recovery actions:

- establish a program to monitor the NSW Barking Owl population and study its demographics;
- investigate conservation management strategies ;
- support biological and ecological studies;
- support population genetics studies;
- investigate the cultural and historic significance of the Barking Owl;
- protect known Barking Owl nest sites and surrounding habitat;
- assist with the protection of Barking Owl habitat from disturbance due to developments and activities; and
- maintain links with the community.

A1.6 Recovery Plan: Koala (*Phascolarctos cinereus*) (DECC 2008a)

Aims/Objectives:

To reverse the decline of the koala in NSW, to ensure adequate protection, management and restoration of koala habitat and to maintain healthy and breeding populations of koalas throughout their current range.

Specific Objectives:

- to conserve koalas in their existing habitat;
- to rehabilitate and restore koala habitat and populations;
- to develop a better understanding of the conservation biology of koalas;
- to ensure that the community has access to factual information about the distribution, conservation and management of koalas at a national, state and local scale;
- to manage captive, sick or injured koalas and orphaned wild koalas to ensure consistent and high standards of care;

- to manage over-browsing to prevent both koala starvation and ecosystem damage in discrete patches of habitat; and
- to coordinate, promote the implementation, and monitor the effectiveness of the NSW Koala Recovery Plan across NSW.

Recovery actions:

- increasing awareness in the community and local and state government bodies regarding the management and conservation of koalas;
- define the factors that determine koala habitat including soils, elevation, climate and tree species (food and shelter) within the area;
- develop comprehensive Koala Plans of Management under SEPP 44;
- assist DECCW in production of a regional list of koala food and shelter trees for catchment management authorities, other local government areas and local/regional koala plans that deal with specific issues and/or locations; and
- incorporate koala habitat protection measures into local environmental plans (LEP), and other relevant management plans.

A1.7 Recovery Plan: Large Forest Owls including Powerful Owl (*Ninox strenua*) (DEC 2006)

Aims/Objectives:

The overall objective of the NSW Large Forest Owl Recovery Plan is to ensure that the three species persist in the wild in NSW in each region where they presently occur. Depending on the success of Ongoing management actions, monitoring and further studies, a further objective is to reassess the conservation status of the species and downlist from Vulnerable to secure if appropriate.

Specific Objectives:

- to minimise the impacts of development activities on large forest owls and their habitats outside conservation reserves and State forests;
- to assess the distribution and amount of high quality habitat for each owl species across public and private lands to get an estimate of the number and proportion of occupied territories of each species that are, and are not, protected;
- to monitor trends in population parameters (numbers, distribution, territory fidelity and breeding success) across the range of the three species and across different land tenures and disturbance histories;
- to raise awareness of the conservation requirements of the three large forest owls amongst the broader community, to involve the community in owl conservation efforts and in so doing increase the information base about owl habitats and biology; and

- to coordinate the implementation of the recovery plan and continually seek to integrate actions in this plan with actions in other recovery plans or conservation initiatives.

Recovery actions:

- encourage groups such as Landcare, to protect existing habitat (particularly known nest sites) and establish new habitat (particularly linking existing fragments of habitat or around nest sites);
- encourage involvement of researchers and students in the recovery efforts for the three large forest owls, particularly in habitat survey, and population monitoring;
- encourage and coordinate the involvement of community-based groups (eg the Australian Bird and Bat Study Association) and animal care groups (eg WIRES) in the implementation of recovery actions; and
- seek to integrate recovery actions with other recovery plan actions and conservation initiatives.

A1.8 Recovery Plan *Lathamus discolor* (Swift parrot) (Swift Parrot Recovery Team 2001)

Aims/Objectives:

- to change the conservation status of the swift parrot from endangered to vulnerable within 10 years; and
- to achieve a demonstrable sustained improvement in the quality of swift parrot habitat to increase carrying capacity.

Specific objectives

- to identify priority habitats and sites across the range of the swift parrot;
- to implement management strategies at the landscape scale to protect and improve priority habitats and sites resulting in a sustained improvement in carrying capacity;
- to reduce the incidence of collisions with man-made structures;
- to determine population trends within the breeding range;
- to quantify improvements in carrying capacity by monitoring changes in extent and quality of habitat; and
- to increase public awareness about the recovery program and to involve the community in the recovery.

Recovery actions:

- identify and map priority foraging habitats in New South Wales, Victoria, Queensland and to identify important breeding sites in Tasmania;
- implement a strategy to protect priority sites and habitats using a range of administrative avenues and voluntary measures, including, threatened species legislation, vegetation

clearance controls, management prescriptions, codes of practice, conservation agreements, covenants and Land for Wildlife schemes;

- identify degraded habitats that have potential to benefit the recovery of the swift parrot. These sites will be targeted for protection and habitat improvement, including undertaking rehabilitation and revegetation works;
- monitor collisions and collision hazards, particularly during the breeding season and take remedial action to reduce the impact of this source of mortality on the population.; monitor the density of the breeding population and the extent and quality of habitat to assess the progress of the recovery program towards meeting its objectives;
- increase public awareness about the recovery program through an information and education program; and
- involve the community in the recovery through the support of networks and participation in operations groups and the recovery team.

A1.9 Draft Recovery Plan: Southern Brown Bandicoot (*Isodon obesulus*) (DEC 2006a)

Aims/Objectives:

The overall objective of this recovery plan is to improve the conservation status of the Southern Brown Bandicoot and maximise the opportunity for viability of this species in the wild in New South Wales.

Specific Objectives:

- to Identify and Implement Land Management Practices That Assist in the Recovery of the Species;
- clarify the Status of the Species by Better Defining its Distribution and Relative Abundance;
- undertake Research to Broaden the Knowledge Base on the Species, Gathering Critical Information to Assist in its Recovery; and
- improve Community Awareness of Conservation Significance of the Southern Brown Bandicoot.

Recovery actions:

- to establish intensive introduced carnivore control programs around known populations;
- to monitor populations to determine the success of introduced carnivore control programs in reducing impacts on the species;
- to monitor the level of road-kill at trouble spots and erecting signs where necessary;
- to implement fire management regimes around known populations that promote favoured habitat;

- to ensure that future development is carried out in a way that does not impact significantly on known populations through provision of environmental assessment guidelines;
- to undertaking further survey; and
- to raise community awareness of the species and involving public interest groups in various aspects of the recovery program.

A1.10 Draft National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus*

Aims/Objectives:

Overall objectives:

- to reduce the impact of threatening processes on Grey-headed Flying-foxes and arrest decline throughout the species' range
- to conserve the functional roles of Grey-headed Flying-foxes in seed dispersal and pollination
- to improve the standard of information available to guide recovery of the Grey-headed Flying-fox, in order to increase community knowledge of the species and reduce the impact of negative public attitudes on the species.

Specific Objectives:

Initiatives to meet these objectives will incorporate principles of sustainable development and promote procedures to minimise significant adverse social and economic impacts, such as the use of environmental incentive schemes and equitable cost-sharing arrangements.

- to identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes throughout their range
- to protect and increase the extent of key winter and spring foraging habitat of Grey-headed Flying-foxes
- to identify roosting habitat critical to the survival of Grey-headed Flying-foxes
- to protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes
- to substantially reduce deliberate destruction of Grey-headed Flying-foxes in fruit crops
- to reduce negative public attitudes toward Grey-headed Flying-foxes and reduce conflict with humans
- to increase public awareness and understanding of Grey-headed Flying-foxes and the recovery program, and to involve the community in recovery actions, where appropriate, to reduce the threat of negative public attitudes and conflict with humans
- to monitor population trends in Grey-headed Flying-foxes so as to monitor the species' national distribution and status
- to assess and reduce the impact on Grey-headed Flying-foxes of electrocution on powerlines and entanglement in netting and on barbed-wire

- to improve knowledge of the demographics and population structure of Grey-headed Flying-foxes in order to increase understanding of the ecological requirements of the species
- to increase the effectiveness and efficiency of recovery initiatives for Grey-headed Flying-foxes by working cooperatively with conservation and management programs with overlapping objectives to remove or reduce the impact of threatening processes on the species
- to maintain an effective Grey-headed Flying-fox National Recovery Team to oversee the implementation of the Grey-headed Flying-fox National Recovery Plan to remove or reduce the impact of threatening processes on the species
- to provide long-term economic benefits associated with the protection of ecosystem services, promotion of sustainable forest management, improved crop protection regimes, promotion of sustainable agricultural practices and increased viability of some commercial fruit industries.

Recovery Actions

- Identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes across their range.
- Enhance winter and spring foraging habitat for Grey-headed Flying-foxes
- Identify, protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes
- Significantly reduce levels of deliberate Grey-headed Flying-fox destruction associated with commercial horticulture
- Provide information and advice to managers, community groups and members of the public that are involved with controversial flying-fox camps
- Produce and circulate educational resources to improve public attitudes toward Grey-headed Flying-foxes, promote the recovery program to the wider community and encourage participation in recovery actions
- Monitor population trends for the Grey-headed Flying-fox
- Assess the impacts on Grey-headed Flying-foxes of electrocution on powerlines and entanglement in netting and barbed wire, and implement strategies to reduce these impacts
- Oversee a program of research to improve knowledge of the demographics and population structure of the Grey-headed Flying-fox

A2 Threat Abatement Plans and other weed plans

A2.1 Threat Abatement Plan - Predation by the European Fox (*Vulpes vulpes*) (NPWS 2001)

Objective

- ensure that fox control programs undertaken for conservation purposes in New South Wales focus on those threatened species which are most likely to be impacted by fox predation;
- ensure that fox control programs are effective in minimising the impacts of fox predation on targeted threatened species;
- provide an experimental basis for validating the priority species for fox control and for measuring the effectiveness of control programs; and
- provide support for the implementation of the plan.

A2.2 Threat Abatement Plan - Predation by the Plague Minnow (*Gambusia holbrooki*) (NPWS 2003)

Objective

- minimise human dispersal of *Gambusia*;
- reduce impacts of *Gambusia* on threatened frog species at key sites;
- integrate *Gambusia* threat abatement plan with other aquatic restoration programs;
- increase knowledge of the general ecology of *Gambusia*, its impact on native frog species and mechanisms for its control; and
- ensure effective implementation of the threat abatement plan.

A2.3 Threat Abatement Plan - Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed) (DEC 2006b)

Objectives

- ensure that bitou bush (and boneseed) control is undertaken in areas where the benefits to threatened species, populations and ecological communities are greatest;
- evaluate the effectiveness of control programs with respect to the response of priority species, populations and ecological communities;
- ensure implementation and administration of the Bitou Threat Abatement Plan is undertaken; and
- establish guidelines for future control programs and research projects based on the outcomes of this plan.

A2.4 Plan to protect environmental assets from Lantana (*Lantana camara*) (Biosecurity Qld 2010)

Objectives

- Ensure that lantana control is undertaken in areas where the benefits to high-priority environmental assets are greatest.
- Ensure that lantana control is undertaken at, and outside of, containment lines.
- Evaluate the effectiveness of control programs at high-priority control sites with respect to the response of environmental assets.
- Ensure that stakeholders and the general public are involved/participate at high-priority control sites, by raising awareness of this Plan and the threat lantana poses to environmental assets.
- Ensure implementation and administration of this Plan is undertaken.
- Evaluate the ways in which lantana causes the decline of environmental assets and determine the effects of lantana control on these assets.
- Establish guidelines for future control programs and research projects based on the outcomes of this Plan.

A3 Priority Action Statements

The NSW *Threatened Species Conservation Act 1995* requires the PAS to identify clear timetables for recovery and threat abatement planning and achievement, including PAS review. Current information on Priority Action Statements relevant to Ku-ring-gai LGA is provided on within the Office of Environment and Heritage website:

<http://www.environment.nsw.gov.au/threatenedspeciesapp/PasSearchLga.aspx?lgaName=Ku-Ring-Gai+Council>

This web page provides priority action statements relevant to council's management of threatened species known or predicted to occur within Ku-ring-gai bushlands. This may include species that have not been sighted for long periods or who are considered vagrants within the area. It is not intended that the conduct or management of these action be the sole responsibility of Council.

A total of 665 priority actions have been identified to help recover threatened species and tackle threatening processes in the Ku-ring-gai Council local government area. These priority actions are grouped into 25 recovery and 6 threat abatement strategies.