

MCKAY RESERVE AND DARK GULLY PARK

PLAN OF MANAGEMENT

PITTWATER COUNCIL

Adopted 28.11.94

Amended 12.02.01

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Executive Summary

McKay Reserve is an area of remnant bushland in Palm Beach on the steep western facing slopes above Pittwater managed by Pittwater Council. Bush regeneration work has been carried out in the Reserve for a number of years, by local resident volunteers and professional bush regenerators under Council's supervision. Dark Gully Park is a small reserve on the foreshore of Pittwater at the lower end of Dark Gully Creek and directly adjoins McKay Reserve.

State Environmental Planning Policy No 19 - Bushland in Urban Areas applies to McKay Reserve and Dark Gully Park and requires the protection of remnant bushland in urban areas within New South Wales.

A draft Plan of Management has been prepared to guide the Council's management of the two areas and to provide a basis for future bushland regeneration work in the Reserve. The Local Government Act 1993 (Section 36) requires that Council prepare a draft plan of management for community land.

Such a plan must identify :

- the category of the land;
- the objectives and performance targets of the plan with respect to the land;
- the means by which these objectives and performance targets will be achieved;
- the methods which will be used to assess whether performance targets and objectives are being achieved.

Performance assessment will take place in the context of the annual State of the Environment Report required under the Local Government Act 1993. As part of these reporting requirements an annual audit of McKay Reserve and Dark Gully Park should be undertaken.

Category of the Land

McKay Reserve can be categorised as a natural area including areas of bushland, wetland, watercourse and escarpment. Dark Gully Park includes both park and natural area which includes bushland, watercourse and foreshore.

Significance of the Reserves

McKay Reserve and Dark Gully Park contribute to Sydney's urban bushland, which distinguish Sydney as one of a few major cities which have substantial areas of natural bushland within their limits and is an integral component of its great natural beauty.

Urban bushland areas throughout the Sydney region are significant because :

- they contribute to the landscape quality of the city,
- they provide habitat for plants and animals, which would otherwise become locally or regionally extinct,
- they provide a corridor for the movement of migratory and nomadic animals, particularly birds, through the urban area,
- they provide an educational resource and the first contact point with nature for many urban residents,
- they enable urban residents to undertake recreational pursuits in a bushland setting,
- they are important for scientific studies, providing a record of the original landscape and vegetation and the changes wrought by urban development.

McKay Reserve is significant because :

- it protects an example of the bushland of Barrenjoey Peninsula in a condition similar to that which occurred when the area was first visited by Captain Phillip in 1788,
- it includes samples of plant communities which are uncommon in the Pittwater area and which are inadequately conserved in New South Wales; Newport Bangalay Woodland and Spotted Gum Forest,
- it includes samples of a plant community which is poorly conserved on the Barrenjoey Peninsula; Red Bloodwood Scribbly Gum Woodland,
- it protects populations of three plant species which have regional conservation significance; Snow Wood, *Daviesia umbellulata* and Large-fruited Red Mahogany,
- it supports a wide diversity of fauna species in the context of urban bushland in the Sydney region,
- it provides suitable habitat and food trees for four fauna species considered to be of special conservation significance; Glossy Black-Cockatoo, Koala, Squirrel Glider and Long-nosed Bandicoot.

(ii)

- it protects aboriginal sites which demonstrate the link between the land and its original human inhabitants.

Management Objectives

The management objectives for McKay Reserve are :

- to protect the natural features of the Reserve, particularly populations of significant plant species and communities and animal species listed in this Plan; namely, Snow Wood, *Daviesia umbellulata*, Large-fruited Red Mahogany, Spotted Gum Forest, Newport Bangalay Woodland, Glossy Black Cockatoo, Koala, Long-nosed Bandicoot and Squirrel Glider,
- to identify, preserve and protect Aboriginal sites in the Reserve, including the shelter site,
- to maintain a natural range of structural and floristic diversity of bushland within the Reserve,
- to adequately manage the bushland/ urban interface,
- to prevent damage to the Reserve from urban run-off, stormwater and pollution,
- to prevent weed invasion and control weed species occurring in the Reserve,
- to minimise dieback of eucalypts and angophoras in the Reserve,
- to protect human life and property in and adjacent to the Reserve from wildfire and maintain ecological processes in the Reserve by seeking to maintain a near-natural fire regime in the body of the Reserve,
- to control and eradicate, where possible, feral animals within the Reserve,
- to provide opportunities for low impact recreational, scientific and educational use of the Reserve, consistent with other objectives, and
- to encourage community and neighbour participation in bushland management.

(iii)

Actions

Public Attitude

Performance Target:

- To engender a spirit of co-operation in the Reserves, the Council will hold annual open days.
- Public understanding of the value of the Reserve, the threats to the Reserve and the actions that individuals can take to protect the significant values of the Reserve will be improved by publication of this Plan.

Implementation Strategy:

- Annual open days will be held on a particular theme, e.g. impact of roof water, weed identification, impact of domestic animals.
- Publication of leaflet on McKay Reserve, its values and the threats to its biodiversity.
- Publication of a leaflet on problem weeds in bushland areas and making gardens bush friendly.

Performance Assessment:

- Assess neighbour and public attitude by systematic recording of responses to information days, complaints and compliments.
- Residents will be informed on progress in the Reserve management program on an annual basis through the State of the Environment Report.

Weed Control

Performance Target:

- Weeds in the Reserve will be controlled and where feasible eliminated by bush regeneration work by contractors, Council staff and volunteers.
- Overall priority will be given to gullies downslope from sites where sediment and runoff control structures are put in place.
- Contract bush regeneration will extend for three years and cover the entire Reserve. Weed management priorities will be determined by Council staff.
- Volunteer work will be under the supervision of trained Council employees.

Implementation Strategy:

- Continue and expand the program of bush regeneration in McKay Reserve on the basis of a three year primary contract.
- Priorities for bush regeneration are to consolidate and join existing sites, conduct primary and secondary work in areas where sediment control is carried out, protect significant plants and communities, protect catchment values and limit weed invasion along Reserve edges and watercourses.
- Seek additional funds external to Council to carry out bush regeneration in areas where dense weeds occur such as adjacent to the access road to the Water Board Reservoir.
- Identify troublesome weeds as noxious weeds and formal listing of these weeds as Noxious Weeds within the Pittwater Council area.
- Development of weed control strategy for known problem weeds in the Reserve.
- Incorporation of weed control strategies in bush regeneration program.
- Enforcement of Noxious Weeds Act.

Performance Assessment:

- Impact of weed control/bush regeneration will be carried out by establishing fixed photographic points and 2m x 2m quadrats which are monitored by photography every six months and recording all plants present and the density of plants (cover) in a 1m x 1m square quadrat in the centre of the larger square and used to record plant density at the same time each year.
- Analysis is to be undertaken by Council staff, with advice from the Royal Botanic Gardens.
- Review of the work undertaken by contractors is to be undertaken by requiring quarterly and yearly reports which summarise the work completed. The yearly reports are to include a map of the areas worked and the weed densities/intensities occurring in the Reserve at the conclusion of each year.
- The success of plantings carried out by bush regeneration contractors is also to be assessed. This is to be done by location of photographic points in areas where plantings have occurred and irregular inspections of plantings by Council's Environmental Officer.
- To ensure measures aimed at reduced the problems of urban run-off are effective some quadrats should be located in areas currently affected by urban run-off.

Liaison with Public Authorities

Performance Targets:

- That the Water Board and Sydney Electricity minimise the impacts of their activities on the reserves.

Implementation Strategy:

- The Water Board and Sydney Electricity will be informed of the contents of this Plan and requested to take account of the Plan in planning or carrying out operations in or adjacent to the Reserve and in preparing Environmental Impact Assessment reports for proposed operations in the Reserve.

Performance Assessment:

- Regular liaison with the Water Board and Sydney Electricity to ensure the impact of their activities in the Reserve is minimised.

Dieback

Performance Targets:

- Dieback in the Reserve will be monitored.
- The incidence of dieback will be limited by construction of sediment and run-off control structures
- The fire regime will take ecological values into account to promote eucalypt and angophora regeneration.
- Measures aimed at improving public awareness of the values of the Reserve and the factors which threaten its integrity will assist in limiting the spread of dieback.

Implementation Strategy:

- Monitoring of vegetation quadrats placed in areas below constructed sediment control structures and in burnt areas on an annual basis.

Performance Assessment:

- Monitoring of the problem of eucalypt dieback will be undertaken on a Council-wide basis and reported in the State of Environment Report.

Fire

Performance Target:

- Fuel in the fuel reduced zone will be reduced by use of fire or manual means as and when appropriate. Any necessary hazard reduction burns will be carried out as hot burns in autumn where practical.

Implementation Strategy:

- Reduce fuel loads in the Fuel Reduction Zone in the Reserve and along property boundaries in a manner which protects biodiversity.
- Encourage local residents to reduce fire hazard on their own properties and provide information on how this can be done.

Measurement of Performance:

- The assessment of the success of fire protection policies and strategies can only be undertaken by monitoring fire occurrences and their impact. Records of fires occurring in the Reserve and the damage they cause should be maintained. Review of policies and strategies should take place in light of this experience.
- Ecological requirements of fire management in the Reserve can be assessed through use of the quadrats, regular observations by bush regeneration contractors, Council staff and residents and photographs.

Fauna

Performance Target:

- Records of fauna species present in the Reserve will be maintained by Council staff. Control of feral animals will be undertaken as necessary.
- The impact of domestic animals on urban wildlife will be reduced by improving public awareness of the problem and by enforcing legislation controlling domestic animals.

Implementation Strategy:

- Prepare a profile on each fauna species of special significance.
- Control feral animals within the Reserve on an 'as needs' basis.

Performance Assessment:

- Regular (every five years) survey of residents regarding the urban wildlife in their areas, particularly the endangered species within the Council area.

Cultural Heritage

Performance Target:

- A register of sites of Aboriginal and European cultural significance within McKay Reserve and Dark Gully Park will be maintained. Sites will be examined as part of an annual audit of the Reserve. Any damage to sites will be repaired in a

manner appropriate to the significance of the site and in consultation with relevant authorities.

Performance Assessment:

- Regular inspection of heritage items to ensure that protection of heritage items is consistent with the provisions of the Burra Charter, the National Parks and Wildlife Act and the Heritage Act.

Access

Performance Target:

- The section of McKay Road which dissects the Reserve is proposed to be closed to vehicular access and changed to a walking track. Legal access to private property will be maintained. Recommended for deferral.
- Illegal vehicle access routes through the Reserve will be closed. Recommended for deferral.
- An assessment of the access needs through the Reserve and Dark Gully Park will be conducted by Council staff. The state of existing informal access tracks will be monitored annually by Council staff.

Implementation Strategy:

- Close McKay Road to vehicular access and establish a walking track along the route, sufficiently wide to allow access by emergency vehicles.
- Close the illegal access along the unmade portion of Ralston Road.
- Monitor use of the Reserve and its impact.
- Investigate development of walking tracks in the Reserve.
- Access to Dark Gully Park will be upgraded by erection of signposting and restoration of damaged steps on the existing track.

Reserve Boundaries

- Incorporate requirements for fencing between private property and the Reserve in development control plans for the locality.

Performance Assessment:

- Performance assessment regarding access should include monitoring of the public's views regarding the acceptability of the improved access and monitoring of vegetation along tracks to ensure that weed problems are not being caused by the presence of access tracks.

Stormwater & Drainage Control

Performance Targets:

- Sediment and run-off control structures be constructed at each point where drains from roads discharge into the Reserve. Removal of accumulated sediment from structures be carried out on a regular basis by Council works staff.
- Points of stormwater discharge into the Reserve be identified. These direct discharges to the Reserve should be connected to Council's stormwater system where feasible. Where not feasible, management options such as dispersal or sediment and velocity control measures be undertaken to limit the impact of these discharges. Weeds growing around discharge points be controlled and removed from the Reserve. Residents adjacent to the Reserve and Dark Gully Park be advised of the detrimental impacts of disposal of stormwater and be encouraged to take measures to prevent or minimise these impacts.
- Action be taken against any illegal discharge of effluent, greywater or poolwater into the Reserve.
- Controls on new development adjacent to the Reserve be established and implemented to limit the impact of past and future development on the Reserve.

Implementation Strategy:

- Construct sediment control basins, stilling basins and/or energy dissipators at all outlet points from Council road drains in McKay Reserve. Upgrade and maintain the existing sediment basin.
- Regular maintenance of sediment control basins, with special efforts after significant rainfall events.
- Incorporate requirements for improved stormwater disposal in development control.
- Prepare site specific stormwater control solutions and encourage implementation by local residents.

Performance Assessment:

- Completion of sediment control works proposed in this plan will achieve the desired performance target under this category. Monitoring of vegetation will be used to assess whether the sediment control works are achieving the objective of minimising pollution of the Reserve from urban run-off.

RECOMMENDED ACTIONS

Action	Timetable	Cost Estimate
		\$
Implementation Target		
Bush Regeneration Contract (BRC)	1994-97	25 000 p.a.
Fuel Reduction in Reserve	ongoing	staff time
Fuel Reduction on Private Land	ongoing	compliance
Sediment Control Basins	1995-96	10 000 per basin
McKay Reserve Open Day	ongoing	staff time + 500
McKay Reserve Leaflet and Display	1994-95	2000
Weeds & Gardens Leaflet	1995-96	1000
Roofwater Control	ongoing	*1
Site Specific Stormwater Control Solutions	ongoing	staff time
Sediment Control Maintenance	ongoing	works staff time
Noxious Weeds Classification	1994-95	staff time
Weed Control Strategy	ongoing	BRC/staff
Noxious Weeds Enforcement	ongoing	compliance
Feral Animal Control	ongoing	1000
Fauna Profiles	1994-95	staff time
McKay Road Closure (rec. for deferral)	1995-96	20 000
Ralston Road Closure (rec. for deferral)	1994-95	1 000
Monitoring Use & Impact	ongoing	staff time
Walking Track Investigation	1995-96	staff time
Boundary Fencing	ongoing	*1
Liaison with Public Authorities	ongoing	staff time
Performance Assessment		
Weed Density Monitoring	ongoing	BRC
Fire Monitoring	ongoing	BRC/staff
Dieback Monitoring	ongoing	staff time

Notes

*1 These targets involve compliance with conditions for development and building approvals. Cost is ensuring compliance with the conditions.

BRC Bush Regeneration Contract

Landuse Planning Table

(Amendment adopted 12.02.01)

Permissible Uses Exempt (these may be subject to approval under Part 5 of the EPA Act 1979)	Permissible Uses Requiring Development Consent	Prohibited Uses
Bush regeneration, habitat restoration and weed control	Utility installations and similar	Extractive industries and agriculture
Fire hazard reduction activities	Buildings ancillary or incidental to the reserve	Sporting facilities
Ecological burns	Major public drainage works	Permanent private access across a reserve
Multi-use tracks other than motor vehicle	Major rock / soil stabilization works and earthworks	Commercial signage
Boardwalks and minor bridges	Major facilities (not buildings) being viewing platforms, bridges, educational facilities and the like	Dumping of refuse (including building materials, soil, fill, household wastes, etc.)
Temporary activities or developments requiring a lease or licence under the Local Government Act (1993)	Commercial Eco-tourism Activities	Vegetation removal not in accordance with Councils Tree Preservation and Management Order
Appropriate sustainable low impact recreation activities and facilities (other than buildings)	Vehicle access (emergency access, fire breaks and service trails).	Private alienation or encroachment
Minor public drainage and stormwater works		Introduction of exotic flora and fauna
Minor fences		Playground facilities
Compliance, directional, interpretive, identification and safety signs		Flood structures (damming and reduction of environmental flows)
Environmental education activities		Removal of habitat features such as soil, leaf litter, rocks, stones, pebbles and the like
Any use as permitted under Council's Tree Preservation and Management Order		Recreational motor sports (including 4 wheel driving, motorbike riding, etc.)
Minor rock works and earthworks associated with soil stabilization and erosion control		Domestic drainage outlets
Any activity as defined in Management Plans consistent with the core objectives and management objectives		Horse riding facilities
Feral animal control and eradication.		Unleashed dog exercise areas
Biodiversity recovery and enhancement		Water extraction

MCKAY RESERVE AND DARK GULLY PARK

PLAN OF MANAGEMENT

1.0 INTRODUCTION

McKay Reserve is an area of remnant bushland in Palm Beach on the steep western facing slopes above Pittwater. The Reserve was largely created during the period from 1957 to 1960 when Warringah Shire Council was entrusted with care and control of this Crown land. The Reserve is now managed by Pittwater Council.

Bush regeneration work has been carried out in the Reserve for a number of years, firstly by local residents and then by a combination of volunteers and professional bush regeneration teams under contract to the Council.

Dark Gully Park is a small reserve on the foreshore of Pittwater at the lower end of Dark Gully Creek. The Park includes areas of bushland and grassland.

This Draft Plan of Management has been prepared to guide the Council's management of the two areas and to provide a basis for future bushland regeneration work in the Reserve.

2.0 PLANNING AND LEGAL CONTEXT

2.1 LOCAL GOVERNMENT ACT

The Local Government Act 1993 (Section 36) requires that Council prepare a draft plan of management for community land. Such a plan must identify :

- the category of the land;
- the objectives and performance targets of the plan with respect to the land;
- the means by which these objectives and performance targets will be achieved;
- the methods which will be used to assess whether performance targets and objectives are being achieved.

In terms of Section 36 (4) of the Local Government Act, McKay Reserve falls within the natural area category and can be further categorised as including areas of bushland, wetland, watercourse and escarpment. Dark Gully Park includes both natural area and park. The natural area includes bushland, watercourse and foreshore.

2.2 STATE ENVIRONMENTAL PLANNING POLICY NO 19 - BUSHLAND IN URBAN AREAS

State Environmental Planning Policy No 19 - Bushland in Urban Areas was made to protect remnant bushland in urban areas within New South Wales. The Policy applies to land zoned or reserved as Public Open Space. Under the Policy Councils may prepare plans of management for bushland areas within such land. Circular No B13 of the Department of Planning states that a management plan should :

- describe the bushland in light of the aims and objectives of the Policy;
- include measures to enable the recreational use of bushland, where appropriate;
- specify the intended methods of bushfire hazard reduction, measures to prevent bushland degradation and restore degraded areas.

The Department has also published management guidelines for urban bushland. The guidelines identify the need to prepare a resource inventory of the bushland area, to identify management objectives and strategies, and to derive an action plan for the bushland.

2.3 LOCAL ENVIRONMENTAL PLAN

The current Local Environmental Plan for McKay Reserve zones the Reserve as 6(a) Public Open Space and proposed road closure. Dark Gully Park also has a majority of 6(a) zoning with a small section of County Open Space.

3.0 RESERVE DESCRIPTION

3.1 Location, Description & History

McKay Reserve is located on the west-facing slopes above Pittwater. It extends from the Pacific Road - Ralston Road junction in the north to Bynya Road above Dark Gully Park in the south. McKay Road passes through the Reserve between Ralston Road and Ebor Road. Dark Gully Park is a small foreshore reserve located on the eastern shore of Pittwater at the mouth of Dark Gully Creek.

The Pittwater area has changed considerably over the last 20,000 years. At the height of the last Ice Age, 17,000 years ago the sea level was over 120 metres lower and the coastline was over 20 kilometres further east than its present position. The sea level gradually rose to its present position with the recession of the Ice Age.

Aboriginal people lived in the area for several thousand years prior to European occupation. The local aboriginals belonged to the Guringai group who inhabited the land between Port Jackson and Broken Bay.

The diverse range of food resources in the Pittwater - Barrenjoey area attracted aboriginal people to the area. Fish, crustacea and shellfish were available from estuarine and coastal areas. The animals on land such as possums, koalas, birds and eggs were another important source of protein. The forests and woodlands provided a plentiful supply of plant foods throughout the year.

In March 1788, Governor Phillip explored and named Pittwater as part of a trip to Broken Bay. The party moored in Pittwater and encountered several groups of aboriginals (Steege 1984).

The first land grant in the Barrenjoey area was made in 1816 when 400 acres of land was granted to James Napper, a surgeon. The land was known as 'Larkfield'. The land remained virtually intact until 1900, being inhabited by aboriginals, fishermen, timber cutters and vegetable gardeners. The earliest recorded use of the name Palm Beach for the locality was in the early 1800's. The name derives from the Cabbage Tree Palms which occur in the area, behind the beach and in Dark Gully.

Part of the Napper grant was acquired by the State Government in 1881. In 1900 a group of Sydney businessmen purchased the remainder in the name of the Barrenjoey Land Company Limited. Following the sale the Company subdivided the land in 18 large blocks, but a lack of buyers meant that the subdivision fell through (Steege 1984).

Staged subdivision of the Palm Beach area into housing allotments commenced in 1912 and was far more successful than the earlier subdivision plan. The land which includes much of the present McKay Reserve was included in the fourth stage of subdivision in 1915. Some of the lots created now form part of the Reserve.

The Reserve was created under the County of Cumberland Planning Scheme, being formally entrusted to Warringah Shire Council on 10th July 1958.

McKay Reserve is named after an early real estate agent who was also once the Sydney Harbour Trust Commissioner (Steege 1984).

Local involvement in Reserve management was formalised in 1984 through the formation of a 530A Committee by Warringah Shire Council.

In recent years local concern at the management of McKay Reserve saw an active management involvement by volunteers and subsequent contracting of bush regeneration teams by Warringah and Pittwater Councils. Pittwater Council took over care, control and management of the Reserve in 1992.

3.2 Land Tenure

McKay Reserve includes a number of separate parcels of land acquired over a number of years. The County of Cumberland entrusted major components of the Reserve to Warringah Shire Council during the years 1957 to 1960. Additional areas, mainly previous road reserves, have been added to the Reserve over the years. Part of the unmade section of Ralston Road (Lot 1 DP 821374) is owned by Pittwater Council. The northern part of this road (Lot 1 DP 790731) is a public road and is noted on the Local Environmental Plan as Proposed Road Closure. The Road Closure would enable the land to be formally incorporated as part of the Reserve but the Application for Road Closure is yet to be made by the Council.

A Water Board reservoir occurs in the Reserve off McKay Road. The land on which the Reservoir occurs is alienated from the Reserve. An access road from McKay Road leads to the Reservoir. Sydney Electricity also have structures in the Reserve. Several easements for drainage occur within the Reserve.

3.3 Topography, Geology and Soils

McKay Reserve extends from the ridgeline of the Barrenjoey Peninsula at Palm Beach down the western facing slopes to Barrenjoey Road. The aspect of the Reserve is generally to the west and south-west. Elevation ranges from 5 metres to about 100 metres. Watercourses in the Reserve include Dark Gully Creek, the main watercourse towards the southern end of the Reserve and a number of smaller non-perennial watercourses (see map).

The higher parts of the Reserve are underlain by Hawkesbury sandstone. Lower down the geological strata consists of sediments of the Newport Formation, part of the Narrabeen Group.

Areas of flat to moderately inclined slopes on Hawkesbury Sandstone have been identified as having soils of the Gynea soil landscape unit. On steeper slopes on Hawkesbury Sandstone, soils of the Hawkesbury soil landscape unit occur (Chapman

& Murphy 1988). The Watagan soil landscape unit occurs in areas underlain by Newport Formation sediments.

3.4 Vegetation

The flora and fauna survey of McKay Reserve carried out by P. and J. Smith in 1992 found that four plant communities occur in the Reserve. For ease of reference these have been assigned names which reflect their composition and/or ecology. The four plant communities are described below.

Red Bloodwood - Scribbly Gum Woodland

Red Bloodwood - Scribbly Gum Woodland occurs on Hawkesbury Sandstone towards the top of the Palm Beach plateau. The terrain is flatter and less rocky than the bulk of the Reserve. The area supporting this plant community in the Reserve is restricted to 1.5 hectares.

The dominant tree species are Red Bloodwood (*Eucalyptus gummifera*) and Scribbly Gum (*E. haemastoma*). Associated tree species include Sydney Red Gum (*Angophora costata*) and Grey Gum (*E. punctata*). Tree height averages about 12 metres.

Smaller trees to about 9 metres in height include Black She-oak (*Allocasuarina littoralis*) and Old Man Banksia (*Banksia serrata*). There is also a shrub layer of medium density to 2 metres in height. Common shrub species include Needle-bush (*Hakea sericea*), Rock Banksia (*Banksia oblongifolia*), Hair-pin Banksia (*Banksia spinulosa*) and Pink Spider Flower (*Grevillea sericea*).

A dense ground layer to 50 cm tall is dominated by sedges, grasses and low shrubs. Common ground layer plants include Wiry Panic (*Entolasia stricta*), sedges (*Ptilanthelium deustum* and *Cyathochaeta diandra*), Twisted Mat-rush (*Lomandra obliqua*) and Pale Mat-rush (*Lomandra glauca*).

The extent of this community along the Barrenjoey Peninsula has been greatly reduced by urban development. Apart from McKay Reserve, the only other remnant is in Bilgola Plateau Reserve. Each occupies only a small area. Elsewhere this community is present in Kuring-gai National Park, Muogamarra Nature Reserve and Brisbane Water National Park. The community is considered to be adequately reserved in New South Wales (Benson 1989), but has local significance as a remnant of the local vegetation.

Hawkesbury Sandstone Open-Forest

This community occurs on moderate to steep slopes associated with soils of the Hawkesbury soil landscape unit (Chapman and Murphy 1989), with an occurrence on flatter land south-west of Cynthea Road. The structure is variable with open-forest to woodland formation being present. The most common tree species are Red Bloodwood, Sydney Red Gum and Sydney Peppermint (*E. piperita*). Associated trees

include Bastard Mahogany (*E. umbra*) and Grey Gum. Tree height varies from 10 metres on exposed slopes to over 25 metres in sheltered gullies. In some, limited areas near the ridgetop Sydney Peppermint dominates the canopy with few other tree species present.

There is a well developed understorey of low trees about 8 metres in height. Black She-oak is most common and in some places forms a dense low closed forest with few eucalypts present. Old Man Banksia is also found in this understorey stratum. In more sheltered areas such as the upper part of Dark Gully Creek, the low tree layer consists of small trees of 10 to 12 metres with Forest Oak (*Allocasuarina torulosa*), Cheese Tree (*Glochidion ferdinandii*), Cabbage-tree Palm (*Livistona australis*) and Lillypilly (*Acmena smithii*). Along the creek the three latter species form a narrow strip of rainforest trees.

The shrub and ground layers are quite variable in composition and density. Common shrubs include Blueberry Ash (*Elaeocarpus reticulatus*), Mock Olive (*Notolaea longifolia*), Broad-leaf Star-hair (*Astrotricha latifolia*) and Pink Spider Flower. Herbs include Paroo Lily (*Dianella caerulea*), Wiry Panic, Tall Saw-sedge (*Gahnia clarkei*), a grass tree (*Xanthorrhoea media*), Spiny Mat-rush (*Lomandra longifolia*) and Black Bog Rush (*Schoenus melanostachys*). In wet areas common ferns are False Bracken (*Calochlaena dubia*). Climbers include Sweet Sarsaparilla (*Smilax glyciphylla*), Wonga Vine (*Pandorea pandorana*) and Wombat Berry (*Eustrephus latifolius*).

Within this broad community is a small area of sedge dominated swampy ground. The dominant species is Black Bog-Rush (*Schoenus melanostachys*). The area has many dead trees indicating that the swamp vegetation has developed as a result of recent hydrological changes.

Hawkesbury Sandstone Open-forest due to its presence on steeper land has not been affected to as great a degree as other plant communities by urban development. It is present in Council bushland reserves at Angophora Reserve, McKay Reserve and Stapleton Park. Elsewhere it is adequately conserved in Kuring-gai National Park, Muogamarra Nature Reserve and Brisbane Water National Park and on a statewide basis (Benson 1989).

Spotted Gum Forest

Spotted Gum Forest occurs on lower slopes of McKay Reserve along Barrenjoey Road and in Dark Gully Park. Towards the north of the Reserve it extends onto higher slopes, in an area of sheltered aspect. The plant community is associated with Newport formation geology on soils of the Watagan soil landscape unit (Chapman and Murphy 1989). The dominant tree species is Spotted Gum (*E. maculata*), with associated species including Grey Ironbark (*E. paniculata*) and Bangalay (*E. botryoides*). Tree height is generally over 20 metres tall with individuals reaching 30 metres. The canopy density has been reduced due to dieback over the years. This problem appears to be continuing.

There is a layer of tall shrubs and small trees of medium to high density. The most common species include Forest Oak, Cheese Tree, Blueberry Ash and Sweet

Pittosporum. Other associated species include Mock Olive, Hop Bush (*Dodonaea triquetra*) and the introduced plant, Lantana (*Lantana camara*).

The ground layer is dense and in wet areas dominated by ferns. Elsewhere grasses and sedges are common. Frequent ground layer species include Bracken Fern (*Pteridium esculentum*), False Bracken, Common Maidenhair Fern (*Adiantum aethiopicum*), Wiry Panic, Variable Sword-sedge (*Lepidosperma laterale*), Spiny Mat-rush, Kangaroo Grass and the introduced plant Asparagus (*Protasparagus aethiopicus*). Common climbers include Wonga Vine, Sweet Sarsaparilla and *Morinda jasminoides*.

Spotted Gum Forest was formerly widespread on the lower slopes of the western side of the Barrenjoey Peninsula. The extent of this community has been greatly affected by urban development, but examples remain in McKay Reserve, Angophora Reserve and Stapleton Park. Spotted Gum Forest of the type present in McKay Reserve is only found on Newport Formation geology. Barrenjoey Peninsula was formerly a significant part of its distribution. Other examples occur on Scotland Island, the western shores of Pittwater and at Burley Griffin Lodge, Avalon, a property owned by the National Trust. All remaining examples have conservation significance at a state level.

Newport Bangalay Woodland

Newport Bangalay Woodland is found in areas along creeklines on sites with Newport Formation Geology. The prime area is the lower end of Dark Gully Creek and the drainage line opposite Nabilla Road. The dominant tree species are Bangalay (*E. botryoides*), Spotted Gum and Rough-barked Apple (*Angophora costata*).

Underneath the canopy, a dense layer of rainforest trees is present. Common species include Cabbage-Tree Palm, Sweet Pittosporum, Lillypilly and Port Jackson Fig (*Ficus rubiginosa*). Weed species are common and prevent regeneration of native species. Common weeds include Wandering Jew (*Tradescantia albiflora*), Fishbone Fern (*Nephrolepis cordifolia*) and Morning Glory (*Ipomoea indica*). Native ground layer plants include False Bracken, Prickly Rasp Fern (*Doodia aspera*) and the climber, Water Vine (*Cissus antarctica*).

Newport Bangalay Woodland has a restricted distribution on Barrenjoey Peninsula. Examples exist at McKay Reserve, Dark Gully Park and Crown of Newport Reserve. More generally it is restricted to Newport Formation geology. Other populations exist at Cicada Glen Creek and McCarrs Creek within Kuring-gai National Park.

Significant Plant Species

Smith and Smith identified two plant species as being of particular conservation significance within McKay Reserve and Dark Gully Park. The two species are Daviesia umbellulata and Snow Wood (*Parachidendron pruinsum* var. *pruinsum*). The presence of Large-fruited Red Mahogany (*Eucalyptus scias*) in McKay Reserve also has significance as it is a species of restricted distribution in the Sydney area.

Daviesia umbellulata is described by Smith and Smith (1992) as 'a shrub species found in both New South Wales and Queensland. In New South Wales it occurs in coastal districts north from Thirlmere, and also on the Northern Tablelands near Torrington (Harden 1991). It is rare in the Sydney region and has not been recorded in any of the national parks and nature reserves around Broken Bay (Benson and Fallding 1981, Thomas and Benson 1985 a,b, McRae 1990). A good stand of the species was found during the present survey on an exposed slope in the *Eucalyptus maculata* community beside Barrenjoey Road, in and adjacent to the Reserve.

Snow Wood is a tree to 15 metres in height which is typically found in rainforest communities. In New South Wales it occurs north from Nowra, but is uncommon in the Sydney region. Schofield (1992) found Snow Wood near the head of Dark Gully Creek. A population has also been recorded in Dark Gully Park.

Large-fruited Red Mahogany is usually a small tree or mallee found on poorer soils. In McKay Reserve, it occurs in Hawkesbury Sandstone Open-forest and Red Bloodwood - Scribbly Gum Woodland, in exposed areas near ridgetops.

3.5 Fauna

Smith and Smith (1992) found that four mammal species, 37 bird species, one frog species and three reptile species have been recorded for McKay Reserve. They stated that further species were likely to be found with additional surveys. These could include a further four mammal species, 21 bird species, one frog species and eight reptile species.

Smith and Smith (1992) state that the low numbers of fauna species present can be accounted for by the extent of urban development adjacent to the Reserve. They stated that Koalas, which were previously found in the Reserve, were no longer present due to the presence of dogs, reduced areas of suitable habitat and road kills. They concluded that despite the small and isolated nature of the Reserve, it still supported quite a variety of fauna, similar in diversity and composition to that recorded in Angophora Reserve. A more recent survey of residents by Pittwater Council has found resulted in additional records for fauna in and near to the Reserve. These include a record of a Koala near Bynya Road.

Three fauna species recorded in the Reserve are recognised as being of special significance. These are discussed below.

Glossy Black-Cockatoo (*Calyptorhynchus lathami*)

The Glossy Black-Cockatoo is listed as vulnerable and rare in Schedule 12 of the National Parks and Wildlife Act (1967). It is also recognised as rare on a national basis (Garnett 1992).

Glossy Black-Cockatoos feed on the seeds of She-Oaks, of which both Black She-Oak (*Allocasuarina littoralis*) and Forest Oak (*Allocasuarina torulosa*) are abundant in

McKay Reserve. The birds nest in large hollows of Eucalypt trees and these are an important habitat requirement of the species.

Two Glossy Black-Cockatoos were observed feeding on Forest Oak seeds in the Reserve in early summer, 1991 (J. Powell as reported in Smith and Smith 1992). As this is the only record for the site it was suggested that Glossy Black-Cockatoos are rare visitors to the Reserve. It is known that they travel widely in search of food.

Koala (*Phascolarctos cinereus*)

The Koala is listed as a vulnerable and rare species in New South Wales, but is more common in Queensland and Victoria. At a national level it is classed as probably secure. The Koala colony on Barrenjoey Peninsula, once the largest colony near Sydney, has declined dramatically since the 1970's. The population was estimated at 123 in 1970 and declined to about eight in 1989 (Smith and Smith 1992). Their numbers may have dwindled even further since that time. The species is in grave danger of local extinction.

The most recent record for the Palm Beach area is from 1993. There have been previous records for McKay Reserve. There is a possibility of occasional individuals wandering north from the Avalon area and perhaps even recolonising McKay Reserve, should there be a general population recovery. However, the continual attrition of prime Koala habitat that has occurred on Barrenjoey Peninsula over the years has made the likelihood of any substantial population recovery increasingly remote.

Koalas feed almost exclusively on eucalypt leaves. The principal feed tree on the Peninsula is the Grey Gum, with trees of secondary importance including the Scribbly Gum and Swamp Mahogany. The numbers of these trees in McKay Reserve is very low. The best habitat is provided by the Red Bloodwood - Scribbly Gum woodland with densities of 60 Scribbly Gum and 10 Grey Gum trees per hectare. The total area of this community in the Reserve is only 1.5 hectares. The other communities are poor habitat for Koalas, the best, Hawkesbury Sandstone Open-forest has only six Grey Gum trees per hectare.

Squirrel Glider (*Petaurus norfolcensis*)

The Squirrel Glider is a medium-sized, arboreal gliding possum that shelters and breeds in eucalypt hollows, and feeds on insects, nectar, pollen and plant exudates. It is distributed through Queensland, New South Wales and Victoria, mainly west of the Great Dividing Range. Although classed as vulnerable and rare in New South Wales and vulnerable in Victoria, it is classed as probably secure at a national level.

The Squirrel Glider is an uncommon species in the Sydney Region. There have been only two localities near Sydney from which specimens have been received by the Australian Museum over the last twenty years : Barrenjoey Peninsula and Grose Vale-Kurmond. The species has not been recorded in McKay Reserve, but its occurrence there is a distinct possibility. The most recent records are a specimen collected at Careel Bay in October 1989, a female with two pouch young, and two specimens held by the Australian Museum from Ruskin Rowe at Avalon. There are also three

previous museum specimens from Avalon: one collected in 1972 and two in the 1940's.

An essential requirement for any Squirrel Gliders occurring in McKay Reserve would be eucalypt hollows for day-time shelter and for breeding. A study in Victoria indicated that most food is obtained from eucalypts and acacias. Winter flowering Banksias may also be an important food source. At McKay Reserve there may be different food sources which are important for any local Squirrel Glider populations.

Long-nosed Bandicoot (*Perameles nasuta*)

The Long-nosed Bandicoot is a medium-sized ground dwelling marsupial. It forages at night for invertebrates and plant matter, both of which it usually obtains by digging characteristic conical pits in the soil. It shelters during the day in a nest on the ground. The Long-nosed Bandicoot is distributed along the east coast of Australia from north Queensland to Tasmania. It is considered a secure species at both national and state levels. It is a declining species in the Sydney region. Described as extremely abundant in the 1950's and 1960's, it has disappeared from a number of suburbs in the last 20 years. It remains reasonably common in some localities, including Barrenjoey Peninsula, but it is a species which needs to be watched. Possible reasons for its decline include clearing of its bushland habitat, heavy predation by cats, dogs and foxes, and diseases such as toxoplasmosis.

3.6 Aboriginal Sites

A number of aboriginal sites have been located within McKay Reserve and Dark Gully Park. These include a rock shelter with hand stencil and shell middens, including one with a stone axe. A systematic survey of the two areas has not been undertaken. Additional survey work is necessary to document the full range of aboriginal sites in the Reserve.

Precise location details are not divulged as a matter of policy. Council will provide management and protection of these sites in consultation with the Metropolitan Aboriginal Land Council and aboriginal sites officers from the National Parks and Wildlife Service.

Regular monitoring of sites should be undertaken to ensure sites are not being damaged by vandals or indirect influences.

3.7 European Heritage

No items of European heritage have been listed for either McKay Reserve or Dark Gully Park by the National Trust or the Barrenjoey Peninsula Heritage Study. A survey of the Reserve could be undertaken as part of a review of the Heritage Study for the Barrenjoey Peninsula and Pittwater.

3.8 Statement of Significance

Few major cities the size of Sydney have substantial areas of natural bushland within their boundaries. Sydney's urban bushland makes an important contribution to the city's character as a place of great natural beauty.

Urban bushland areas throughout the Sydney region are significant because :

- they contribute to the landscape quality of the city,
- they provide habitat for plants and animals, which would otherwise become locally or regionally extinct,
- they provide a corridor for the movement of migratory and nomadic animals, particularly birds, through the urban area,
- they provide an educational resource and the first contact point with nature for many urban residents,
- they enable urban residents to undertake recreational pursuits in a bushland setting,
- they are important for scientific studies, providing a record of the original landscape and vegetation and the changes wrought by urban development.

McKay Reserve is significant because :

- it protects an example of the bushland of Barrenjoey Peninsula in a condition similar to that which occurred when the area was first visited by Captain Phillip in 1788,
- it includes samples of plant communities which are uncommon in the Pittwater area and which are inadequately conserved in New South Wales; Newport Bangalay Woodland and Spotted Gum Forest,
- it includes samples of a plant community which is poorly conserved on the Barrenjoey Peninsula; Red Bloodwood Scribbly Gum Woodland,
- it protects populations of three plant species which have regional conservation significance; Snow Wood, *Daviesia umbellulata* and Large-fruited Red Mahogany,
- it supports a wide diversity of fauna species in the context of urban bushland in the Sydney region,
- it provides suitable habitat and food trees for four fauna species considered to be of special conservation significance; Glossy Black-Cockatoo, Koala, Squirrel Glider and Long-nosed Bandicoot,

- it protects aboriginal sites which demonstrate the link between the land and its original human inhabitants.

4.0 MANAGEMENT OBJECTIVES

The management objectives for McKay Reserve are :

- to protect the natural features of the Reserve, particularly populations of significant plant species and communities and animal species listed in this Plan; namely, Snow Wood, *Daviesia umbellulata*, Large-fruited Red Mahogany, Spotted Gum Forest, Newport Bangalay Woodland, Glossy Black Cockatoo, Koala, Long-nosed Bandicoot and Squirrel Glider,
- to identify, preserve and protect Aboriginal sites in the Reserve, including the shelter site,
- to maintain a natural range of structural and floristic diversity of bushland within the Reserve,
- to adequately manage the bushland/ urban interface,
- to prevent damage to the Reserve from urban run-off, stormwater and pollution,
- to prevent weed invasion and control weed species occurring in the Reserve,
- to minimise dieback of eucalypts and angophoras in the Reserve,
- to protect human life and property in and adjacent to the Reserve from wildfire and maintain ecological processes in the Reserve by seeking to maintain a near-natural fire regime in the body of the Reserve,
- to control and eradicate, where possible, feral animals within the Reserve,
- to provide opportunities for low impact recreational, scientific and educational use of the Reserve, consistent with other objectives, and
- to encourage community and neighbour participation in bushland management.

5.0 MANAGEMENT ISSUES

5.1 Weed Invasion

Weed invasion in McKay Reserve is concentrated along the boundaries with neighbouring properties, creeklines and drainage outflows. Weed infested sites also occur in the vicinity of Lookout Reserve where past clearing, apparently to maintain views, has provided an opportunity for weed species to colonise the cleared area.

The most widespread and prolific weeds in McKay Reserve include Lantana (*Lantana camara*), Morning Glory (*Ipomoea indica*), Wandering Jew (*Tradescantia albiflora*), Fish-bone Fern (*Nephrolepis cordifolia*), Balsam (*Impatiens sultanii*), Bitou Bush (*Chrysanthemoides monilifera*), Asparagus (*Protasparagus aethiopicus*), Small-leaved Privet (*Ligustrum sinense*), Large-leaved Privet (*Ligustrum lucidum*), Japanese Honeysuckle (*Lonicera japonica*) and Cassia (*Senna pendula*).

Over 130 introduced plant species have been recorded in the Reserve. This is a high number which may reflect the intensity of searching for weeds around the edges of the Reserve rather than any inherent problem with the Reserve.

The areas of greatest weed density are the boundaries of the Reserve behind houses in Bynya Road and Cynthea Road, along Dark Gully creek and the gully leading downhill from the corner of Cynthea Road and Ebor Road, the northern part of the Reserve, behind houses in Pacific Road and a minor drainage line off McKay Road. Management problems which must be addressed to limit the invasion of the Reserve by introduced plants include the control of urban run-off and pollution, the impact of the Reserves neighbours, the impact of Water Board structures and easements and public access. The efficiency and co-ordination of the volunteer and contract bush regenerators working in the Reserve is another issue which can affect the extent of weed invasion.

Management Strategies

Weed invasion in McKay Reserve will be reduced by the following strategy:

- Classification of known problem weeds as Noxious Weeds within the Pittwater Council area.
- Developing species and location specific control strategies for known problem weeds as part of the bushland regeneration program for the Reserve.
- Use of a combination of structures and development controls to reduce and control urban run-off and pollution.
- Educating neighbours about the problems caused by weeds escaping into the Reserve, encouraging them to plant bush gardens using locally indigenous plants and to replace lawns adjacent to the Reserve with mulched bush gardens.

- Ensuring that activities of the Water Board and Sydney Electricity in the Reserve are undertaken in a manner sympathetic to the management objectives of the Reserve.
- Regular monitoring of areas used by the public so that any weed problems arising from use of the Reserve are addressed at an early stage.

5.2 Bush Regeneration

Volunteers started working in the Reserve to clear weeds in the mid 1980's. Warringah Shire Council encouraged the efforts of the volunteers and then contracted professional bush regeneration teams from 1989. Initially the work was contracted to the Indigenous Regeneration Company (until 1991) and, more recently, to the Sydney Bush Regeneration Company. Indigenous Regeneration Company were also contracted to restore land affected by the construction of sewer lines through a part of the Reserve by the Water Board.

The weed clearance carried out by the volunteers concentrated on the dense stands of Lantana in the Cynthea, Bynya and Ebor Road areas. The approach of the bushland regeneration teams, under the direction of Warringah and, more recently, Pittwater Council has been to concentrate on consolidating areas previously subjected to primary treatment by volunteers and to prevent excessive weed growth in areas affected by sewer line construction. Staging of primary treatment has aimed to work from the top of creeklines down. Bush regeneration work has been restricted to the upper slopes and ridge tops as weed invasion in these areas has the greatest potential to damage the Reserve.

The rapid primary clearing in early years in areas subject to nutrient incursions has resulted in proliferation of annual weed species in areas at the back of residences. Consequently considerable time and effort has been expended in addressing secondary weed problems. A more co-ordinated approach has been seen as necessary to ensure efficient use of contractors and volunteers time in future weed control efforts. The problems have been exacerbated by continual dumping of garden rubbish and lawn clippings, and lopping and apparent poisoning of trees and shrubs in the Reserve.

In some areas which were previously cultivated as vegetable gardens and grossly degraded, weed clearance has been followed by mulching and planting with plant species indigenous to the site. Mulching and planting has extended into areas where stormwater drainage restricted regeneration of native canopy trees. In such areas some plantings and transplantings had occurred previously and natural regeneration has not been successful after a five year period. Bush regeneration contractors are required that planting and mulching does not interfere with natural ecological processes in the Reserve.

The current level of funding for bush regeneration works (about \$ 15 000 per annum) is barely sufficient to ensure maintenance of the areas already subjected to primary clearing of shrubby weed growth. A significant increase in recurrent funding is necessary to ensure weed control priorities are addressed. This additional funding

should not be at the expense of urban bushland management in the rest of the Council area.

Management Strategies

- Future bush regeneration contractors will be employed on a three-year contract to enable a more systematic and holistic approach to bush regeneration in the Reserve.
- Planting in the Reserve will only take place in areas approved by the Council's Officers. Plantings will only include local plant species propagated from material sourced from the Reserve.
- Co-ordination of bush regeneration activities by local residents and contractors will be the responsibility of Council's Environmental Officer.
- The bush regeneration contract will cover the whole Reserve, not discrete sections of the Reserve, as is the present case. Overall weed control priorities will be identified in discussion between contractors and Council officers. Additional work by volunteers or contractors will be based on the agreed weed control priorities. Volunteers work will be supervised by the trained Council employees.
- Where additional funding is available from external sources, bush regeneration work may focus on target areas in addition to those priorities identified in the overall contract.

5.3 Eucalypt Dieback

Dieback and death of eucalypt trees has been recognised as a major problem in bushland areas on the Barrenjoey Peninsula. A report prepared by Council staff found that dieback was present in bushland reserves and private properties.

In McKay Reserve the worst affected areas are those along drainage lines and adjacent slopes, with about 23% of the Reserve being badly affected. Within these stands about half of the trees are dead and about 16% are unhealthy.

Based on the Council report the primary cause of dieback in Pittwater is urban runoff. At McKay Reserve the problem is likely to lead to long-term loss of trees and understorey species from the Reserve unless it is addressed. Amelioration of the impacts will require improvements to urban runoff control in the catchment of McKay Reserve. Controlled use of fire to promote eucalypt regeneration will also be important in addressing the problem.

Bangalay trees are also being affected by heavy lerp infestations which occur sporadically. Smith and Smith (1992) noted that this was a problem at the time of their survey and that it was a widespread and recurring phenomenon on Barrenjoey Peninsula.

Management Strategy

Eucalypt dieback in McKay Reserve will be addressed by :

- implementing recommendations of the report 'Dieback in Pittwater Municipality', namely by; controlling the quality and quantity of urban runoff, managing fire to promote eucalypt regeneration, monitoring tree health and educating residents on practices which reduce adverse impacts on the Reserve.

5.4 Stormwater Control and Drainage

A large number of drainage outlets occur in McKay Reserve. These include three Council road drains and drains which dispose of stormwater from adjoining residences. Only one road drain has any form of sediment control. The other two have extensive weed plumes downslope from them, creating a persistent long-term management problem. Nevertheless, the nature of the weed plumes indicates that sediment control measures combined with a focussed bush regeneration program could be successful in removing much of the problem.

Urban run-off problems arise from properties and roadways along the Barrenjoey ridge, above the Reserve. Areas of particular problem include the corner of Ebor and McKay Roads, the upper part of Dark Gully Creek and the Reserve adjacent to 36 Bynya Road.

The disposal of stormwater into the Reserve has been permitted in the past as it offered the cheapest and easiest option. Regrettably, this practice has led to long term management problems in the Reserve and should no longer be condoned or permitted for new developments or redevelopment. In the case of established residences a co-operative approach between Council and land owners is likely to be the most effective solution.

Connection of properties adjacent to the Reserve to the sewer took place over the last few years along Bynya Road, Ebor Road and parts of Ralston Road. It is expected that this will improve the condition of the Reserve in areas previously subject to septic tank run-off.

Disposal of poolwater and in a few cases septic tank effluent remains a problem. Run-off from gardens adjacent to the Reserve is also contributing to increased nutrient loads and transports weed seeds into the Reserve.

The amount of run-off from urban areas is greater than that for undisturbed bushland due to the presence of hard surfaces which fail to absorb water. The level of nutrients, particularly Phosphorus, is much greater. Sources of Phosphorus include garden fertilisers and dog faeces.

Management Strategy

The impacts of urban run-off and stormwater drainage on McKay Reserve will be reduced by :

- Ensuring that all new Development and Building Applications on land adjacent to bushland include requirements for disposal of stormwater to roads or Council stormwater systems which do not drain directly into the Reserve. In cases where this is not feasible, alternative methods of disposal of stormwater will be favoured such as direction to on-site absorption trenches in areas that are not subject to landslip, or alternative dispersal systems.
- Application of Council's On Site Detention Policy for all new Development and Building Applications to control the rate of release of water.
- Construction of sediment control basins, stilling basins and/or energy dissipators at all outlet points from road gutters.
- Ensuring that all new road works do not direct water runoff into bushland but allow water to enter roadside vegetation in a diffuse manner, for example, by allowing informal edges, grassed swales or roll kerbs.
- Co-ordinating bushland management programs to follow on from stormwater control construction to maximise the benefits of improved stormwater control.
- Encouraging residents with existing stormwater outlets extending into McKay Reserve to provide for on-site absorption or re-direction of stormwater away from the Reserve.
- Ensuring regular removal of accumulated sediment from sediment traps and basins.
- Acting against illegal disposal of poolwater, grey water or septic tank effluent.
- Developing solutions for any localised drainage and flooding problems for dwellings adjoining the Reserve. Solutions which avoid concentration of stormwater into the Reserve, such as installation of mounds across driveways and on roadside verges are favoured.

5.5 Fire

Fire management in urban bushland needs to ensure that fire hazard to life or property is minimised whilst protecting the natural features of the bushland. Fires have occurred as a natural disturbance to bushland in the Sydney region for tens of thousands of years. Many of the plant species found in Sydney's bushland areas have characters which enable them to regenerate after wildfires. Changes to the fire regime (the timing, intensity and season of fires) can have a severe effect on some species to

the point where some species may become locally extinct under an inappropriate fire regime.

In general, urban bushland reserves pose a lesser threat to life and property than larger forested areas as they are often small, isolated areas of bushland in a predominantly urban environment; they are more readily accessed by fire fighters than remote bushland locations; fires are generally observed at an early stage; and, the changes to vegetation caused by nutrient increases and urban runoff act to reduce the flammability of the bushland.

On the other hand the remaining bushland is often on steep land, by its nature unsuitable for urban development. The steep nature of the land means that fire hazard is increased. On days of extreme fire danger even small reserves may pose a threat to life and property.

In the case of McKay Reserve, where aspect is predominantly to the west with urban development on the ridgetop, there are areas where fire hazard would be rated as high based on the guidelines issued by the Department of Bush Fire Services.

In areas of the highest hazard in McKay Reserve, where houses back onto land with slopes of 10 to 20° a Fuel Reduction Zone of 40 metres should be maintained to reduce risk to life and property. In flatter areas with slopes of 0 to 10° a Fuel Reduction Zone of 20 metres should be maintained. Fuel reduction can be by use of fuel reduction burns or by manual means. The Council has adopted both techniques in the past in an effort to reduce fuel levels in the fuel reduction zone. Problems also encountered in the Reserve which contribute to fire hazard are dumping of garden refuse, piling of fallen branches and continual lopping for views creating dense bushy growth at low levels as opposed to normal tree form growth.

In addition to the hazard reduction zone a fuel free zone should be maintained on properties adjoining the Reserve. Residents adjoining the Reserve should be made aware of their responsibility to reduce fire hazard on their own land. Wood piles should not be located adjacent to buildings, roof gutters should be regularly cleared of leaf litter and branches overhanging roofs should be pruned.

Urban bushland fire management needs to take into consideration the ecological needs of the plants and animals of the bushland, in addition to the risk posed by wildfires to life and property. There is considerable evidence that fire regimes have changed significantly in urban bushland areas since European settlement. In general terms, fires are less frequent, cooler and controlled more quickly. The changed fire regime is contributing to the loss of species which competed more successfully under the previous fire regime. Such species include members of the families Fabaceae (eg. Eggs and Bacon) and Proteaceae (eg. Grevilleas). In the Barrenjoey Peninsula area it appears that the changed fire regime may also be contributing to dieback of Eucalypts and proliferation of rainforest species such as Cheese Tree and Sweet Pittosporum.

In order to meet the dual objectives of ensuring regeneration of the range of species present in the Reserve and ensuring that hazard reduction burns are carried out in a safe manner a medium to hot burn in autumn is most appropriate. Rainforest gullies

should not be burnt as the practice will kill rainforest trees and lead to an increased risk of fire due to drying of the vegetation and fuel layer.

Wildfires are part of the history of the Palm Beach area and McKay Reserve. In 1918 a fire at Palm Beach destroyed at least one house (Palm Beach Association 1988). More recently, a wildfire occurred in McKay Reserve in 1965. The extent of urban development means that McKay Reserve is more likely to be subject only to fires originating in the Reserve, rather than sweeping in from other parts of the Barrenjoey Peninsula. It is possible that, in extreme fire conditions, a spot fire could start in the Reserve from a major conflagration in Ku-ring-gai Chase National Park.

In an effort to reduce fire hazard an intentional fire was conducted in 1991. This fire burnt out about one third of the Reserve.

Continued frequent, broad-scale burning could lead to a loss of biodiversity and local extinction of plant and animal species. Natural fire frequencies in the Reserve are within the range of a fire every 30 to 100 years. Broad-scale hazard reduction burns in the Reserve should be conducted in a manner that retains patches of unburnt vegetation.

McKay Reserve appears to have always supported a dynamic mosaic of plant species favouring both wet and dry habitats. Evidence for this is the prolific germination of Cabbage Tree Palms in dry sites within Hawkesbury Sandstone forest following the intentional burn of 1991. Fire management practices need to be sufficiently flexible to allow this dynamic interaction between various elements of the vegetation to continue.

Fires of low intensity may exacerbate weed problems in areas susceptible to invasion. Follow-up weeding will be implemented where necessary to minimise this problem.

The protection of a diverse range of fauna species in the Reserve may not be able to be achieved if too much of the Reserve is burnt at one time. Low intensity fires can render areas uninhabitable by some bird species (Smith 1989). Unburnt refuge areas need to be maintained in any hazard reduction regime.

Management Strategies

Fire hazard to life and property will be reduced by :

- Management of a fuel reduced zone in the upper parts of the Reserve adjacent to urban development. Fuel will be reduced by use of fire or manual means, which may include hand clearing.
- Use of Council's powers under the Bushfire Act to ensure that property owners reduce fire hazard on their own land. This shall include removal of hazardous stores of firewood and undergrowth. Action will be taken against landowners who create fire hazards by dumping of garden waste into the Reserve.

The dual aims of fire hazard reduction and biodiversity conservation will be achieved by :

- undertaking hazard reduction burns in a manner which will promote germination of a range of native plant species i.e. hazard reduction burns will be of a timing and intensity to achieve significant germination of members of the Fabaceae and Proteaceae families.
- undertaking manual treatment in the fuel reduction zone in a manner which seeks to promote the retention of a native plant ecosystem, this would include targeting of weed species in fuel reduction activities and integration of manual fuel removal into the bushland management program.
- avoiding sensitive locations such as gullies with rainforest trees and planted areas when using hazard reduction burns.
- monitoring by Council staff of the response of bushland to fire hazard reduction activities, including assessing the success of seed germination following hazard reduction burns and mechanical fuel removal.

5.6 Significant Plant Species

Management of the significant species of flora found within the Reserve, Snow Wood, *Daviesia umbellulata* and Large-fruited Red Mahogany, requires additional knowledge of their ecological requirements and the extent to which reserve management problems are impacting on the species.

The focus of bush regeneration needs to be changed from solely the areas where houses back onto the Reserve to the Reserve in its entirety. This will enable spot weeding if significant plant species are under threat.

Monitoring of the populations should be undertaken to ensure they are maintained by the management practices adopted. Management should be responsive to any problems revealed by monitoring.

Management Strategies

Rare plant populations in the Reserve will be protected by :

- Regular monitoring by Council staff (once yearly) of known populations of significant plant species. Recording and monitoring of any additional populations found in the future.
- Providing flexibility in the bush regeneration program to allow for spot weeding near populations where necessary.

5.7 Native Fauna

The abundance and diversity of native fauna species in the Reserve may be affected by predation, indirectly through changes to the structure and diversity of the vegetation, by human use of the Reserve and by the fire regime.

Protection of koalas on the Barrenjoey Peninsula has been the subject of public interest over a long period. In 1990 Smith and Smith completed a study of the koalas in the area. Their study made a number of recommendations, some of which were adopted by Warringah Shire Council.

More recently Pittwater Council have conducted a household survey of endangered species including the Koala, Long-nosed Bandicoot and Squirrel Glider. At its meeting of 29th November 1993, Council endorsed the recommendations of the Survey report. The reports recommendations cover fauna surveys, monitoring of endangered species populations, recording of information, habitat protection, wildlife corridors, predator control, road injuries and community education and co-operation.

Control of dogs is an important issue in Koala management. Dogs are known to be an important cause of death to Koalas in northern New South Wales (Canfield 1987). Dogs appear to be a major cause of Koala deaths in the Barrenjoey Peninsula area (Smith and Smith 1990). Options available to Council to reduce the impact of dogs on Koalas in McKay Reserve are to ban dogs from the Reserve, to ensure dogs are leashed at all times whilst in the Reserve, to patrol the Reserve to ensure that dogs aren't roaming at night and to educate the public on the impact of dogs on Koala populations.

Management Strategies

Fauna populations in the Reserve will be managed by :

- Monitoring of the fauna of the Reserve to obtain additional knowledge of the abundance, diversity and habitat requirements of the species which use the Reserve. Results of the monitoring will be used to assist in future management decisions. A profile of the fauna species of special significance which occur in or visit the Reserve will be maintained for management purposes. This profile should record observations on the species location, habits (feeding, breeding), predators, timing of visits, observations etc.
- The household survey of endangered species will be repeated at three yearly intervals throughout the Pittwater area.
- The potential threat to the population of Long-Nosed Bandicoots in the Reserve will be reduced by a campaign of education of residents regarding the dangers posed to urban wildlife by domestic cats and dogs. Residents will also be encouraged to keep their cats inside at night and place bells around cats necks to limit predation of bird species.

5.8 Introduced Predators

The extent of the threat to urban wildlife posed by introduced predators in the Reserve is not clearly known. Populations of fox are known from the Reserve by scats and trapping. Smith and Smith (1992) did not record any feral cats in the Reserve, but the presence of domestic cats is certain.

Management Strategy

- Introduced predators including foxes, and domestic cats and dogs will be controlled within the Reserve. Control of foxes should be by trapping and humane euthanasia by a veterinarian. Control of domestic cats and dogs will be achieved by a public education campaign and by impoundment of free-roaming dogs. The legal measures available to Council to control domestic cats and dogs will be used to the fullest extent possible.

5.9 Access & Walking Tracks

Provision of public access in McKay Reserve is for the purpose of providing low impact recreational use of the reserve by visitors, consistent with maintaining its natural values. Access to McKay Reserve is possible from the junction of Pacific Road and the unmade part of Ralston Road, McKay Road, Ebor Road, Cynthea Road, Bynya Road and Barrenjoey Road. Rights of way or access reserves between houses occur off Pacific Road, Cynthea Road and Bynya Road. McKay Road also provides access through part of the Reserve, splitting a section of the Reserve off from the bulk of the Reserve. A track leads from McKay Road to the Water Board Reservoir.

Access to Dark Gully Park is from a steep pathway off Thyra Road. Access is also possible from Pittwater. The access from Thyra Road is difficult to find due to lack of signposting. The track is steep and some steps are deteriorating with age.

Walking tracks in McKay Reserve are all informal and often obscure with no co-ordinated system of tracks. The most popular area is the Lookout area where a large number of informal tracks exist.

To some extent public support for the protection and management of urban bushland relies on the accessibility to bushland areas. Childhood experiences in local bushland can often lead to greater awareness of the need for environmental protection and an appreciation of natural bushland. Accordingly it is important that urban bushland is managed in a way that encourages use by the general public.

The problems of increased access for rubbish dumpers and introduced animals are counterbalanced by having low impact access by interested people who care for the Reserve. Increased use of the Reserve can also lead to greater awareness by the public of problems caused by rubbish dumping, straying pets and pollution.

A walking track system could link the top of the Reserve to Barrenjoey Road and traverse the upper slopes of the Reserve from Bynya Road to Cynthea Road, then

along Ebor and McKay Roads to join Pacific Road along the general line of the unmade portion of Ralston Road.

McKay Road was originally planned to provide access to residential allotments on either side of the Road. With purchase of these allotments for incorporation into the Reserve, the original reason for the existence of the Road became invalid. The presence of the road means that an important but small part of the Reserve is now isolated from the bulk of the Reserve. A previous proposal to close the road was the subject of public controversy and Warringah Shire Council resolved that the road should remain open. In the context of management planning of McKay Reserve it is appropriate to review the need for continued use of the Road.

McKay Road does not receive high levels of usage. It provides access to the Lookout, but closure of the road would not add significantly to the distance people must walk from their parked cars to the lookout. Access for elderly, young and disabled people could still be provided. Access from the northern end of the Road to the Water Board Reservoir would still be necessary, but this could be provided by a narrower track than that existing at present.

The Road could be ripped and replaced with a narrower walking track. The track side could then be rehabilitated, thereby improving flora and fauna habitat in the area and improving the recreational quality of the Reserve.

The private access road to the rear of properties fronting Pacific Road from the corner of Ralston Road and McKay Road is illegal under the Trust by which the Reserve was dedicated to Council. Warringah Shire Council resolved on 5th November 1991 that private access to the Reserve be terminated within twelve months of that date and that steps be taken to seal off such access except by emergency vehicles. This resolution has not been affirmed or acted upon by Pittwater Council.

Management Strategies

Council will manage access to the Reserve by :

- ensuring that continued informal use of the Lookout area does not degrade local plant communities or lead to excessive soil compaction,
- investigating the construction of a walking track system in the Reserve,
- closing McKay Road to vehicular access in a manner that allows for continued access to the Lookout by elderly and disabled persons, continued legal access to private property and access by Water Board vehicles to the Reservoir,
- affirmation and implementation of the decision by Warringah Shire Council to close the illegal access through the Reserve to properties fronting Pacific Road,
- improve public access to Dark Gully Park by providing signposting and restoring damaged steps.

5.10 Boundaries and Development Adjacent to the Reserve

At McKay Reserve management problems arising from adjacent urban development are considerable. They include urban run-off, rubbish dumping, disposal of stormwater, draining of swimming pools and straying by domestic pets. In the past illegal encroachment into the Reserves has been a problem. The Council's active bushland management and the efforts of volunteers have greatly reduced the incidence of illegal encroachments.

Co-operation between contract bush regenerators, Council staff, volunteers and residents is necessary if effective management of the Reserve boundaries is to be achieved.

Some of the problems arise due a lack of clear definition of the boundary between private land and the Reserve. Fencing between private property and the Reserve should be required as a condition of consent for new buildings or development. As an interim measure Council could place a treated pine mowing strip on the Reserve boundary.

A range of other measures can be implemented to reduce impact from neighbouring properties. Most rely on public education.

Whilst the urban areas adjacent to the Reserve are established residential areas they will undoubtedly be subject to future development and building works. Under State Environmental Planning Policy No 19, Council is required to take into account the effect of development on urban bushland, and, in particular, on soil erosion, the siltation of streams and waterways and the spread of weeds and exotic plants.

In approving such development in areas adjacent to McKay Reserve the Council will seek to prevent future impact on the Reserve.

Management Strategies

The impact on the Reserve of developments on adjacent land will be minimised through the use of appropriate controls. Conditions which may be attached to approvals for development adjacent to McKay Reserve include :

- That fencing of the boundary between the Reserve and the private property be erected,
- That stormwater be redirected to the front of properties rather than into the Reserve. Where this is not feasible due to topographic or geological conditions, alternative disposal methods be utilised such as an absorption trench on site in areas not subject to landslip, or other dispersal options.

- That urban run-off be controlled where it enters the Reserve to remove sediment and limit velocity to that similar to the natural condition. This will require the construction of sediment retention basins and energy dissipators. Priority should be given to identified problem areas.
- That Council's On Site Detention Policy be applied for all new Development and Building Applications to control the rate of release of water.
- That landscaping works on private property are compatible with the management of bushland in the Reserve, in accordance with Council's Landscape Management Policy.

6.0 Performance & Priorities

Under the Local Government Act 1993, Councils are required to set performance targets in management plans for community land.

6.1 Performance Targets

Neighbours

A spirit of co-operation between the Reserves neighbours, the Council, bush regenerators and volunteers in addressing management problems in the Reserve will be promoted by Reserve open days, held annually.

Public understanding of the value of the Reserve, the threats to the Reserve and the actions that individuals can take to protect the significant values of the Reserve will be improved by publication of this Plan. Residents will be informed on progress in the Reserve management program on an annual basis through the State of the Environment Report.

Weed Control

Weeds in the Reserve will be controlled and where feasible eliminated by continuation of the existing bush regeneration contract and work in the Reserve by Council staff and volunteers. The contract will extend for three years and cover the entire Reserve. Weed management priorities will be determined by Council staff in consultation with bush regeneration contractors and volunteers. Volunteer work will be under the supervision of trained Council employees. Overall priority should be given to gullies downslope from sites where sediment and runoff control structures are put in place.

The Water Board and Sydney Electricity will be informed of the contents of this Plan and requested to take account of the Plan in planning or carrying out operations in or adjacent to the Reserve and in preparing Environmental Impact Assessment reports for proposed operations in the Reserve.

Dieback

Dieback in the Reserve will be monitored. The incidence of dieback will be limited by construction of sediment and run-off control structures and improvements to the fire hazard reduction regime to account for ecological values. Measures aimed at improving public awareness of the values of the Reserve and the factors which threaten its integrity will assist in limiting the spread of dieback.

Fire

Fuel in the fuel reduced zone will be reduced by use of fire or manual means as and when appropriate. Any necessary hazard reduction burns will be carried out as hot burns in autumn where practical.

Fauna

Records of fauna species present in the Reserve will be maintained by Council staff. Control of feral animals will be undertaken as necessary.

The impact of domestic animals on urban wildlife will be reduced by improving public awareness of the problem and by enforcing legislation controlling domestic animals.

Cultural Heritage

A register of sites of Aboriginal and European cultural significance within McKay Reserve and Dark Gully Park will be maintained. Sites will be examined as part of an annual audit of the Reserve. Any damage to sites will be repaired in a manner appropriate to the significance of the site and in consultation with relevant authorities.

Access

The section of McKay Road which dissects the Reserve is proposed to be closed to vehicular access and changed to a walking track. Legal access to private property will be maintained.

Illegal vehicle access routes through the Reserve will be closed.

An assessment of the access needs through the Reserve and Dark Gully Park will be conducted by Council staff. The state of existing informal access tracks will be monitored annually by Council staff.

Stormwater & Drainage Control

Sediment and run-off control structures will be constructed at each point where drains from roads discharge into the Reserve. Removal of accumulated sediment from structures will be carried out on a regular basis by Council works staff.

Points of stormwater discharge into the Reserve be identified. These direct discharges to the Reserve should be connected to Council's stormwater system where feasible. Where not feasible, management options such as dispersal or sediment and velocity control measures be undertaken to limit the impact of these discharges. Weeds growing around discharge points be controlled and removed from the Reserve. Residents adjacent to the Reserve and Dark Gully Park be advised of the detrimental impacts of disposal of stormwater and be encouraged to take measures to prevent or minimise these impacts.

Action will be taken against any illegal discharge of effluent, greywater or poolwater into the Reserve.

Controls on new development adjacent to the Reserve will be established and implemented to limit the impact of past and future development on the Reserve.

6.2 Implementation Strategy

Bush Regeneration

Continue with and expand the program of bush regeneration in McKay Reserve on the basis of a three year primary contract. Priorities for bush regeneration are to consolidate and join existing sites, conduct primary and secondary work in areas where sediment control is carried out, protect significant plants and communities, protect catchment values and limit weed invasion along Reserve edges and watercourses.

Seek additional funds external to Council to carry out bush regeneration in areas where dense weeds occur such as adjacent to the access road to the Water Board Reservoir.

Public Awareness

Conduct annual open days for Reserve neighbours and volunteers. Each open day should have a particular theme, e.g. impact of roofwater, weed identification, impact of domestic animals.

Publication of leaflet on McKay Reserve, its values and the threats to its biodiversity.

Publication of a leaflet on problem weeds in bushland areas and making gardens bush friendly.

Stormwater Control and Drainage

Construct sediment control basins, stilling basins and/or energy dissipators at all outlet points from Council road drains in McKay Reserve. Upgrade and maintain the existing sediment basin.

Regular maintenance of sediment control basins, with special efforts after significant rainfall events.

Incorporate requirements for improved roofwater disposal in development control.

Prepare of site specific stormwater control solutions and encourage implementation by local residents.

Weed Control

Identify troublesome weeds as noxious weeds and formal listing of these weeds as Noxious Weeds within the Pittwater Council area.

Development of weed control strategy for known problem weeds in the Reserve.

Incorporation of weed control strategies in bush regeneration program.

Enforcement of Noxious Weeds Act.

Fire Management

Reduce fuel loads in the Fuel Reduction Zone in the Reserve and along property boundaries in a manner which protects biodiversity.

Encourage local residents to reduce fire hazard on their own properties and provide information on how this can be done.

Feral Animal Control

Control feral animals within the Reserve on as 'as needs' basis.

Fauna

Prepare a profile on each fauna species of special significance.

Access

Close McKay Road to vehicular access and establish a walking track along the route, sufficiently wide to allow access by emergency vehicles.

Close the illegal access along the unmade portion of Ralston Road.

Monitor use of the Reserve and its impact.

Investigate development of walking tracks in the Reserve.

Access to Dark Gully Park will be upgraded by erection of signposting and restoration of damaged steps on the existing track.

Reserve Boundaries

Incorporate requirements for fencing between private property and the Reserve in development control plans for the locality.

Liaison with Public Authorities

Regular liaison with the Water Board and Sydney Electricity to ensure the impact of their activities in the Reserve is minimised.

6.3 Assessment of Performance

Performance assessment will take place in the context of the annual State of the Environment Report required under the Local Government Act 1993. As part of these reporting requirements an annual audit of McKay Reserve and Dark Gully Park should be undertaken.

The emphasis in performance assessment for McKay Reserve and Dark Gully Park should be on methods which are simple and practical given the resource and financial constraints on management - the performance assessment should not divert scarce funds and resources away from Reserve management tasks. They should be undertaken in a way which improves rather than detracts from management.

Some performance assessment tasks are best undertaken by personnel who visit the Reserve rarely rather than regular visitors such as bush regeneration contractors. Use of rare visitors can bring to light problems overlooked by regular visitors and allows more of an overview approach.

Attitude of Neighbours/Public

The attitude of neighbours and the public can be assessed by systematic recording of responses to information days, complaints and compliments. More detailed assessment by formal survey techniques could be considered as part of a Council-wide survey of residents attitudes every five years.

Weed Control

Simple and practical means of assessing impact of weed control/bush regeneration will be carried out by establishing photographic points in parts of the Reserve from which photos are taken every six months. Quadrats will be established to monitor weed density and native plant species diversity. Within these quadrats (2x2 metres) all plant species occurring will be recorded. A 1 metre square quadrat with cross hairs can be placed in the centre of the larger square and used to record plant density. Plants occurring under each cross-hair (say 25) are recorded to provide an estimate of plant cover. Records are to be made at the same time each year, possibly in early spring. Analysis is to be undertaken by Council staff, with advice from the Royal Botanic Gardens.

Review of the work undertaken by contractors is to be undertaken by requiring quarterly and yearly reports which summarise the work completed. The yearly reports are to include a map of the areas worked and the weed densities/intensities occurring in the Reserve at the conclusion of each year. The success of plantings carried out by bush regeneration contractors is also to be assessed. This is to be done by location of photographic points in areas where plantings have occurred and irregular inspections of plantings by Council's Environmental Officer.

To ensure measures aimed at reduced the problems of urban run-off are effective some quadrats should be located in areas currently affected by urban run-off.

Dieback

Monitoring of the problem of eucalypt dieback should be undertaken on a Council-wide basis. The quadrats used in the flora and fauna study could be used as part of a monitoring program over the whole Council area.

Drainage

Completion of sediment control works proposed in this plan will achieve the desired performance target under this category. Monitoring of vegetation will be used to assess whether the sediment control works are achieving the objective of minimising pollution of the Reserve from urban run-off.

Fire

The assessment of the success of fire protection policies and strategies can only be undertaken by monitoring fire occurrences and their impact. Records of fires occurring in the Reserve and the damage they cause should be maintained. Review of policies and strategies should take place in light of this experience.

Ecological requirements of fire management in the Reserve can be assessed through use of the quadrats, regular observations by bush regeneration contractors, Council staff and residents and photographs.

Fauna

Regular (every five years) survey of residents regarding the urban wildlife in their areas, particularly the endangered species within the Council area.

Access

Performance assessment regarding access should include monitoring of the public's views regarding the acceptability of the improved access and monitoring of vegetation along tracks to ensure that weed problems are not being caused by the presence of access tracks.

Heritage

Regular inspection of heritage items to ensure that protection of heritage items is consistent with the provisions of the Burra Charter, the National Parks and Wildlife Act and the Heritage Act.

RECOMMENDED ACTIONS

Action	Timetable	Cost Estimate
		\$
Implementation Target		
Bush Regeneration Contract (BRC)	1994-97	25 000 p.a.
Fuel Reduction in Reserve	ongoing	staff time
Fuel Reduction on Private Land	ongoing	compliance
Sediment Control Basins	1995-96	10 000 per basin
McKay Reserve Open Day	ongoing	staff time + 500
McKay Reserve Leaflet and Display	1994-95	2000
Weeds & Gardens Leaflet	1995-96	1000
Roofwater Control	ongoing	*1
Site Specific Stormwater Control Solutions	ongoing	staff time
Sediment Control Maintenance	ongoing	works staff time
Noxious Weeds Classification	1994-95	staff time
Weed Control Strategy	ongoing	BRC/staff
Noxious Weeds Enforcement	ongoing	compliance
Feral Animal Control	ongoing	1000
Fauna Profiles	1994-95	staff time
McKay Road Closure	1995-96	20 000
Ralston Road Closure	1994-95	1 000
Monitoring Use & Impact	ongoing	staff time
Walking Track Investigation	1995-96	staff time
Boundary Fencing	ongoing	*1
Liaison with Public Authorities	ongoing	staff time
Performance Assessment		
Weed Density Monitoring	ongoing	BRC
Fire Monitoring	ongoing	BRC/staff
Dieback Monitoring	ongoing	staff time

Notes

*1 These targets involve compliance with conditions for development and building approvals. Cost is ensuring compliance with the conditions.

BRC Bush Regeneration Contract

Acknowledgements

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Plant Communities: haem= *E. gummifera*-*E. haemastoma*; cost= *E. gummifera*-*A. costata*; macu= *E. maculata*; botr=*E. botryoides*-*E. maculata*

FORK FERNS

Psilotum nudum

O

Selaginella uliginosa

O

Adiantum aethiopicum

O

A

O

Adiantum hispidulum

O

Blechnum cartilagineum

O

O

Doodia aspera

F

Cyathea cooperi

O

O

Davallia pyxidata

O

* *Nephrolepis cordifolia*

O

F

Histiopteris incisa

O

Pteridium esculentum

F

A

A

Calochlaena dubia

O

A

A

F

Gleichenia dicarpa

O

O

Sticherus flabellatus

O

Lindsaea linearis

O

O

<i>Lindsaea microphylla</i>	O			
SPECIES	PLANT COMMUNITIES:			
BOTR	HAEMCOST	MACU		
OSMUNDACEAE				
<i>Todea barbara</i>	O	O		
POLYPODIACEAE				
<i>Pyrrosia rupestris</i>		O		
SCHIZAEACEAE				
<i>Schizaea bifida</i>		O		
THELYPTERIDACEAE				
<i>Christella dentata</i>	O	O		
CYCADS				
ZAMIACEAE				
<i>Macrozamia communis</i>		O		
ANGIOSPERMS				
DICOTYLEDONS				
ACANTHACEAE				
<i>Brunoniella pumilio</i>		O		
<i>Pseuderanthemum variable</i>		F	O	
ACERACEAE				
* <i>Acer negundo</i>	O			
AIZOACEAE				
<i>Tetragonia tetragonoides</i>	O	O		
ANACARDIACEAE				
* <i>Toxicodendron succedaneum</i>	O	O		
APIACEAE				
<i>Actinotus helianthi</i>	F	F	O	
<i>Actinotus minor</i>	O			
* <i>Ammi majus</i>		O		
* <i>Apium leptophyllum</i>	O	O		
<i>Centella asiatica</i>	O	O		
* <i>Hydrocotyle bonariensis</i>		O	O	
<i>Hydrocotyle peduncularis</i>		O	F	
<i>Platysace linearifolia</i>	O	O		
<i>Xanthosia pilosa</i>		O		
<i>Xanthosia tridentata</i>	F	F		

SPECIES BOTR	PLANT COMMUNITIES:	HAEMCOST	MACU
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APOCYNACEAE

<i>Parsonsia straminea</i>			O
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ARALIACEAE

<i>Astrotricha latifolia</i>		F	O
* <i>Hedera helix</i>		O	
<i>Polyscias sambucifolia</i>	O	F	O
* <i>Schefflera actinophylla</i>	O		
* <i>Tetrapanax papyrifer</i>	O		

ASCLEPIADACEAE

<i>Marsdenia suaveolens</i>		O	
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ASTERACEAE

* <i>Ageratina adenophora</i>	O	O	O
* <i>Ageratum houstonianum</i>		O	
* <i>Aster subulatus</i>		O	
* <i>Bidens pilosa</i>	O	O	O
<i>Cassinia uncata</i>		O	

ASTERACEAE

* <i>Chrysanthemoides monilifera</i>	O	O	O
* <i>Conyza albida</i>	O	O	
* <i>Conyza bilbaoana</i>	O		
* <i>Conyza bonariensis</i>	O	O	
* <i>Conyza canadensis</i>		O	
* <i>Conyza parva</i>		O	
* <i>Coreopsis lanceolata</i>	O	O	
<i>Cotula australis</i>		O	
* <i>Crassocephalum crepidioides</i>		O	
* <i>Erechtites valerianifolia</i>		O	
* <i>Galinsoga parviflora</i>		O	
* <i>Gnaphalium</i> sp.	O		
* <i>Hypochoeris radicata</i>	O	O	
<i>Laginifera stipitata</i>	O	O	O
<i>Olearia tomentosa</i>		O	
* <i>Senecio madagascariensis</i>	O	O	
* <i>Sonchus oleraceus</i>	O	O	O
* <i>Tagetes minuta</i>		O	
* <i>Taraxacum officinale</i>		O	

BALSAMINACEAE

* <i>Impatiens sultanii</i>		O	
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BASELLACEAE

* *Anredera cordifolia*

O

SPECIES BOTR	PLANT COMMUNITIES:	HAEMCOST	MACU
BIGNONIACEAE			
<i>Pandorea pandorana</i>	O	A	A
BRASSICACEAE			
* <i>Cardamine hirsuta</i>	O	O	
CAMPANULACEAE			
<i>Wahlenbergia gracilis</i>		O	
CAPRIFOLIACEAE			
* <i>Lonicera japonica</i>	O	O	O
CARYOPHYLLACEAE			
* <i>Cerastium glomeratum</i>		O	
* <i>Petrorhagia velutina</i>		O	
* <i>Stellaria media</i>	O		
CASUARINACEAE			
<i>Allocasuarina littoralis</i>	A	A	
<i>Allocasuarina torulosa</i>	O	A	A O
* <i>Casuarina cunninghamiana</i>	O		
CHENOPODIACEAE			
* <i>Chenopodium album</i>	O		
* <i>Chenopodium ambrosioides</i>		O	
CHLOANTHACEAE			
<i>Chloanthes stoechadis</i>	O		
CONVOLVULACEAE			
<i>Dichondra repens</i>		O	
* <i>Ipomaea indica</i>	O	O	F
CRASSULACEAE			
<i>Crassula sieberana</i>		O	
CUNONIACEAE			
<i>Ceratopetalum gummiferum</i>	O	F	
DILLENIACEAE			
<i>Hibbertia aspera</i>			O
<i>Hibbertia dentata</i>		F	O
<i>Hibbertia empetrifolia</i>	F	F	
<i>Hibbertia obtusifolia</i>	O		

SPECIES BOTR	PLANT COMMUNITIES:	HAEMCOST	MACU	
DROSERACEAE				
<i>Drosera auriculata</i>		O		
<i>Drosera spathulata</i>		O		
ELAEOCARPACEAE				
<i>Elaeocarpus reticulatus</i>	F	A	A	
EPACRIDACEAE				
<i>Acrotriche divaricata</i>		O		
<i>Epacris longiflora</i>		F		
<i>Epacris microphylla</i>		O		
<i>Epacris pulchella</i>	O	O		
<i>Leucopogon juniperinus</i>		O	O	
<i>Leucopogon microphyllus</i>		O		
<i>Melichrus procumbens</i>		O		
<i>Monotoca elliptica</i>		O		
<i>Woollsia pungens</i>	O	O		
EUPHORBIACEAE				
<i>Breynia oblongifolia</i>	O	O		
* <i>Euphorbia peplus</i>	O	O		
<i>Glochidion ferdinandi</i>	O	A	A	
<i>Omаланthus populifolius</i>	O	O		O
<i>Phyllanthus hirtellus</i>	O	O		
EUPOMATIACEAE				
<i>Eupomatia laurina</i>				O
FABACEAE				
<i>Acacia elata</i>		O		
<i>Acacia floribunda</i>		O		
<i>Acacia linifolia</i>		O		
<i>Acacia longifolia</i>		O		
<i>Acacia myrtifolia</i>		O	O	
<i>Acacia parramattensis</i>		O		
* <i>Acacia saligna</i>	O	O	O	O
<i>Acacia suaveolens</i>	O	F	O	
<i>Acacia terminalis</i>		O		
<i>Acacia ulicifolia</i>	O	O	O	
<i>Aotus ericoides</i>	O	F		
FABACEAE				
<i>Daviesia umbellulata</i>			F	
<i>Desmodium rhytidophyllum</i>		O	O	

<i>Desmodium varians</i>		O	
<i>Dillwynia retorta</i>		O	O
SPECIES	PLANT COMMUNITIES:	HAEMCOST	MACU
BOTR			

FABACEAE

* <i>Erythrina</i> X <i>sykesii</i>		O	
* <i>Genista stenopetala</i>		O	
<i>Glycine clandestina</i>	O	O	O
<i>Gompholobium latifolium</i>		O	
<i>Hardenbergia violacea</i>	O	O	O
<i>Jacksonia scoparia</i>		O	O
<i>Kennedia rubicunda</i>	O	O	
* <i>Medicago polymorpha</i>	O	O	
<i>Mirbelia rubiifolia</i>		O	
<i>Oxylobium ilicifolium</i>		O	O
<i>Pararchidendrom pruinsum</i>		O	
* <i>Paraserianthes lophantha</i>	O	O	
<i>Platylobium formosum</i>	O	O	
<i>Pultenaea daphnoides</i>	O	O	O
<i>Pultenaea elliptica</i>	F	F	O
<i>Pultenaea flexilis</i>	O	O	
* <i>Senna pendula</i>	O	O	O
* <i>Trifolium repens</i>	O		
* <i>Vicia sativa</i>		O	
* <i>Vicia tetrasperma</i>		O	

FUMARIACEAE

* <i>Fumaria</i> sp.		O	
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GERANIACEAE

<i>Geranium homeanum</i>	O		
<i>Pelargonium inodorum</i>	O	O	

GOODENIACEAE

<i>Dampiera stricta</i>	O		
<i>Goodenia bellidifolia</i>	F		
<i>Goodenia heterophylla</i>		O	O
<i>Scaevola calendulacea</i>		O	
<i>Scaevola ramosissima</i>	O		

HALORAGACEAE

<i>Gonocarpus micranthus</i>	O		
<i>Gonocarpus teucrioides</i>		F	

LAMIACEAE

<i>Plectranthus parviflorus</i>		O	
<i>Prostanthera denticulata</i>		F	
* <i>Stachys arvensis</i>		O	

<i>Westringia fruticosa</i>	O			
SPECIES	PLANT COMMUNITIES:	HAEMCOST	MACU	
BOTR				
LAURACEAE				
<i>Cassytha glabella</i>	O			
<i>Cassytha pubescens</i>	F	F		
* <i>Cinnamomum camphora</i>	O	O	O	
<i>Cryptocarya glaucescens</i>		O		
LAURACEAE				
<i>Endiandra sieberi</i>	O			
LOBELIACEAE				
<i>Lobelia alata</i>	O			
<i>Pratia purpurascens</i>		F	F	
LOGANIACEAE				
<i>Mitrasacme polymorpha</i>		O		
MALVACEAE				
* <i>Sida rhombifolia</i>	O	O		
MELIACEAE				
<i>Synoum glandulosum</i>		O	O	F
MENISPERMACEAE				
<i>Stephania japonica</i>		O		
MONIMIACEAE				
<i>Wilkiea huegeliana</i>		O		
MORACEAE				
<i>Ficus rubignosa</i>		O	O	F
MYRSINACEAE				
<i>Rapanea variabilis</i>	O			
MYRTACEAE				
<i>Acmena smithii</i>		F	O	F
<i>Angophora costata</i>	A	A	O	
<i>Angophora floribunda</i>	O			F
* <i>Callistemon viminalis</i>	O			
<i>Eucalyptus botryoides</i>		O	F	A
<i>Eucalyptus gummifera</i>	A	A	O	
<i>Eucalyptus haemastoma</i>	A			
<i>Eucalyptus maculata</i>			A	F

<i>Eucalyptus paniculata</i>		O	F	
<i>Eucalyptus piperita</i>		O	A	
<i>Eucalyptus punctata</i>		O	O	
<i>Eucalyptus scias</i>		O	O	
SPECIES	PLANT COMMUNITIES:	HAEMCOST	MACU	
BOTR				
MYRTACEAE				
<i>Eucalyptus umbra</i>		F	O	
<i>Kunzea ambigua</i>			O	
<i>Leptospermum polygalifolium</i>		O		
<i>Leptospermum trinervium</i>	O	F		
<i>Syncarpia glomulifera</i>		O		
<i>Tristaniopsis collina</i>		O		
OCHNACEAE				
* <i>Ochna serrulata</i>	O	O	O	
OLEACEAE				
* <i>Jasminum polyanthus</i>	O			
* <i>Ligustrum lucidum</i>	O	O	O	
* <i>Ligustrum sinense</i>	O	O	O	
OLEACEAE				
<i>Notolaea longifolia</i>		F	A	
ONAGRACEAE				
<i>Epilobium billardierianum</i>		O		
* <i>Oenothera stricta</i>		O		
OXALIDACEAE				
* <i>Oxalis corniculata</i> s.l.		O	O	
* <i>Oxalis latifolia</i>		O	O	
* <i>Oxalis pes-caprae</i>		O		
PASSIFLORACEAE				
* <i>Passiflora caerulea</i>		O		
* <i>Passiflora edulis</i>	O	O	O	
PHYTOLACCACEAE				
* <i>Phytolacca octandra</i>	O	O		
PITTOSPORACEAE				
<i>Billardiera scandens</i>	O	O	O	
<i>Citriobatus pauciflorus</i>		O		
<i>Pittosporum revolutum</i>	O	O		
<i>Pittosporum undulatum</i>	O	A	A	A
PLANTAGINACEAE				

* *Plantago lanceolata*

PLATANACEAE

* *Platanus X hybrida* O

SPECIES PLANT COMMUNITIES: HAEMCOST MACU
BOTR

POLYGALACEAE

Comesperma volubile O

POLYGONACEAE

* *Acetosa sagittata* O O

* *Rumex crispus* O O

PROTEACEAE

Banksia ericifolia O

Banksia integrifolia O F

Banksia oblongifolia F O

Banksia serrata F F

Banksia spinulosa F F

Conospermum taxifolium O

Grevillea linearifolia O

Grevillea sericea F F

Hakea gibbosa O

Hakea salicifolia O

Hakea sericea A F O

Hakea teretifolia O

Isopogon anemonifolius F

Lambertia formosa O

Lomatia silaifolia O O

Persoonia lanceolata O

Persoonia levis O O O

Persoonia linearis O O O

Persoonia pinifolia O

Petrophile pulchella O

Xylomelum pyriforme O

RANUNCULACEAE

Clematis aristata O

Clematis glycinoides O O

* *Ranunculus repens* O

Ranunculus sp. O

RHAMNACEAE

Pomaderris ferruginea O

ROSACEAE

* *Cotoneaster glaucophyllus* O O

* <i>Prunus cerasus</i>		O		
* <i>Prunus persica</i>	O			
* <i>Pyracantha angustifolia</i>	O	O		
* <i>Rhaphiolepis indica</i>	O	O		
* <i>Rubus fruticosus</i> spp. agg.				O

SPECIES	PLANT COMMUNITIES:	HAEMCOST	MACU
BOTR			

RUBIACEAE

<i>Morinda jasminoides</i>		O	A
<i>Opercularia aspera</i>		O	
<i>Pomax umbellata</i>		O	

RUTACEAE

<i>Correa reflexa</i>		O	
<i>Zieria pilosa</i>	O	O	
<i>Zieria smithii</i>		F	F

SALICACEAE

* <i>Salix babylonica</i>		O	
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SAPINDACEAE

<i>Dodonaea triquetra</i>	O	F	A
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SOLANACEAE

* <i>Lycopersicon esculentum</i>	O	O	
* <i>Physalis peruviana</i>		O	
* <i>Solanum americanum</i>		O	O
* <i>Solanum mauritianum</i>			O
* <i>Solanum nigrum</i>	O	O	

STERCULIACEAE

<i>Lasiopetalum ferrugineum</i>			O
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STYLIDIACEAE

<i>Stylidium graminifolium</i>	O	O	
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THUNBERGIACEAE

* <i>Thunbergia alata</i>	O		O
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THYMELAEACEAE

<i>Pimelea linifolia</i>	O	O	O
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TREMANDRACEAE

<i>Tetratheca ericifolia</i>		O	
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TROPAEOLACEAE

* <i>Tropaeolum majus</i>		O	O
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ULMACEAE					
<i>Trema aspera</i>			O		
URTICACEAE					
<i>Urtica incisa</i>			O		
SPECIES	PLANT COMMUNITIES:	HAEMCOST	MACU		
BOTR					
VERBENACEAE					
<i>Hybanthus monopetalus</i>				O	
<i>Viola hederacea</i>			O		
VITACEAE					
<i>Cayratia clematidea</i>		O			
<i>Cissus antarctica</i>			O		F
<i>Cissus hypoglauca</i>		F	F	F	O
MONOCOTYLEDONS					
ALLIACEAE					
* <i>Agapanthus orientalis</i>			O		
* <i>Nothoscordum borbonicum</i>			O		
AMARYLLIDACEAE					
* <i>Clivia</i> cv.		O			
ANTHERICACEAE					
<i>Arthropodium milleflorum</i>			O		
* <i>Chlorophytum comosum</i>		O	O		
<i>Thysanotus tuberosus</i>		O			
ARACEAE					
* <i>Alocasia brisbanensis</i>		O			
* <i>Philodendron</i> sp.		O			
ARECACEAE					
<i>Livistona australis</i>		O	F	O	A
* <i>Phoenix canariensis</i>			O		
ASPARAGACEAE					
* <i>Protasparagus aethiopicus</i>		O	O	A	F
BLANFORDIACEAE					
<i>Blandfordia nobilis</i>		O			
CANNACEAE					
* <i>Canna indica</i>		O	O		O

COLCHICACEAE

Burchardia umbellata

O

COMMELINACEAE

Commelina cyanea

O

* *Tradescantia albiflora*

O

O

A

SPECIES

PLANT COMMUNITIES:

HAEMCOST MACU

BOTR

CYPERACEAE

Cyathochaeta diandra

A

O

Cyperus brevifolius

O

* *Cyperus eragrostis*

O

Gahnia clarkei

A

O

Isolepis nodosus

O

Lepidosperma laterale

O

A

A

Lepidosperma lineare

O

Ptilanthelium deustum

A

Schoenus melanostachys

A

IRIDACEAE

* *Crocasmia X crocosmiiflora*

O

O

Patersonia glabrata

O

Patersonia sericea

O

* *Romulea rosea*

O

* *Watsonia bulbilifera*

O

O

JUNCACEAE

* *Juncus cognatus*

O

Juncus ?holoschoenus

O

Juncus planifolius

O

Juncus usitatus

O

O

LILIACEAE

* *Lilium formosum*

O

O

O

* *Lilium longiflorum*

O

LOMANDRACEAE

Lomandra cylindrica

O

Lomandra glauca

A

A

Lomandra gracilis

O

Lomandra longifolia

O

A

A

O

Lomandra multiflora

O

Lomandra obliqua

A

F

O

MUSACEAE

* *Musa* sp.

O

O

O

ORCHIDACEAE

<i>Acianthus exsertus</i>		O			
<i>Acianthus fornicatus</i>		O		O	
<i>Corybas</i> sp.		O			
<i>Cryptostylis erecta</i>	O	F			
<i>Cryptostylis subulata</i>	O				
<i>Dendrobium linguiforme</i>		O			
<i>Dendrobium speciosum</i>		O			
SPECIES	PLANT COMMUNITIES:	HAEMCOST	MACU		
BOTR					

ORCHIDACEAE

* <i>Epidendrum</i> cv.	O				
<i>Pterostylis longifolia</i>	O				

ORCHIDACEAE

<i>Pterostylis nutans</i>	O				
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PHILESIACEAE

<i>Eustrephus latifolius</i>	O	A	F	O	
<i>Geitonoplesium cymosum</i>	O	F	O	O	

PHORMIACEAE

<i>Dianella caerulea</i>	F	A	F		
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POACEAE

<i>Agrostis avenacea</i>	O				
* <i>Andropogon virginicus</i>	O	O			
<i>Anisopogon avenaceus</i>	O	O			
<i>Aristida vagans</i>		O	O		
* <i>Arundo donax</i>		O			
* <i>Axonopus affinis</i>	O	O			
* <i>Bambusa</i> sp.	O				O
* <i>Briza maxima</i>	O	O			
* <i>Briza minor</i>	O	O			
* <i>Bromus unioloides</i>	O				
* <i>Cortadiera selloana</i>		O	O	O	
<i>Cymbopogon refractus</i>		O			
* <i>Cynodon dactylon</i>	O	O			
<i>Danthonia tenuior</i>		O	O		
<i>Deyeuxia quadriseta</i>		O			
<i>Dichelachne rara</i>		O			
<i>Digitaria parviflora</i>		O			
* <i>Digitaria sanguinalis</i>	O				
<i>Echinopogon caespitosus</i>		O			
<i>Entolasia marginata</i>	O	O	O		
<i>Entolasia stricta</i>	A	A	A		
* <i>Ehrharta erecta</i>	O	O			

* <i>Eleusine indica</i>	O	O		
<i>Eragrostis brownii</i>		O		
<i>Imperata cylindrica</i>	O	F	F	
<i>Microlaena stipoides</i>		F	F	
<i>Oplismenus aemulus</i>	O	O	O	
<i>Oplismenus imbecillis</i>			O	O
<i>Panicum simile</i>	O	O	F	
<i>Paspalidium distans</i>			O	
* <i>Paspalum dilatatum</i>	O	O		
* <i>Paspalum urvillei</i>		O	O	
SPECIES	PLANT COMMUNITIES:			
BOTR	HAEM	COST	MACU	

POACEAE

* <i>Pennisetum clandestinum</i>		O		
<i>Poa affinis</i>	O	O		
* <i>Poa annua</i>	O	O		
* <i>Rhynchelytrum repens</i>	O	O		
* <i>Setaria gracilis</i>		O		
* <i>Setaria palmifolia</i>				O
* <i>Setaria pumila</i>	O	O		
* <i>Setaria verticillata</i>		O		
* <i>Sporobolus indicus</i>	O	O		
<i>Stipa pubescens</i>		O		
<i>Tetrarrhena juncea</i>	O	F		
<i>Themeda australis</i>	F	F	A	

RESTIONACEAE

<i>Lepyrodia scariosa</i>	F	F		
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SMILACACEAE

<i>Smilax glyciphylla</i>	F	A	A	
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STRELITZIACEAE

* <i>Ravenala madagascariensis</i>		O		
* <i>Strelitzia reginae</i>		O		

UVULARIACEAE

<i>Schelhammera undulata</i>		F	F	O
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XANTHORRHOEACEAE

<i>Xanthorrhoea arborea</i>		F		
<i>Xanthorrhoea media</i>	F	A		

APPENDIX 2 FAUNA SPECIES LIST KNOWN OR LIKELY TO OCCUR IN MCKAY RESERVE AND DARK GULLY PARK

FROGS

Striped Marsh Frog	<i>Lymnodynastes peronii</i>
Common Eastern Froglet	<i>Ranidella signifera</i>

REPTILES

Southern Leaf-tailed Gecko	<i>Phyllurus platurus</i>
Fence Skink	<i>Cryptoblepharus virgatus</i>
Striped Skink	<i>Ctenotus robustus</i>
Copper-tailed Skink	<i>Ctenotus taeniolatus</i>
Cunningham's Skink	<i>Egernia cunninghami</i>
Eastern Water Skink	<i>Eulamprus quoyii</i>
Delicate Skink	<i>Lampropholis delicata</i>
Eastern Blue-tongue	<i>Tiliqua scincoides</i>
Golden-crowned Snake	<i>Cacophis squamulosus</i>
Swamp Snake	<i>Hemiaspis signata</i>
Eastern Blind Snake	<i>Ramphotyphlops nigrescens</i>

BIRDS

White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>
Whistling Kite	<i>Haliastur sphenurus</i>
Little Eagle	<i>Hieraaetus morphnoides</i>
Australian Kestrel	<i>Falco cenchroides</i>
Peregrine Falcon	<i>Falco peregrinus</i>
* Feral Pigeon	<i>Columba livia</i>
Peaceful Dove	<i>Geopelia placida</i>
Crested Pigeon	<i>Ocyphaps lophotes</i>
* Spotted Turtle-Dove	<i>Streptopelia chinensis</i>
Australian King-Parrot	<i>Alisterus scapularis</i>
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>
Galah	<i>Cacatua roseicapilla</i>
Little Corella	<i>Cacatua sanguinea</i>
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>
Crimson Rosella	<i>Platycercus elegans</i>
Eastern Rosella	<i>Platycercus eximius</i>
Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
Pheasant Coucal	<i>Centropus phasianinus</i>
Fan-tailed Cuckoo	<i>Cuculus pyrrhophanus</i>
Common Koel	<i>Eudynamis scolopacea</i>
Southern Boobook	<i>Ninox novaeseelandiae</i>
Barn Owl	<i>Tyto alba</i>
Tawny Frogmouth	<i>Podargus strigoides</i>

BIRDS

White-throated Needle-tail
Laughing Kookaburra
Sacred Kingfisher
Dollarbird
Superb Fairy-wren
Variegated Fairy-wren
Red Wattlebird
Brush Wattlebird
Yellow-faced Honeyeater
White-eared Honeyeater
Noisy Miner
Lewin's Honeyeater
White-naped Honeyeater
Noisy Friarbird
White-cheeked Honeyeater
New Holland Honeyeater
Brown Thornbill
Brown Gerygone
White-throated Gerygone
Spotted Pardalote
Striated Pardalote
White-browed Scrubwren
Black-faced Cuckoo-shrike
Australian Raven
Grey Butcherbird
Australian Magpie-lark
Australian Magpie
Golden Whistler
Eastern Whipbird
Grey Fantail
Willie Wagtail
Pied Currawong
* Common Mynah
* Common Starling
Welcome Swallow
* Red-whiskered Bulbul
Silvereye
Mistletoebird
Red-browed Firetail
* House Sparrow

Hirundapus caudacutus
Dacelo novaeguineae
Halcyon sancta
Eurystomus orientalis
Malurus cyaneus
Malurus lamberti
Anthochaera carunculata
Anthochaera chrysoptera
Lichenostomus chrysops
Lichenostomus leucotis
Manorina melanocephala
Meliphaga lewinii
Melithreptus lunatus
Philemon corniculatus
Phylidonyris nigra
Phylidonyris novaehollandiae
Acanthiza pusilla
Gerygone mouki
Gerygone olivacea
Pardalotus punctatus
Pardalotus striatus
Sericornis frontalis
Coracina novaehollandiae
Corvus coronoides
Cracticus torquatus
Grallina cyanoleuca
Gymnorhina tibicen
Pachycephala pectoralis
Psophodes olivaceus
Rhipidura fuliginosa
Rhipidura leucophrys
Strepera graculina
Acridotheres tristis
Sturnus vulgaris
Hirundo neoxena
Pycnonotus jocosus
Zosterops lateralis
Dicaeum hirundinaceum
Emblema temporalis
Passer domesticus

MAMMALS

Short-beaked Echidna
Long-nosed Bandicoot
Koala
Sugar Glider

Tachyglossus aculeatus
Perameles nasuta
Phascogaleus cinereus
Petaurus breviceps

Squirrel Glider
Common Ringtail Possum
MAMMALS

Petaurus norfolcensis
Pseudocheirus peregrinus

Common Brushtail Possum
Grey-headed Flying-fox
* Black Rat
* Dog
* Red Fox
* Cat

Trichosurus vulpecula
Pteropus poliocephalus
Rattus rattus
Canis familiaris
Vulpes vulpes
Felis catus

Maps

