

Conservation Strategy No.1

# Habitat and Wildlife Corridors



PITTWATER  
COUNCIL

# Habitat and Wildlife Corridors

## *A Conservation Strategy*



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from a Discussion Paper  
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## **1.0 INTRODUCTION**

### **Pittwater's Habitats**

The Pittwater Council area is characterised by natural environmental qualities that make it one of the most desirable residential areas in the Sydney Region. Apart from the well-known beaches and waterways, much of this character is derived from the bushland feel of the area.

There is a wide range of flora and fauna habitats within Pittwater's bushland, ranging from mangroves to heaths and grasslands and from woodland and forest to subtropical rainforest, which contribute to the area's biodiversity.

### **Threats**

In response to the growing push for urban consolidation in the Sydney area, to the requirement under the Local Government Act, 1993, to report as to the State of the Environment Report, particularly on habitat and wildlife corridors and concerns about the loss of fauna habitat in the Pittwater area, a broad-scale study of the fauna habitat that exists both inside and outside the council's bushland reserves was undertaken.

The current push for urban consolidation means that significant amounts of habitat could be lost due to gradual attrition and with it much of the peninsula's unique character. To maintain the character of the area and its biodiversity, planning instruments should be introduced to protect both reserved and unreserved areas of fauna and flora habitat, management of habitats needs to be improved and threats such as weed invasion and predators need to be controlled.

### **Purpose of the Strategy**

This report explains the importance of biodiversity and defines what is meant by habitat and corridors. It summarises the methods used for the Pittwater study and the theory and practicalities of maintaining and enhancing corridors.

It identifies habitats and corridors in Pittwater highlighting areas of priority for future action. Maps accompany the report which locate the corridor and habitat areas identified in the broadscale study. Vegetation types are identified for restoration works and predator control programs are outlined.



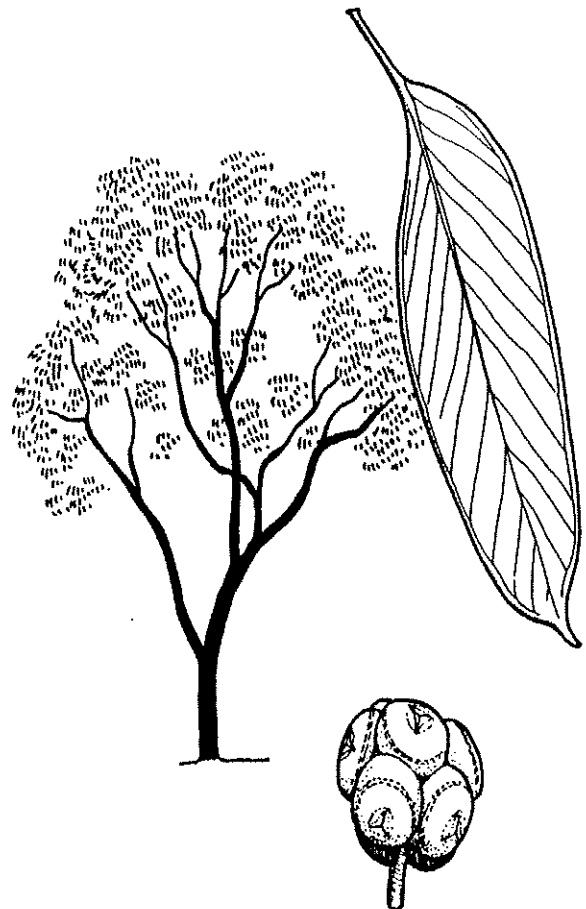
## 2.0 METHODOLOGY

Aerial photographs, orthophotomaps, habitat maps, vegetation maps, the National Parks and Wildlife Service's Wildlife Atlas, the 1990 Koala Study by Peter and Judy Smith and other plans and studies were examined (eg. Plans of Management for Angophora Reserve, McKay Reserve and Stapleton Park, the Ingleside/Warriewood Fauna Conservation Study and Council's Household Species Survey and maps). Naturally vegetated habitat and remnant canopy trees were identified as areas in which protected and endangered fauna are likely to reside or move through.

This was 'ground truthed' by site inspection to determine suitability for fauna. As not all habitat areas could be fully assessed due to time constraints, ground truthing was stratified to sample a cross-section of areas. In built-up areas this involved inspection by streets checking the composition of street and yard trees. In lower density areas more time was spent checking habitat components. Particular attention was given to those areas where other restrictions on dual occupancy such as visual amenity, did not apply.

Records of fauna from various sources (eg Royal Australasian Ornithologists Union, Cumberland Bird Observers Club, WIRES etc.) and impact surveys were used to provide an overall picture of fauna in the area and identify those species which may be affected by urban consolidation.

From the information provided by maps, records and habitat inspection major habitat areas and wildlife corridors were identified and mapped at a 1:4000 scale. Corridor types were ranked on the basis of habitat quality and identified management needs.



*Stringy bark*

## 3.0 WHAT IS BIODIVERSITY?

### 3.1 Definition

The internationally accepted definition of biodiversity is "the variety within and among living organisms and of the ecological systems they comprise." The increasing awareness of the threat posed by man's activities to the planet's biodiversity was recognised by the signing in 1992 of the International Convention on Biological Diversity.

In the lead up to signing this document the Commonwealth Government also developed a draft national strategy for the conservation of Australia's biological diversity which recognised Australia's status as one of the world's megadiverse regions. Although this is yet to be ratified by New South Wales, the State also has legislation with elements designed to protect biodiversity. The most important of these are the Local Government Act 1993, the Environmental Planning and Assessment Act 1979, the Threatened Species Conservation Act 1995, and the Heritage Act 1979. One of the requirements of the Local Government Act is the preparation of an annual report as to the State of the Environment. This must identify important wildlife and habitat corridors.

### 3.2 Pittwater's Biodiversity

The Sydney region is internationally recognised as an area of high biodiversity. The Pittwater Council area in common with other Sydney council areas with a bushland character, also exhibits a high degree of biodiversity.

Pittwater has an array of habitats ranging from wetlands to open forests and includes a large section of Ku-ring-gai Chase National Park. The range of fauna habitats has resulted in 331 native terrestrial vertebrate species being recorded. This is comprised of 252 bird species, 40 mammals, 23 reptiles and 16 amphibians. Of these 28 are listed as endangered in NSW and many, such as the long-nosed bandicoot, are of regional significance.

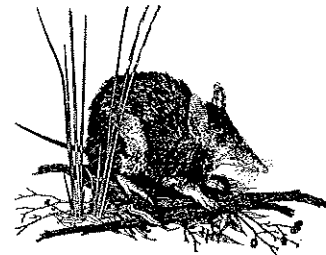
Varying topography, geology and soils as well as relatively high rainfall has also resulted in high floristic diversity. Six vegetation communities of conservation significance occur within the area. One of these - Spotted Gum Open Forest - covering large areas of Bayview, Newport, Clareville and Avalon is not adequately represented in any of the state's national parks. The 1995 State of the Environment Report records five nationally listed rare or threatened plant species and nineteen regionally or locally significant species as well as many orchid species.

A number of butterflies of conservation significance have also been recorded from the area.

### 3.3 Future Viability

Despite the amount of Council managed bushland, the future of Pittwater's diverse biota is not secure. For example, the local koala colony has declined from more than 123 individuals in 1970 to about eight in 1990 Smith and Smith (1990). Due to its high sensitivity to habitat removal and vulnerability to dogs, koalas can be regarded as an indicator of the likely impacts that increased densities of residential development will have on less well-known species. Other species which are likely to decline in the long term are long-nosed bandicoots, squirrel and sugar gliders, and the wide range of smaller bush birds such as fantails, thornbills and whistlers which require structurally diverse native vegetation. More conspicuous and aggressive species such as brushtail possums and lorikeets are more able to cope with increased density of development. A decline in the variety of flora species particularly groundcover and shrub components is also likely.

To arrest this decline in biodiversity steps must be taken within the planning process to ensure habitat retention. Rather than reacting to proposed developments an overall strategy to ensure habitat retention needs to be adopted.



## 4.0 HABITAT AND WILDLIFE CORRIDORS

### 4.1 Definition

Land clearing for residential amenity and farming practices has isolated large areas of habitat in many parts of the world. Smaller remnant habitats between such areas are recognised for their value in linking larger areas of habitat. These links are termed corridors and can be loosely defined as any piece of the landscape allowing movement of biota between larger habitat areas. Wildlife corridors they are generally accepted as an important tool to allow movement and dispersal of species using structural or other features of the habitat.

### 4.2 The Value of Corridors

Wildlife corridors have a range of benefits as they:-

- ❖ allow increased migration rates of species/individuals to assist in the maintenance of species richness and diversity; decrease likelihood of local extinction; and prevent inbreeding.
- ❖ provide increased foraging area for species with large ranges eg. koalas.
- ❖ provide refuge from predators such as domestic pets.
- ❖ widen the variety of habitat available
- ❖ provide refuge from disturbed habitat eg. fire affected bushland
- ❖ limit urban sprawl and abate noise (Noss 1987).

Although there have been various observational studies on wildlife corridors, there is still conjecture over their effectiveness due to the lack of experimental data. Current programs by Dr Lindenmayer of the Australian National University and the CSIRO have been designed to address this shortfall. However, the consensus of opinion amongst conservation biologists is that landscape designs that facilitate movement and dispersal of native fauna/flora (and/or their genes) are highly preferred over those that do not (Harris & Scheck, 1991).

### 4.3 Pittwater's Corridors

From the definition of corridors and their function it can be seen that major parts of the Pittwater area *in toto* act as a corridor for species inhabiting larger habitat areas to the north and south. For example, migratory birds such as kingfishers, honeyeaters and cuckoos are likely to use the peninsula as a stop-off while travelling between Bouddi and Garigal National Parks. On a smaller scale the 'backyard bushland' in often very large and steep naturally vegetated blocks, for example, in Avalon and Clareville acts as a corridor between Stapleton and Angophora Reserves. It is at this scale that this study has been based in an effort to ensure movement of fauna in the Pittwater area is maintained and hopefully enhanced.

The retention of 'backyard bushland' plays an important part in conserving the wide range of species that exist in the Sydney region. The household species survey and recent records from the area indicate that despite degradation and fragmentation, bushland on private land continues to provide habitat for fauna as well as linking major reserves. The majority of koala food trees in the peninsula are located outside council reserves (Smith and Smith, 1990) thus retention and maintenance of non-reserve food trees is vital to the continued survival of the local colony. The importance of private land to the state's koala population has been recognised recently by the introduction and implementation of SEPP 44 - Koala Habitat Protection.

The nature of the original residential development of the Pittwater area has resulted in strips or patches of remnant bushland remaining within large blocks. This is particularly true of Bayview, Bilgola, Avalon, Clareville and Whale and Palm Beaches. Over the past few decades as urban growth has intensified, habitat in the area has been reduced in size. For example, in the area north of Bungan Beach the percentage of forested land dropped from 47% in 1946 to 8% in 1989 (Smith & Smith, 1990). As well as reduction in amount of habitat, fragmentation and other barriers have also occurred making it more difficult for species to move between prime habitat areas. In response to this, areas of non-reserved habitat need to be identified and managed so that their function as both corridor and habitat is maintained.

Areas which represent gaps in corridors between habitat areas need to be rehabilitated to link vegetated areas and restore their potential corridor function.

In Council's 1994 State of the Environment Report the following stresses on wildlife corridors were identified:-

- ❖ removal of native vegetation in areas thought to be used as corridors
- ❖ development in areas thought to be used as corridors
- ❖ unsympathetic landscaping and street tree planting of species not indigenous to the area
- ❖ weed infestation and pollution of creeklines and other natural corridors, by nutrients and sediments.

Management responses need to be developed and implemented to combat these stresses and to additional identified threats such as the impact of traffic, predators and incidence of disease.

#### 4.4 Guidelines for assessing areas of habitat as wildlife corridors

Denny (1994) set out tentative guidelines for corridor assessment. These are outlined below as is the application of them within the Pittwater study.

*"1. Areas of habitat which link two larger areas of habitat, or link habitat planned to be conserved, are better than areas of habitat which lead nowhere or for which there is no opportunity for conservation."*

The general aim behind this Management Strategy has been to maintain and enhance links between areas of quality habitat which are often under Council's care, control and management. On a broad scale habitat retention in the whole of the Council area will maintain a link between the larger habitat areas of Bouddi, Garigal and Ku-ring-gai Chase National Parks.

A primary aim has been to link the peninsula's reserved and unreserved habitat with that of Ku-ring-gai Chase and Garigal, incorporating the naturally vegetated Ingleside escarpment and Warriewood wetlands.

This will allow continued movement of fauna (primarily birds and arboreal mammals) and decrease the likelihood of local extinctions.

On a small scale corridors have been mapped which link the larger Council reserves such as McKay, Stapleton and Angophora Reserves with one another via unreserved residential land.

*"2. Areas of habitat which link two larger areas of habitat in good condition are better than those linking two areas of habitat in poor condition."*

Within the Pittwater Council area are a number of reserves which exhibit better habitat characteristics than in the surrounding areas. One of the major management objectives for these reserves is maintaining and enhancing fauna habitat and further maintenance and enhancement of the habitat surrounding these reserves will assist.

*"3. Areas of habitat which form wide corridors are better than narrow corridors."*

All the corridors have been designed with maximum practicable width. In some areas there are necessarily "choke points" where the corridor narrows due to landform or proximity to major roads eg. between Newport and Mona Vale.

*"4. Areas of habitat which are in good condition from better corridors than those in poor condition."*

This has been the basis of the categorising of corridor types and identification of priority areas. For example, the forested areas of Clareville form a better quality corridor than the flat areas of Newport and have been coded differently where the code for the Newport area indicates that enhancement is necessary and that management priority be directed to that area.

*"5. Areas of habitat which will form corridors are better than no corridors at all."*

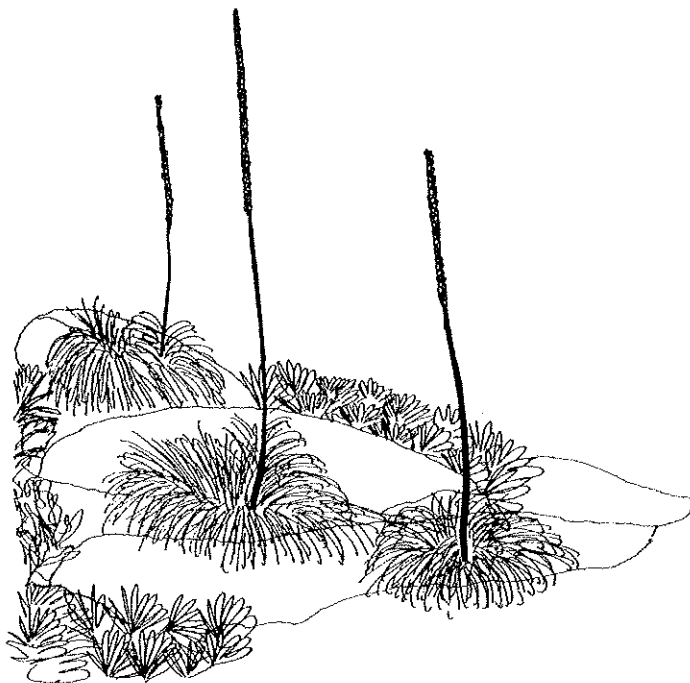
Again this is one of the premises behind the classification. Although heavily populated areas interrupt parts of the corridor system there is still scope for use by fauna if only as "stepping stones" to better habitat.





**"6. Areas of habitat which are combination of different habitat types are better than those comprising a single habitat."**

Many of the corridors pass through a range of habitat types. For example, the one linking McKay Reserve and Stapleton Park is comprised in part of Spotted Gum Open Forest, mixed Eucalypt Woodland, Swamp Forest and Mangroves. Similarly, those linking the lowlands of Warriewood with Ingleside and Bayview pass through a variety of habitat types including wetland, casuarina forest, swamp forest, woodland, forest and heath. Such cross-section of habitat types provides a range of food, nesting and shelter resources for a range of species.



## 5.0 RESULTS

On the accompanying maps six broadly defined habitat areas and corridor types are indicated. These are discussed below.

**MH** - indicates major habitat areas. These include larger reserves and national parks (e.g. McKay, Angophora, Ku-ring-gai Chase, Garigal,) and large expanses of mostly non reserve land in the Bayview - Ingleside-Warriewood area. Major habitat areas have a wide diversity of habitat types and fauna species. As these areas have higher degrees of biodiversity than those between them they need to be linked to allow movement of fauna. Development controls need to be adopted to conserve habitat values in Warriewood / Ingleside release area.

**R** - indicates smaller Council reserves likely to have very modified habitat or suffering adverse edge effects. These can be enhanced by a planting programme, such as undertaken at Catalpa Reserve, or by reducing mowing in grassed areas and allowing natural regeneration.

**Co1** - indicates corridors or habitat areas though disturbed are likely to be of value due to good crown cover and / or understorey. Residential areas mapped thus should have DAs, BAs and subdivision applications referred to the Council's environmental staff and should aim to maintain a larger natural areas.

**Co2** - indicates mostly cleared non-residential areas (eg golf courses, schools, rural sites) with good potential for improvement as corridors.

**Co3** - indicates residential areas with some tree cover but requiring supplementary planting to aid fauna movement e.g. flatter areas of Avalon and Newport. Much of this corridor type has been identified as suitable for urban development. Part of the Avalon Valley has been recently included in the Ruskin Rowe Heritage Conservation LEP which for cultural and natural heritage reasons limits subdivision. Other areas require urgent review as without appropriate ameliorative measures, such development in these areas would result in further restriction of fauna movement.

**HP** - indicates high priority areas essential to fauna movement where there should be no increase to existing development. Alternatively, intensive development could be allowed with conditions where a minimum percentage of the land devoted to native landscaping to assist wildlife movement.

### 5.1 Areas of Special Consideration

The following locations are those considered to be of high priority in maintaining and enhancing fauna habitat and movement. Due to clearing or degradation most of them are currently acting as bottlenecks or barriers to fauna movement.

#### Careel Bay Playing Fields and environs

This area needs mass plantings of habitat trees and shrubs to maintain the corridor between bushland along the escarpment of the north including McKay Reserve and Stapleton Park and the residential bushland of Clareville.

#### Central Avenue, Avalon Parade, Ruskin Rowe

This area is the shortest direct link between Stapleton Park and Angophora Reserve. Around Central Avenue and Avalon Parade there are many Swamp Mahoganies and the rear of lots in Ruskin Rowe contain rainforest elements. This area could be enhanced by street planting of Swamp Mahoganies and Grey Gums along Ruskin Rowe and yard planting away from the busier roads.

#### Bardo Road to Beaconsfield Street, Newport

This area is part of an extended bottleneck between the peninsula and Bayview. Within this area is Trafalgar Park which has a good healthy stand of Grey Gum. This species is the local koala colony's major food source and koalas have been recently sighted in the area. To enhance the area street planting could be undertaken along King Street and in Newport Public School.

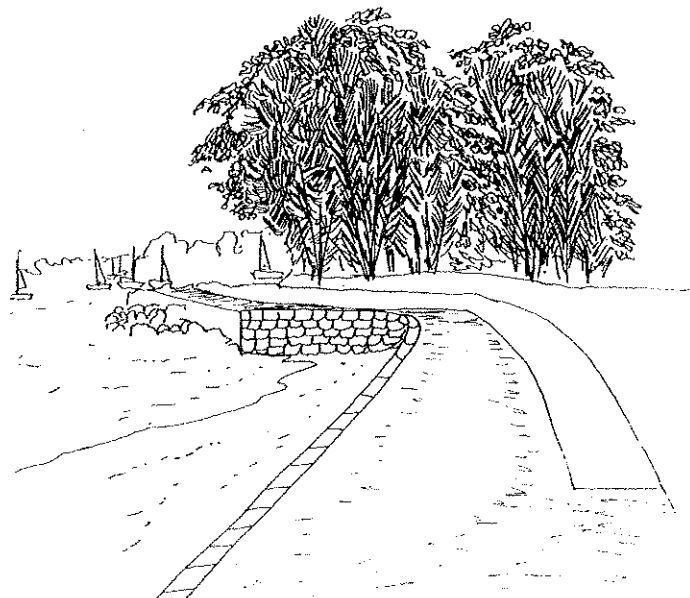
### **Waterview and Mona Streets, Mona Vale; and Bayview Golf Course**

The large tracts of cleared land in this area and recent subdivisions east of Mona Street have removed a large amount of habitat and are a major barrier to fauna moving to the peninsula from Kuring-gai Chase National Park, Katandra Sanctuary and Bayview.

Planting on vacant Works Department land, Pittwater High School and thickening of fairway vegetation in the golf course is needed. The recent subdivision area also requires enhancement to broaden the corridor to the north.

### **Irrawong Reserve and Warriewood Wetlands**

Irrawong Reserve represents the only bushland link between the mosaic of habitat types in the Ingleside area and the Swamp Mahogany forests and wetland areas of Warriewood. For this reason it should have a high priority in bushland management.



## **6.0 IMPLEMENTATION**

### **6.1 Objectives**

It is critical that significant and strategically located habitat and corridors be actively conserved in Pittwater to stem the current trend of gradual attrition of habitat, loss of species and populations and the loss of the peninsula's unique character.

In order to maintain the character of the area and its biodiversity, policies and planning instruments need to be introduced to protect both reserved and unreserved areas of fauna and flora habitat and corridors.

Maintenance and enhancement of identified habitats and corridors must also be a priority for future programs and actions by Council.

### **6.2 Protection**

#### **Area of Site Development and Lot Size**

Development and planning controls need to be adopted to stipulate the percentage of land to be retained as native garden to contribute to wildlife conservation and movement in designated corridor areas. This is directly related to the sizes of blocks of land. There is a critical need to retain remaining habitat through existing large blocks of naturally vegetated land. This in part has been addressed by the various building and locality plans, but these controls should be reviewed.

#### **Landscape Plans**

A major problem with intensive development appears to be the proliferation of hard surfaces (paving, decks) and subsequent loss of remnant vegetation in backyards. Council should continue to require the submission of landscape plans for each Development Application and Building Application within mapped corridors and priority given to indigenous planting.

#### **On Site Detention**

Structures for on site detention of stormwater within corridor areas need to be located within the

developed area of the site such as underneath driveways, etc., and not in the remnant vegetation area.

#### **Retention of Existing Natural Features**

In the subdivision, development and building application processes, applicants must demonstrate that natural features are retained. This may include natural watercourses, existing vegetation and retention of a range of age classes of vegetation (including old growth as well as regenerating younger specimens to assist in continued recruitment) as opposed to revegetation of a site.

#### **Subdivision Applications**

All subdivisions in areas mapped as habitats or corridors should be referred to Council's environmental staff for assessment of flora and fauna including consideration of the value of the site as part of a corridor. Location of building platforms in relation to landscape features, retention of habitat and implications for surrounding habitat should be critically assessed for their impact on flora and fauna habitats.

#### **Dead Trees**

Dead trees are an important source of habitat hollows and are already protected by Council's Tree Preservation Order in Bushland Reserves. This protection of dead trees needs to be extended to cover trees on private property, where risk and safety is not of concern.

#### **Large Subdivisions and New Releases**

Large subdivisions or release areas require detailed fauna conservation planning within the site and to cater for movement to and from surrounding habitat.

#### **Foxes, Cats and Dogs**

Foxes, cats and dogs are significant feral and domestic predators in Pittwater. Subdivisions adjoining major habitats or new release areas may require strict controls on pet ownership in order to conserve native fauna. Council's reserves managers should increase feral animal control

programs and Council's dog control officers should commence evening patrols in corridor areas.

## **6.3 Enhancement**

### **Plans of Management for Large Reserves**

The preparation of management plans for large reserves should be continued and recommendations relating to habitat conservation and enhancement need to be adopted and implemented.

### **Regeneration of Habitat**

Continued funding for bush regeneration programs in significant reserves must be ensured so that habitat restoration or regeneration is maintained and is successful. Privately owned bushland also provides habitat; therefore its regeneration can be encouraged as part of the development assessment process and through community liaison.

### **Corridor Planting**

A program for habitat corridor planting has been commenced in several areas and needs to be expanded to enhance habitat remnants and remnant canopy. Habitat and corridor enhancement programs need to be expanded on lands under public ownership. This could be done with the help of community groups and schools, using Council's Species Care, Rotary Shadehouse programs and other sponsorship opportunities. Planting of corridors on private land will be encouraged. It is essential that all corridor plantings use genetically compatible material i.e. plants grown from locally collected seed or cuttings of species indigenous to the original plant community.

### **Small Parks - Reduced Mowing and Habitat Enhancement**

The habitat value of smaller parks can be enhanced by increased planting of indigenous habitat trees. Natural regeneration should be allowed in those parks with large grassy areas by

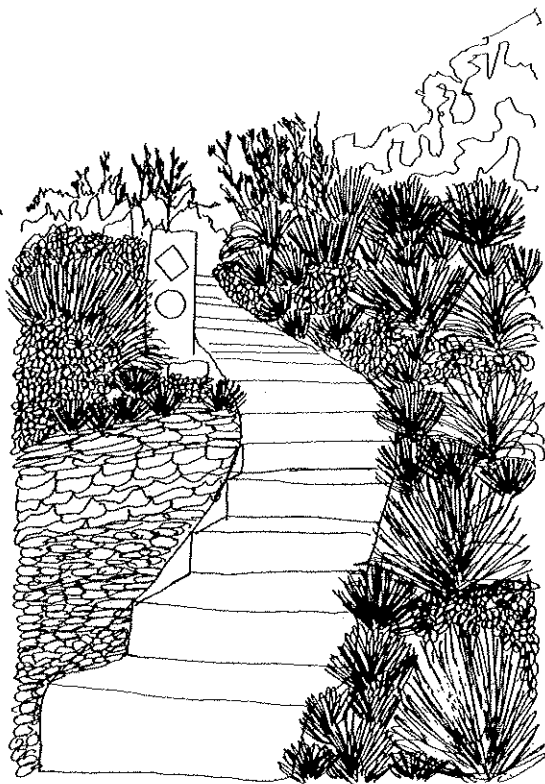
reducing the amount of areas slashed or mowed. James (1994), studying a park in western Sydney, recorded an increase in native plant species richness from 14 species to 45 within 12 months of a change in mowing frequency from six times a year to twice a year.

### **Street Trees**

Habitat trees such as Swamp Mahogany and Coast Banksia occur along many streets. Supplementary planting of these and other appropriate species especially in corridors and priority areas of Newport and Avalon will aid native fauna. Council works staff, utility authorities and residents should be instructed to protect existing trees by avoiding damage to trunks and feeder roots in the drip zone.

### **Public Education Program**

A public education program highlighting the value of backyard bushland needs to be developed and implemented. This should use information in "Native Plants for Your Garden" prepared by Council in 1995. It should also emphasise the threats to fauna and flora posed by factors such as weed invasion and domestic pets. Any future relevant leaflets or publications should discuss the habitat value of backyard bushland and remnant trees.



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## APPENDIX1: PLANTING SCHEDULE

The following species are suggested as those to be planted in areas requiring habitat improvement, based on Sherringham and Sanders (1993) and Cunningham (in prep).

Additional information for planting of appropriate indigenous tree, understorey and ground cover species can be obtained from the following sources - Council's publications eg. "Native Plants for Your Garden", Plans of Management for bushland areas and specific site surveys.

### Careel Bay and Mona Vale

Sydney Golden Wattle	<i>Acacia longifolia</i>
Coast Banksia	<i>Banksia integrifolia</i>
Swamp Oak	<i>Casuarina glauca</i>
Bangalay	<i>Eucalyptus botryoides</i>
Swamp Mahogany	<i>E. robusta</i>
Coast Tea-tree	<i>Leptospermum laevigatum</i>
Snow in summer	<i>Melaleuca linarifolia</i>
Prickly leaved paperbark	<i>M. stypheliodes</i>

### Central Avenue, Avalon Parade, Ruskin Rowe

Hickory	<i>Acacia implexa</i>
Coast Banksia	<i>Banksia integrifolia</i>
Bangalay	<i>Eucalyptus botryoides</i>
Swamp Mahogany	<i>E. robusta</i>
Snow in summer	<i>Melaleuca linarifolia</i>

### Irrawong Reserve

Sydney Golden Wattle	<i>Acacia longifolia</i>
Lilli-pilli	<i>Acmena smithii</i>
Swamp Oak	<i>Casuarina glauca</i>
Black wattle	<i>Callicoma serratifolia</i>
Coachwood	<i>Ceratopetalum apetalum</i>
Bangalay	<i>Eucalyptus botryoides</i>
Swamp Mahogany	<i>E. robusta</i>
Blueberry Ash	<i>Elaeocarpus reticulatis</i>
Saw-sedge	<i>Gahnia sieberi</i>
Cheese Tree	<i>Glochidion ferdinandi</i>
Snow in summer	<i>Melaleuca linariifolia</i>
Bleeding heart	<i>Omalanthus populifolius</i>
Kanooka	<i>Tristaniopsis laurina</i>

## **Warriewood Wetlands**

Waterlogged areas  
Twig rush  
Native Reed  
Cumbungi

*Baumea juncea*  
*Phragmites australis*  
*Typha orientalis*

## **Elanora and Monash Golf Courses**

Sydney Golden Wattle  
Coast Banksia  
Old Man Banksia  
Scribbly gum  
Grey gum  
Black Ash  
Finger Hakea

*Acacia longifolia*  
*Banksia integrifolia*  
*B. serrata*  
*Eucalyptus haemastoma*  
*E punctata*  
*E. sieberi*  
*Hakea dactyloides*



## APPENDIX 2: ENDANGERED FAUNA IN PITTWATER

**KEY:** SMR = Species Management Report  
 RP = Recovery Plan  
 E (TSC) = Endangered Species (Schedule 1- Part 1, Threatened Species Conservation Act)  
 V = Vulnerable Species (Schedule 2 - Threatened Species Conservation Act)  
 E = Endangered (Commonwealth Legislation).

Species	Habitat	Status Nsw	Status Aust.	Recovery Plan
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### Amphibia: 3

Green & Golden Bell Frog	Permanent Waterbodies	E (TSC)	-	-
Giant Burrowing Frog	Creeks	V	-	-
Red-crowned Toadlet	Sandstone ridges & ephemeral creeks	V	-	-

### Birds: 17

Bush Stone-Curlew	Undisturbed grassy Woodland	E (TSC)	-	SMR NPWS
Little Tern	Beaches, estuaries	E (TSC)	E	SMR NPWS
Regent Honeyeater	Forest & woodland	E (TSC)	E	RP in review
Osprey	Coast and tidal rivers	V	-	SMR NPWS
Australasian Bittern	Swamp	V	-	-
Black Bittern	Marshes, creeks in low forest	V	-	-
Mongolian Plover	Tidal mudflats estuaries	V	-	SMR NPWS
Pied Oystercatcher	Beaches, estuaries	V	-	SMR NPWS
Rose-crowned Fruit-dove	Rainforest	V	-	SMR in prep
Superb Fruit Dove	Rainforest	V	-	SMR in prep
Glossy Black-Cockatoo	Casuarina woodland and Forest	V	-	-
Swift Parrot	Urban areas, Forest	V	-	-
Turquoise Parrot	Open forest, Woodland	V	-	-
Superb Parrot	Open Woodland	V	-	-
Powerful Owl	Forest	V	-	-
Masked Owl	Open Forest	V	-	-
Eastern Bristlebird	Woodland Grassland, Swamp	V	-	-

## Mammals: 7

Southern Bandicoot	Brown	Dense habitats	scrubby	E (TSC)	-	-
Tiger Quoll		Forest, Rainforest	Woodland	V	-	-
Koala		Forest, Woodland		V	-	Management Plan for NSW
Squirrel Glider		Forest, Woodland		V	-	-
Common Bent-wing Bat		Forest and caves		V	-	-
Great Pipistrelle		Forest, Woodland		V	-	-
Eastern Little Mastiff-bat		Forest, Woodland		V	-	-

## Reptiles: 1

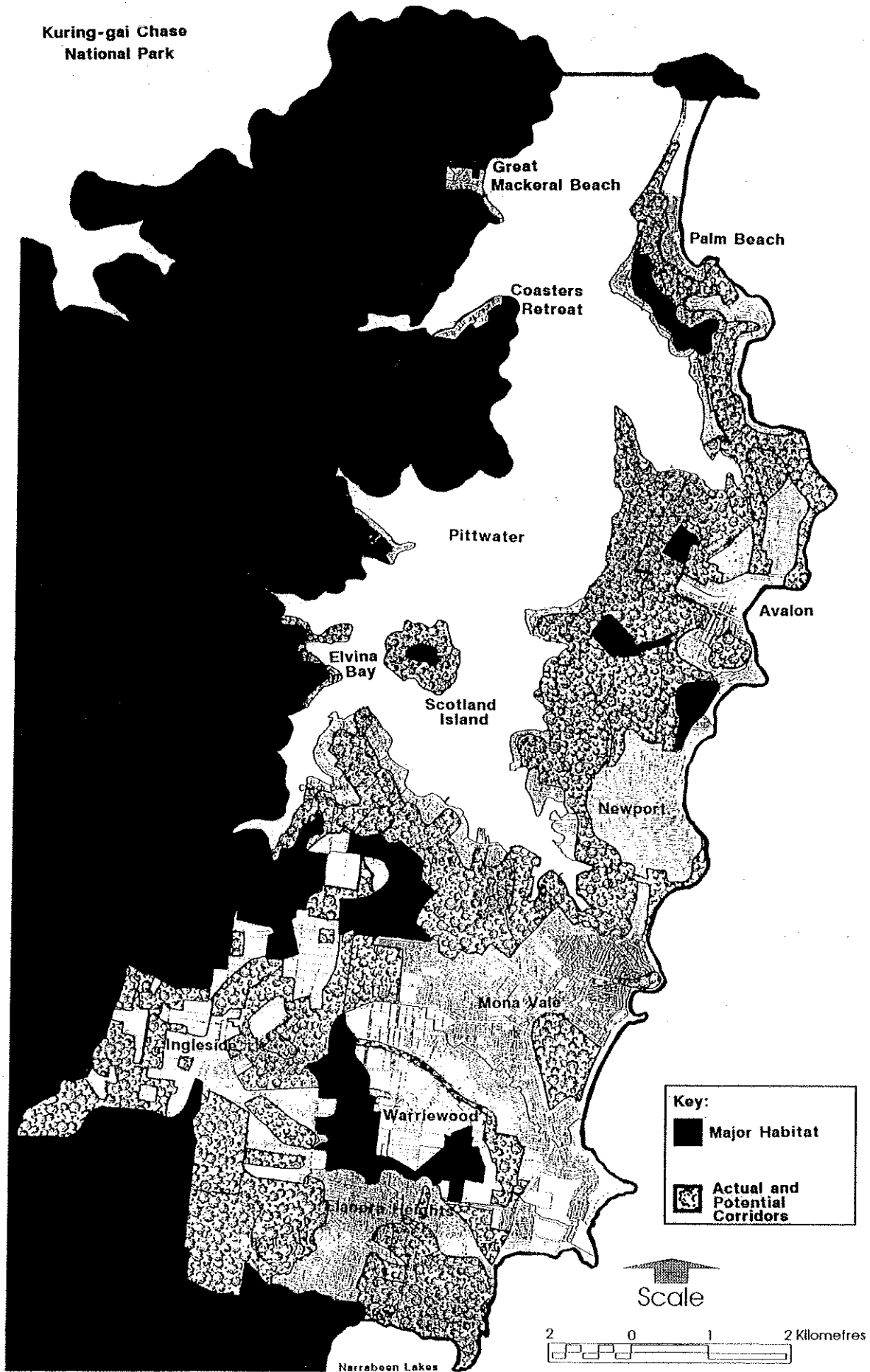
Rosenbergs monitor		Low Woodland Rocky Heath	V	-	-
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## APPENDIX 3: LOCALLY AND REGIONALLY SIGNIFICANT FAUNA SPECIES

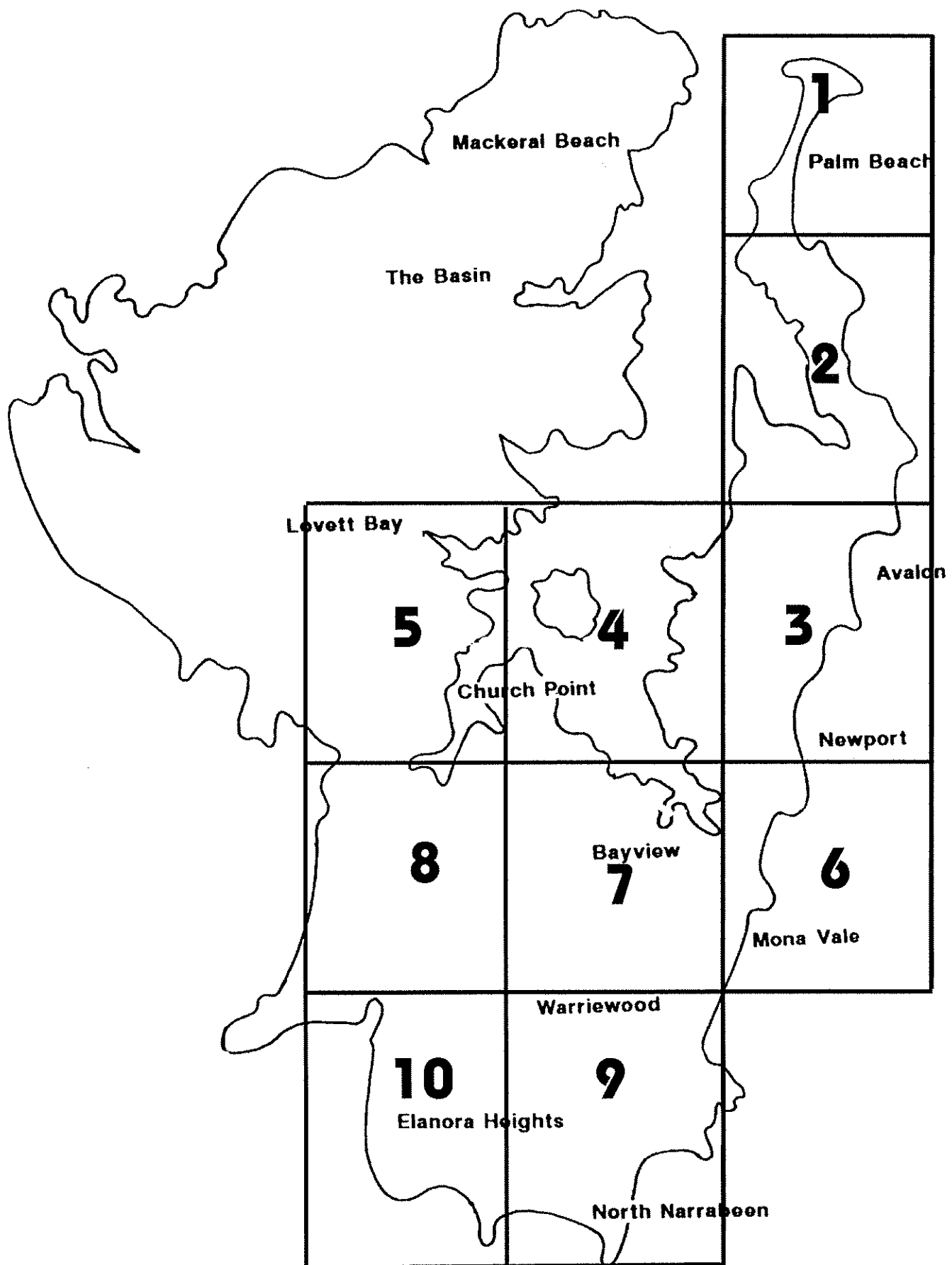
Species	Habitat	Significance
<b>Amphibia</b>		
Brown Tree Frog	Wetlands	North limit of range
<b>Birds</b>		
Brush Turkey	Rainforest	Southern limit of range
Brown Goshawk	Forest/Woodland	Coastal restriction
Lewins Rail	Swamps, lagoons	Uncommon
Whimbrel	Estuaries, coastal grassland	Southern part of range
Wandering Tattler	Mudflats, rocky shores	Uncommon
Red-rumped Parrot	Grassland	Coastal population declining
Pheasant Coucal	Coastal areas	Near southern limit of range
Noisy Pitta	Rainforest	Near southern limit of range
White-bellied Cuckoo-shrike	Woodland	Uncommon, near southern limit of range
Logrunner	Rainforest	Restricted to rainforest
Tawny Grassbird	Grassland, Heath, Swamp	Uncommon, near southern limit of range
Origma	Sydney sandstone	Restricted to Sydney sandstone
Brown Honeyeater	Forest, Woodland, Heath	Near southern limit of range
Black-chinned Honeyeater		
Crescent Honeyeater	Dense, wet forest	Near northern limit of range
Chestnut-breasted Mannikin	Wet grassland, Reeds	Southern limit of range
White-winged Chough	Woodland, Scrub	Extreme range reduction in Sydney area
Pied Butcherbird	Woodland	Uncommon on coast
Regent Bowerbird	Rainforest	Southern limit of range
Suberb Lyrebird	Rainforest Forest	Population declining
<b>Mammals</b>		
Yellow-footed Antechinus	Most	Regionally uncommon
Long-nosed Bandicoot	Scrubby understorey in woodland and forest	Drastic decline in population around Sydney

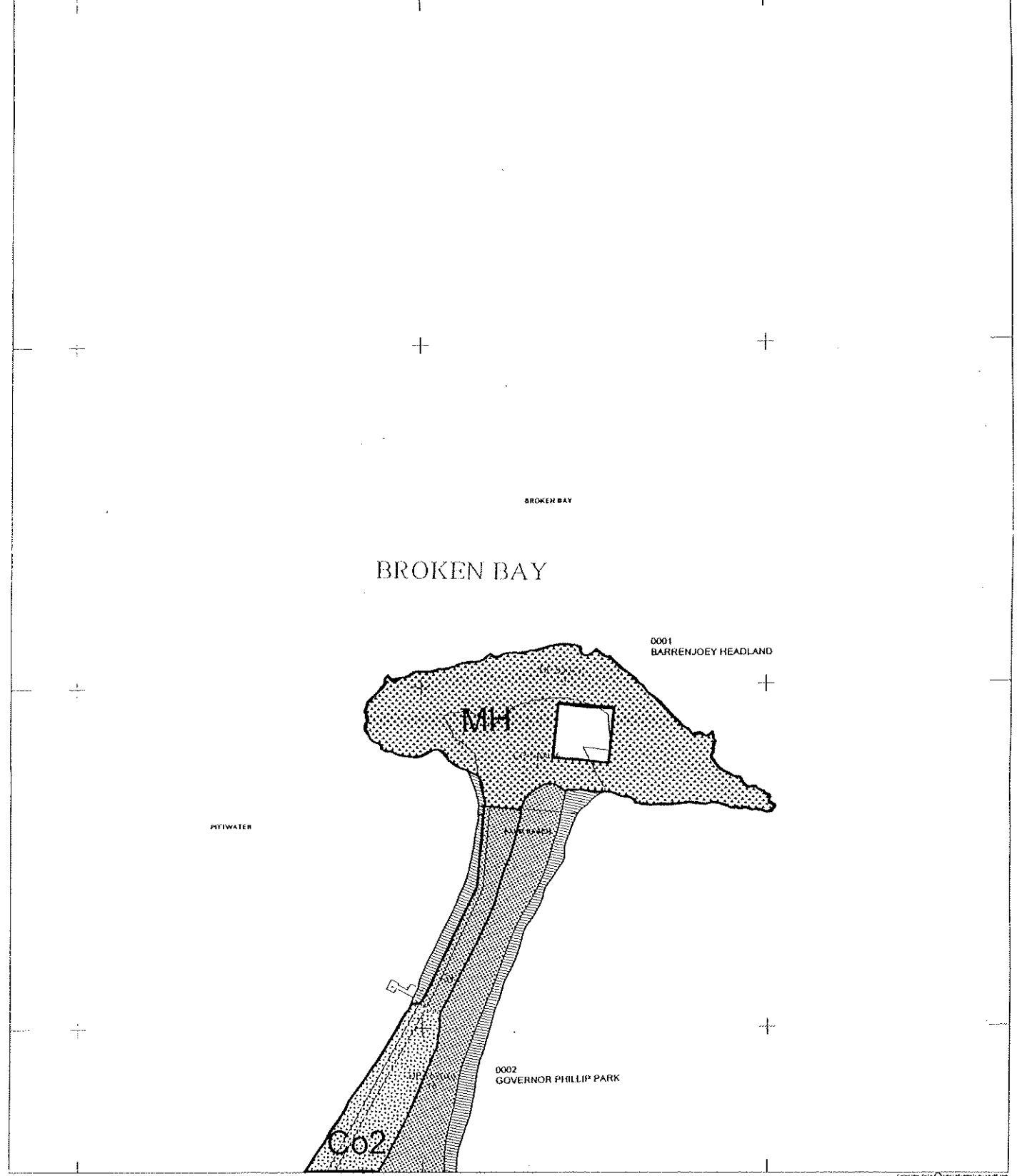
POLICY	ACTION	RESPONSIBILITY	COMPLETED BY	COST ESTIMATE	PERFORMANCE MEASURES
<b>PROTECTION</b>					
Site coverage	Appropriate development and planning controls in corridors	Landuse Planning	Ongoing Incorporate into Pittwater 2000 LEP	staff time	Limit habitat loss
Landscape Plans	Retain / promote native vegetation & limit hard surfaces	Landscape Architect & Building Surveyor	Ongoing	staff time	Limit habitat loss
Retain Natural Features	Retain watercourses & native vegetation of different age classes	Landscape Architect, Tree Preservation Officer, Building Surveyor, Reserves, Engineers	Ongoing	staff time	Limit habitat loss and enhance corridors
On Site Detention	To locate within development area of site	Building Surveyor & Drainage Engineer	Ongoing	staff time	Limit habitat loss
Subdivision Applications	Refer those in corridors to Environmental Officer	Subdivision Planner & Environmental Officer	Ongoing	staff time	Limit habitat loss
Tree Preservation Orders & Landscape Management Policy	Extend policy on dead trees to private land (to check if hollows present and re public safety)	Tree Preservation Officer & Environmental Officer	1996	staff time	Retain habitat hollows
Large Subdivisions & New Releases	Detailed flora & fauna conservation planning	Landuse Planner & Environmental Officer	As appropriate	Developer funded	Retain habitats and corridors
Domestic Animals	Dog control	Compliance Manager	Ongoing	Overtime \$8,000	No. unrestrained dogs impounded & no. infringement notices served.
Feral Predators	Fox & feral cat control	Environmental Officer & Reserves Manager	Commence 1996	Contractors \$20,000	No. of foxes & feral cats removed from reserves
<b>ENHANCEMENT</b>					
Plans of Management for Large Reserves	Targets to conserve & enhance habitats to be included & implemented	Environmental Officer	Plans 1996 Implementation ongoing	Additional budget for implementation	Habitats conserved & enhanced
Habitat Regeneration	Continue bush regeneration programs & promote regeneration of backyard bush through advice to community	Environmental Officer & Reserves Manager	Ongoing	Current staff & funds; expansion of program will require additional funds	Habitats regenerated
Corridor Planting	Use of indigenous flora and fauna habitat species in key corridor areas including reserves, private lands, schools, etc	Environmental Officer, Landscape Architect & Reserves Manager, Coastal Environment Centre	Ongoing	staff time, current funds, sponsorship, joint programs, school, community groups	Planting of corridors
Small Parks	Reduce mowing area & frequency, increase habitat area	Environmental Officer, Landscape Architect & Reserves Manager	Ongoing plus new programs 1996	staff time	Decreased mown area/ larger regenerating habitat area/ increased species diversity
Street Trees	Use of indigenous flora & fauna habitat species in key areas Tree protection	Reserves Manager, Landscape Architect & Tree Preservation Officer Works staff, utilities, residents	Ongoing	staff time, include within current street tree planting budget	Increased indigenous plantings in habitat & corridor areas  Health of existing trees

Kuring-gai Chase  
National Park



**Pittwater Habitat and Wildlife Corridors  
Concept Map**





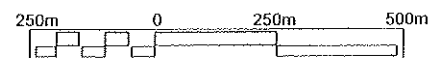
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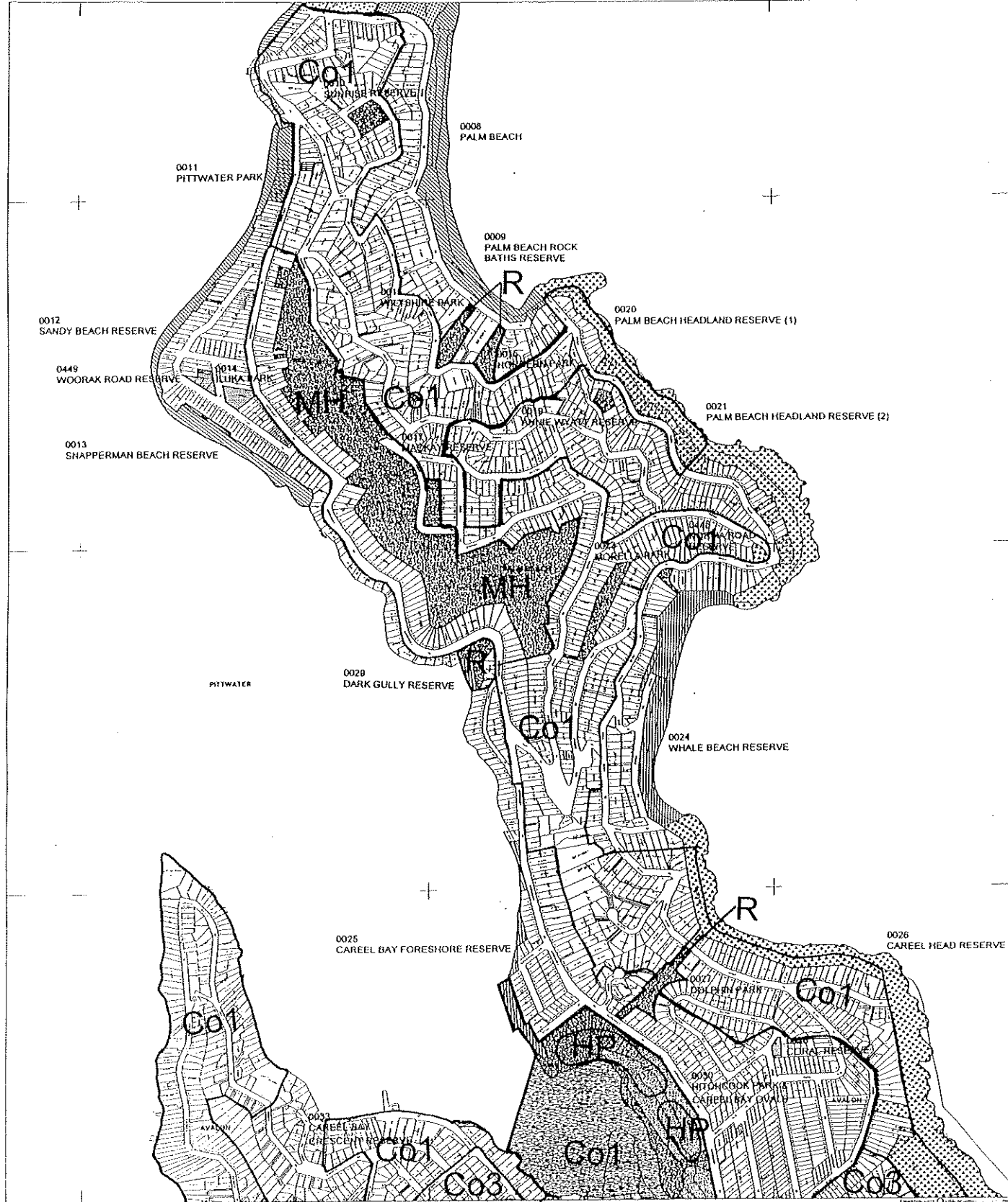
MH	Major habitat areas	Co1	Those areas though disturbed are likely to be of habitat value due to good crown cover and/or understory	HP	High priority areas essential to fauna movement
R	Smaller Council reserves likely to have modified habitat or suffering adverse edge effects				
Co2	Mostly cleared non-residential areas with good potential for improvement of habitat	Co3	Residential areas with some tree cover but requiring supplementary planting to aid fauna movements		

## Habitat & Wildlife Corridors

### Location Map 1

Scale





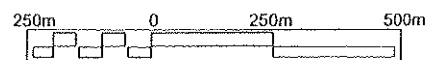
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## Habitat & Wildlife Corridors

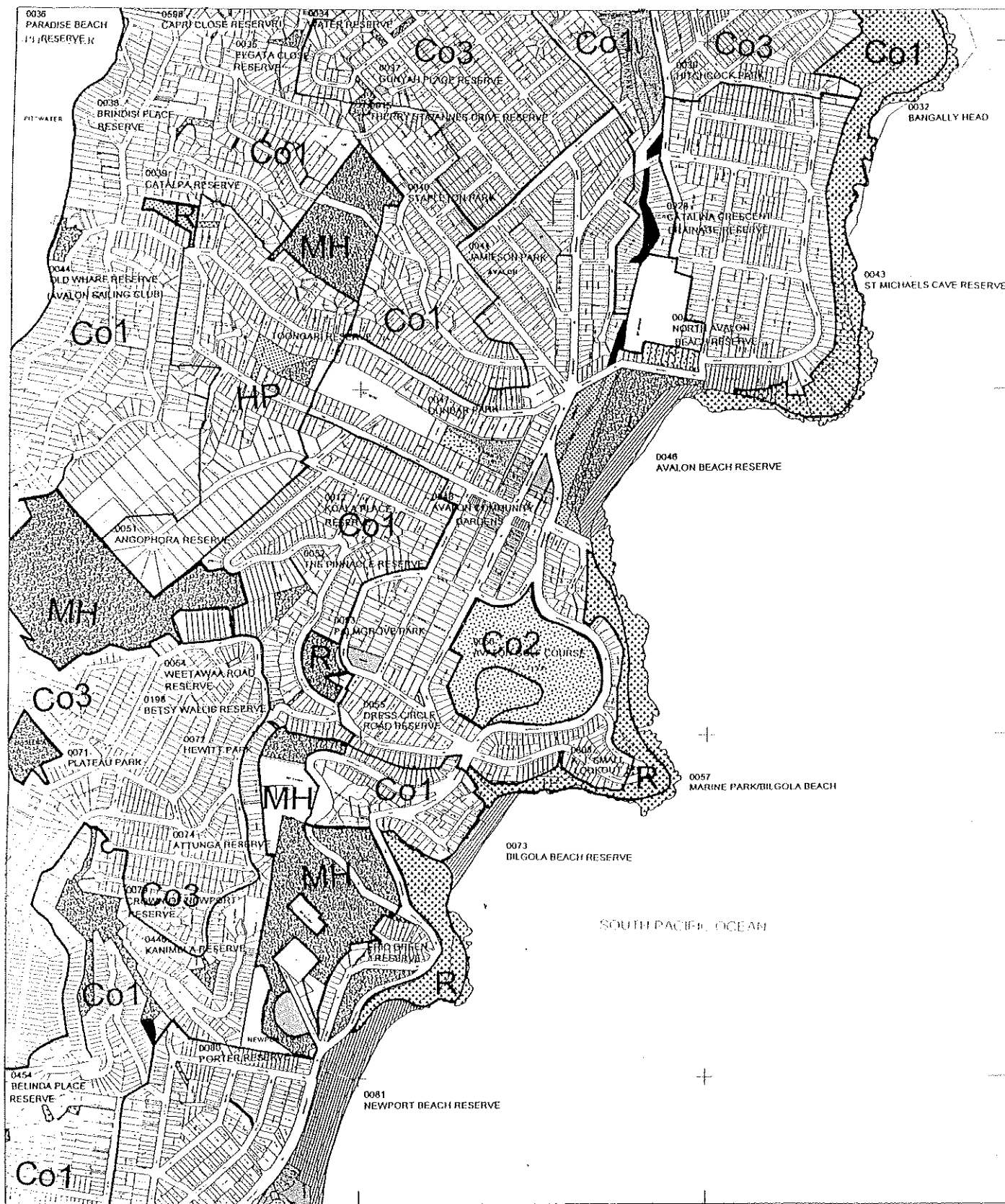
### Location Map 2

Scale



Pittwater Council





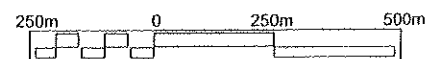
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## Habitat & Wildlife Corridors

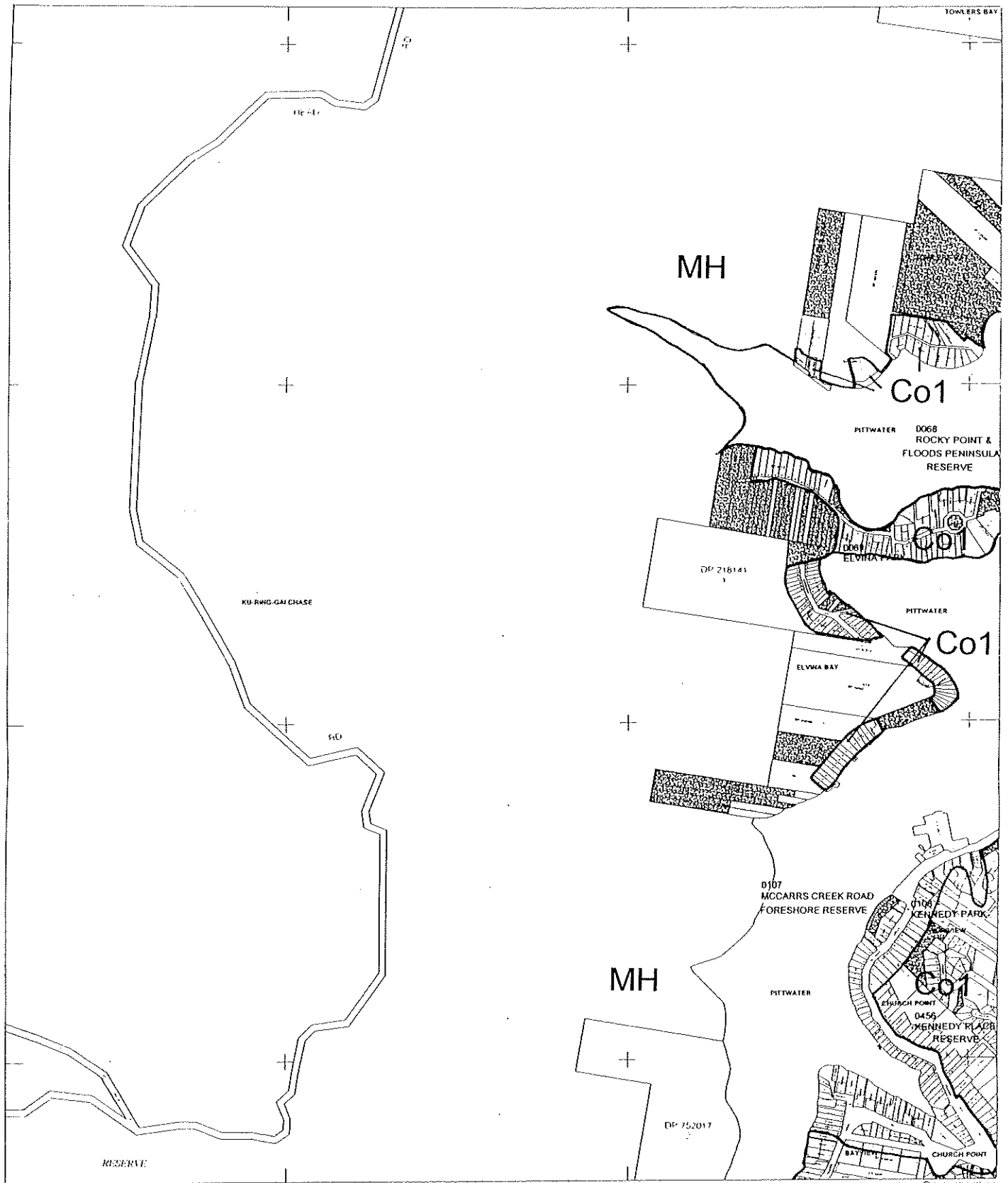
### Location Map 3

Scale



Pittwater Council





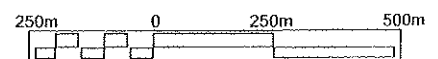
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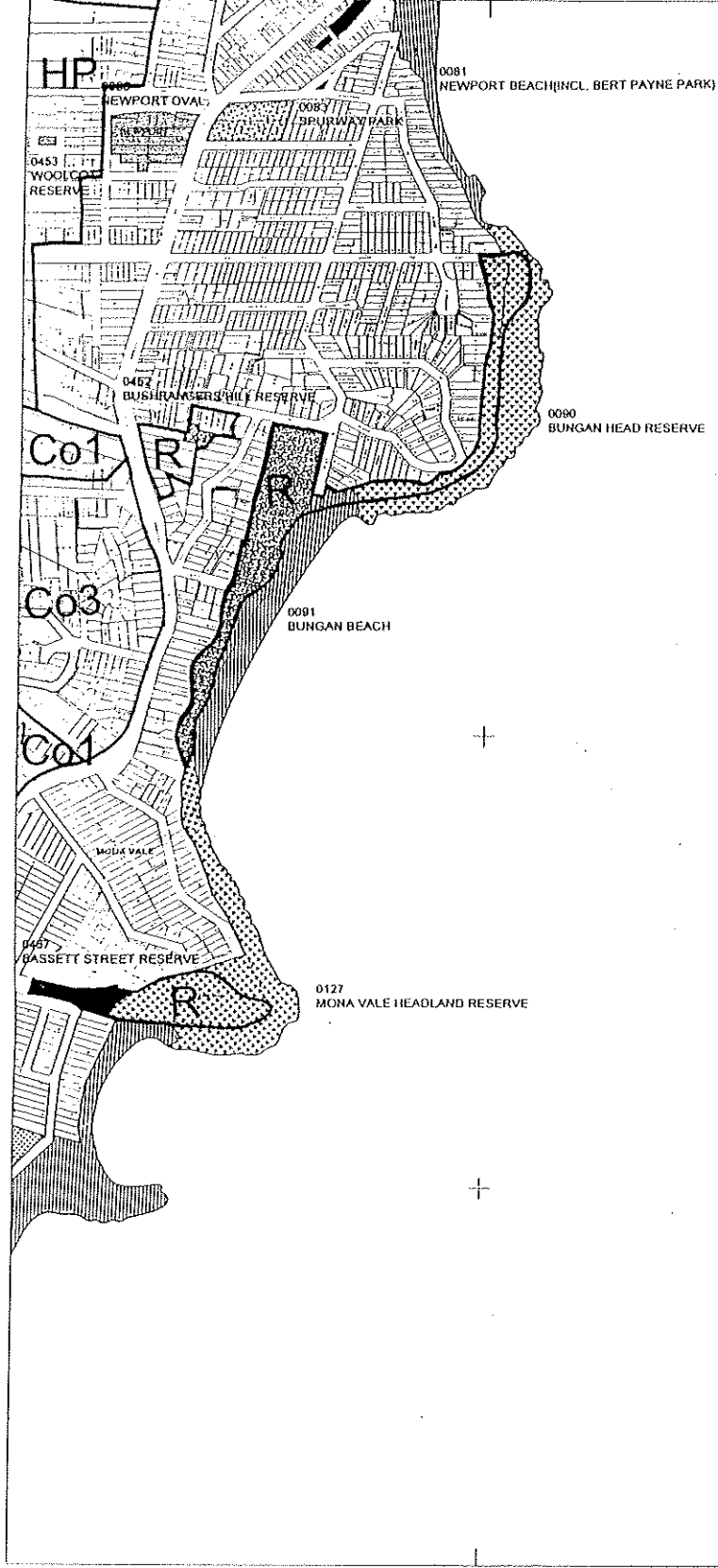
## Habitat & Wildlife Corridors

### Location Map 5

Scale



Pittwater Council



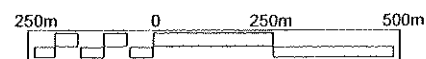
## KEY

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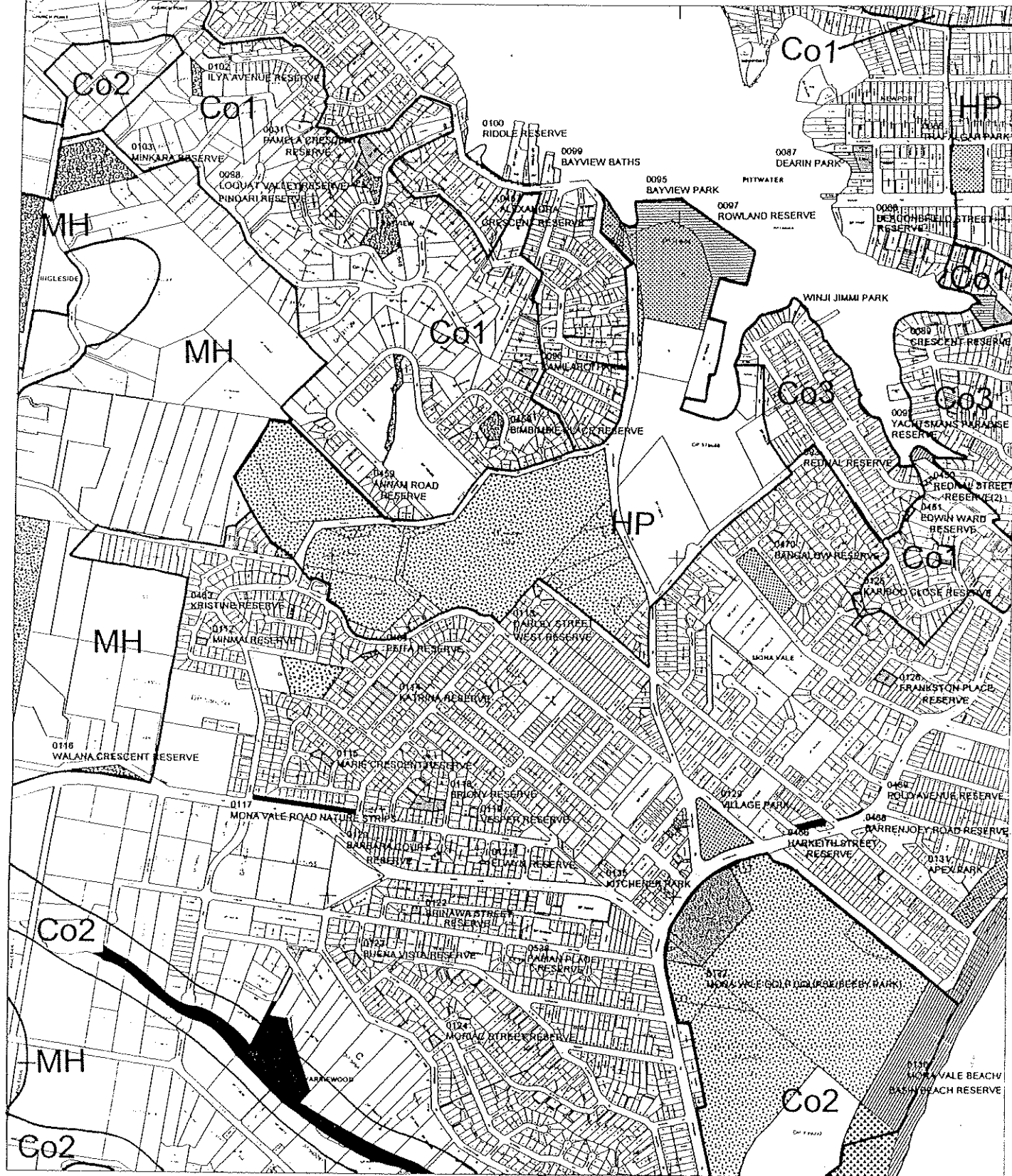
## Habitat & Wildlife Corridors

### Location Map 6

Scale



Pittwater Council



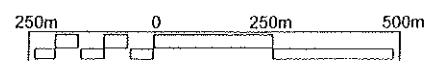
## KEY

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## Habitat & Wildlife Corridors

### Location Map 7

Scale



Pittwater Council



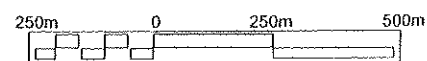
## KEY

MH	Major habitat areas	Co1	Those areas though disturbed are likely to be of habitat value due to good crown cover and/or understorey	HP	High priority areas essential to fauna movement
R	Smaller Council reserves likely to have modified habitat or suffering adverse edge effects				
Co2	Mostly cleared non-residential areas with good potential for improvement of habitat	Co3	Residential areas with some tree cover but requiring supplementary planting to aid fauna movements		

## Habitat & Wildlife Corridors

Location Map 8

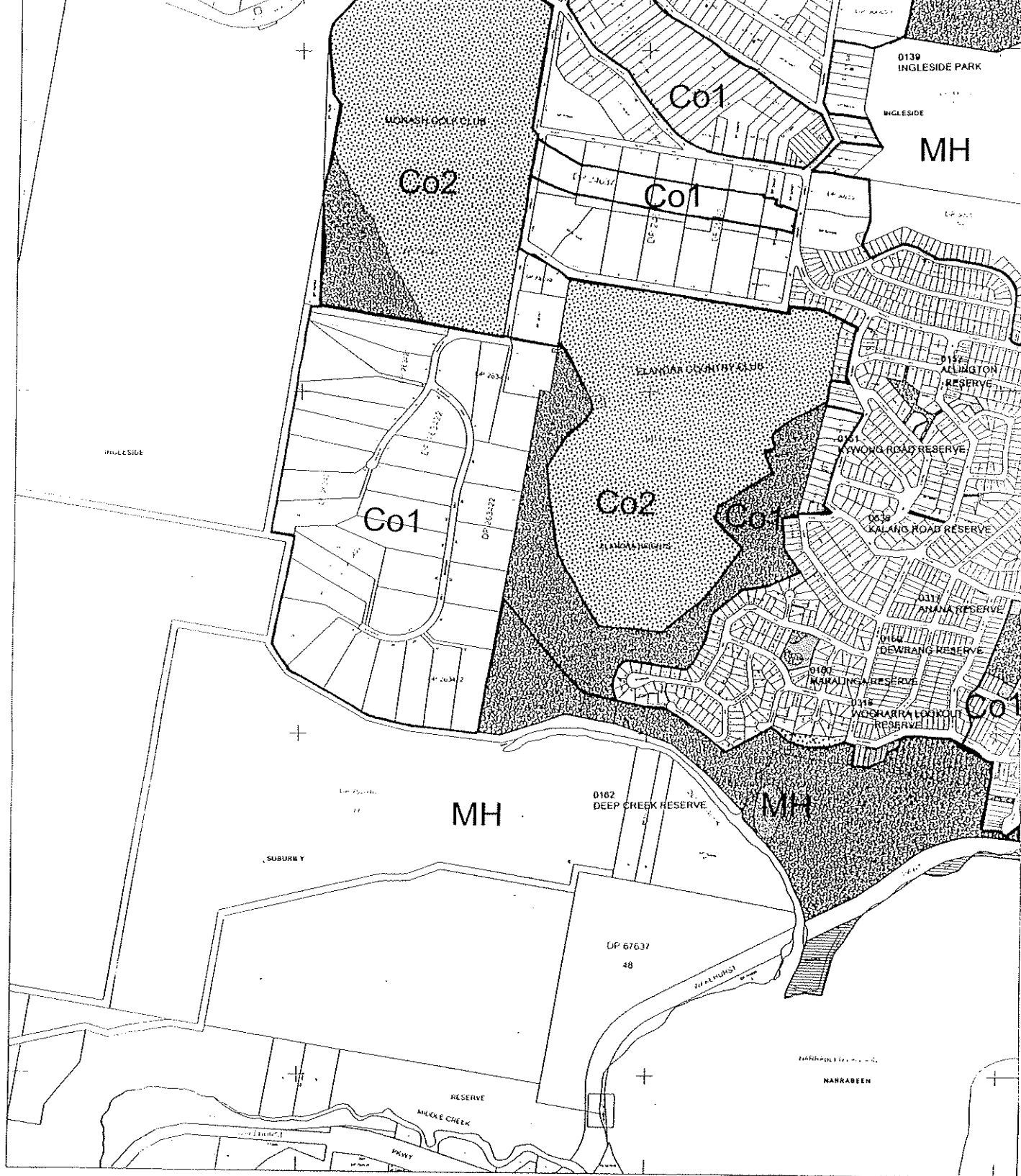
Scale



 Pittwater Council







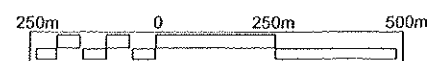
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## Habitat & Wildlife Corridors

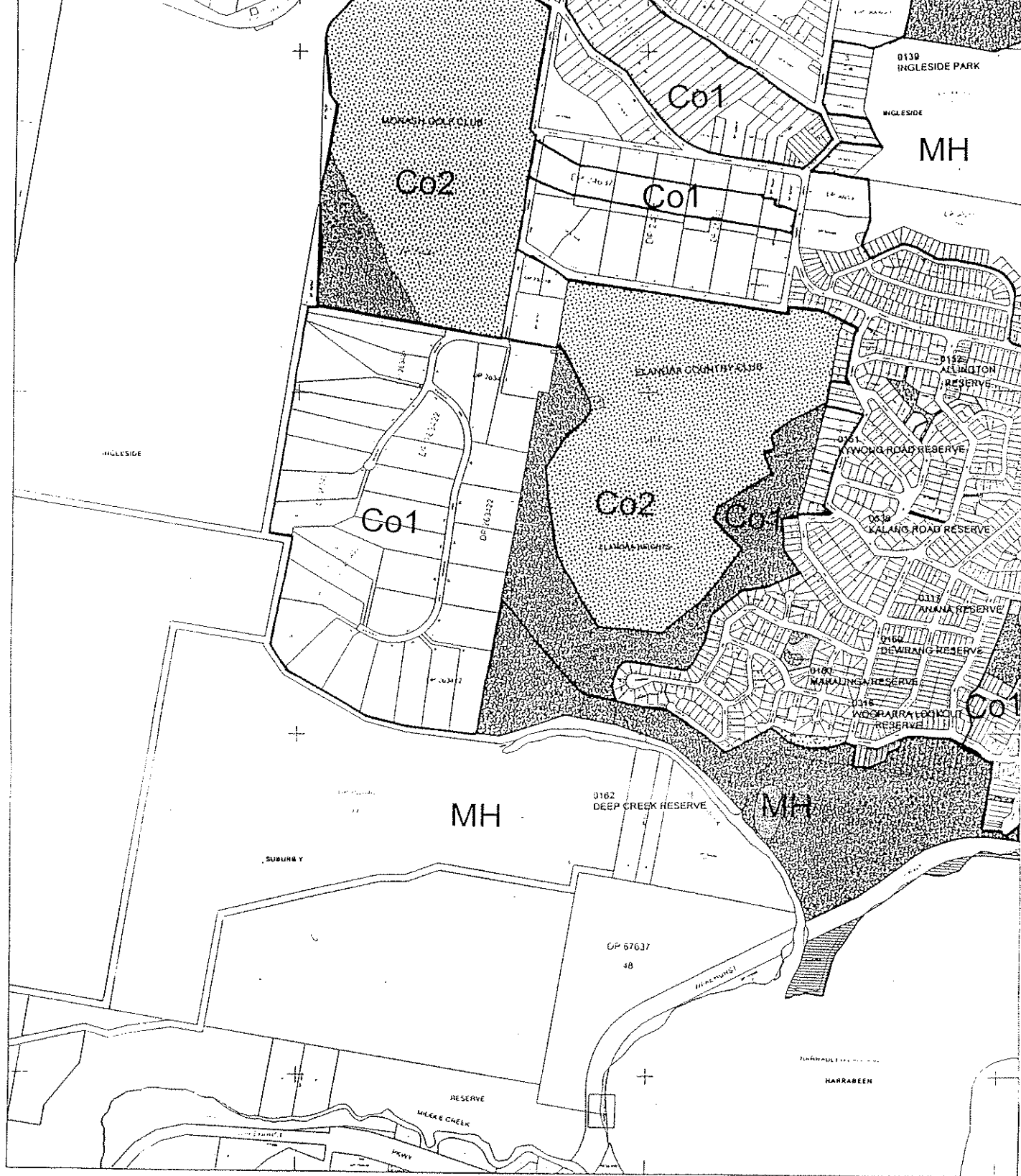
### Location Map 10

Scale



Pittwater Council





## KEY

MH	Major habitat areas	Co1	Those areas though disturbed are likely to be of habitat value due to good crown cover and/or understory	HP	High priority areas essential to fauna movement
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## Habitat & Wildlife Corridors

### Location Map 10

Scale

