

Plans of management are generally prepared on a five yearly basis and aim to provide for longer term planning considerations.

- Funding is dependent on available Council resources and must be assessed against the other priorities of Council.
- Works will be implemented according to priorities. Budget allocations will be assigned as part of the process of the annual review of the Pittwater Management Plan.

Pittwater Natural Areas Plan of Management

Part 1 of 2 - Generic Management Issues

Prepared under the Crown Lands Act, 1989 & Local Government Act, 1993
Prepared by Pittwater Council December 2009



PITTWATER COUNCIL

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Introduction

Pittwater is within the Guringai Homelands.

Natural areas define Pittwater and are reflected in the Pittwater Community Plan:

'Pittwater is a Series of Villages Connected by Bush, Beach and Water.'

Pittwater is fortunate to have a high diversity of natural areas remaining across the LGA. Natural area reserves are those where the land is classified as natural areas with the subcategories of **bushland**, **wetland**, **escarpment**, **watercourse** and **foreshore** as defined in the *Local Government Act 1993*.

The Pittwater LGA covers 125 square kilometres including Pittwater estuary and small areas within Ku-ring-gai Chase National Park. Of this, Pittwater Council is directly responsible for the care control and management of 589 hectares of open space consisting of both Community land and Crown reserves. Natural areas cover 447 hectares including 103 bushland reserves or part reserves covering 303 hectares.¹

Natural area reserves are linked together by bushland on private properties and along nature strips. Collectively the reserves contribute to protecting over 30 vegetation communities and providing wildlife corridors and key habitats for native species including the 22 threatened plant species, two Endangered Populations and eight Endangered Ecological Communities that occur in the LGA.

The natural areas in Pittwater are highly regarded by local residents and visitors. There is a strong desire to retain natural areas for their environmental, scenic and recreational values. The reserves contribute to the 'green' landscape character of the Pittwater area.

This Natural Areas Draft Plan of Management (PoM) applies specifically to Council managed natural area reserves and covers Community land and Crown land. To maximise ecological viability of the reserves and retain the bushland character of Pittwater the PoM also considers actions required outside the reserves.

Many of the reserves contain similar management issues, due to their fragmented nature, stemming from the impact of human activities and natural hazards including flooding, landslip, bushfire, coastal inundation and sea level change. Additionally there are regional management issues associated with sustaining ecological process, corridor links and habitat values.

In order to gain consistent management across the LGA, while facilitating reserve specific management needs, the this PoM is in two parts. Part 1 introduces and discusses the issues common to all or most reserves.

Part 2 contains specific information, management actions and a masterplan for each individual reserve. The reserve chapters will be exhibited and adopted as required.

¹. *Pittwater Council Open Space, Bushland and Recreation Strategy* pp. 6-7.



Boondah Reserve East



Bilgola North Headland



Refuge Cove Reserve



Rocky Point



Bilarong Sanctuary



Sunrise Reserve



Elizabeth Park



Careel Bay



Deep Creek Reserve

Plates 1 – 9. Images showing the diversity of Pittwater's natural areas.

1. Background

1.1 What is a Plan of Management?

A Plan of Management (PoM) is the principal guiding document that directs the future planning and management of public open space. PoMs are:

:

- written by council in consultation with the community;
- identify the important features of the land;
- clarify how council will manage the land; and
- indicate how the land may be used or developed; and

1.2 The Structure of this Plan of Management

This PoM has been prepared in two parts. Part 1 is a generic document that provides a broad outline of the issues relevant to all natural area reserves. Part 2 provides the specific site information and management issues for individual reserves. As the reserve chapters are completed, they will be publically exhibited and adopted by Council.

1.3 The Purpose of this Plan of Management

This PoM aims to ensure that the natural area reserves of the Pittwater area retain their environmental, recreational, scenic, cultural and social values and to address key issues relating to the management of the reserves, including conservation, management, access and public safety.

The objectives of this PoM include:

- comply with the *Local Government Act, 1993* in regards to the preparation of plans of management for Community land.
- comply with the *Crown Lands Act, 1989* in regard to the preparation of plans of management for Crown lands; and
- direction for effective management to achieve sustained Natural Area reserves;
- comply with threatened Species Conservation Act and provide effective management for sustaining threatened species, populations and Endangered ecological Communities;
- prioritisation of management actions that fulfil *Priority Action Statements* (as per the *Threatened Species Act*) for sustaining threatened plants and animals.
- consolidating the planning context and broad issues relating to reserve management into one document;
- state permissible and prohibited uses of the reserves in accordance with the public purpose of the reserves or the land categorisation and zoning categories;
- provide the public and Pittwater Council with a clear direction regarding the future use and management of the natural areas covered by this plan;

1.4 Preparation

Pittwater's natural area reserves are highly valued by the community. The level of community participation has been graded as 'Level 1 – High Impact on the LGA' under Council's Community Engagement Policy No 170. The community have contributed in determining what values are important and how these should be protected and

enhanced. Fifty eight people attended the public meeting that was held during the preparation of this Plan. Issues raised at the meetings and submissions received have been taken into account when preparing the Draft Plan.

1.5 Land to which this Plan applies

This PoM only relates to Community land and Crown Reserves. The Crown Reserves are managed under the *Crown Lands Act, 1989* (CLA) and include land devolved to Council under s.48 of the LGA 1993 or where a Reserve Trust has been appointed and Council manages the affairs of the trust. Community lands are owned by Council and are managed under the Local Government Act, 1993 (LGA). Refer to Table 1.1 for the full list of reserves and Table 1.2 for the list of Crown Reserves.

Table 1.1 List of Natural Area Reserves covered in this PoM.

A

Algona Reserve, Newport
Anana Reserve, / Dewrang Reserve Elanora Heights
Annam Road Reserve, Bayview
Annie Wyatt Park, Palm Beach ([Crown Reserve](#))
(North) Avalon Headland, Avalon

B

Bangalley Headland Reserve, Avalon
Bayview Foreshores, Bayview ([Crown Reserve](#))
Betty Morrison Reserve – refer Bungan Headland
Bilgola North Headland / A.J. Small Lookout, Bilgola
Bilgola South Headland, Bilgola
Bimbimble Place Reserve, Bayview
Bona Crescent Reserve, Towlers Bay
Botham Beach Reserve, Church Point ([Crown Reserve](#))
Bungan Headland Reserve / Betty Morrison, Newport
Bush to Bay, Avalon
Bushrangers Hill Reserve, Newport

C

Cabarita Road Reserve, Avalon
Cabbage Tree Road Reserve, Bayview
Cannes Reserve, Avalon
Capri Close Reserve, Avalon
Careel Headland Reserve, Avalon
Clareville Wharf Reserve – refer Old Wharf Reserve

D

Dark Gully Reserve, Palm Beach
Dewrang Reserve – refer Ananna Reserve
Dolphin Park, Whale Beach

E

Elanora Road Reserve – refer Anana Reserve
Elgata Reserve, Avalon
Elizabeth Park, Scotland Island
Elvina Park, Elvina Bay
Elvina Bay and Lovett Bay (North) Reserve
Elvina Bay and Lovett Bay (South) Reserve

F

Floods Reserve, Lovett Bay
Frog Hollow Reserve, Avalon

G

Goodwin Road Reserve, Newport

H

Harold Reserve, Scotland Island
Hilltop Road Reserve, Newport
Hordern Park, Palm Beach

I

Ilya Avenue Reserve, Bayview
Ingleside Chase, Ingleside
Ingleside Park, Ingleside
Irrawong Reserve, Warriewood

K

Kanimbla Reserve, Bilgola
Kennedy Park, Bayview
Kennedy Place Reserve, Bayview
Kiah Reserve, Clareville
Koorawall Reserve, Bayview
Kunari Place Reserve / Darley Street West Reserve, Mona Vale
Kundibah Reserve, Elanora Heights
Kywong Reserve/ St Andrew's Gate Reserve, Elanora Heights

L

Leahvera Reserve, Scotland Island
Little Head / Palm Beach Headland, Palm Beach
Loquat Valley Reserve, Bayview
Lovett Bay (North) and Towler's Bay Reserves,
Lovett Bay (South) and Elvina Bay Reserves
Lower Plateau Road Reserve, Bilgola

M

Mackeral Beach Reserve, Mackeral Beach
(North) Mackeral Beach Reserve, Mackeral Beach
Maralinga Reserve / Koorangi Reserve, Elanora Heights
Marine Park, Palm Beach
McCarrs Creek Road Foreshore Reserve, Church Point.
(East) McCarrs Creek Road Reserve, Church Point
Marine Reserve, Bilgola
Minkara Reserve, Bayview
(North) Mona Vale Headland Reserve, Mona Vale (Part Crown Reserve)
(South) Mona Vale Headland Reserve, Mona Vale
Morella Park, Palm Beach
Morning Bay Reserve, Towlers Bay

N

Narrabeen Headland Reserve, Narrabeen
Newport Headland, Newport
Newport Heights Reserve, Newport
Norma Road Reserve, Palm Beach

O

Old Wharf Reserve / Clareville Wharf Reserve, Avalon (Crown Reserve)

P

Palmgrove Park, Avalon
Parklands Reserve, Mona Vale
Pathilda Reserve, Scotland Island
Pearl Place Reserve, Narrabeen
Pindari Reserve, Bayview

Q

Quarter Sessions Road Reserve, Church Point

R

Refuge Cove Reserve, Avalon
Rocky Point Reserve, Elvina Bay

S

Salt Pan Cove Reserve, Newport
Shearwater Reserve, Ingleside
South Bilgola Headland, Bilgola
Sunrise Reserve, Palm Beach (Crown Reserve)

T

Towlers Bay and Lovett Bay (North) Reserves
Turimetta Headland Reserve, Warriewood

W

Whale Beach Headland Reserve, Whale Beach
Wiltshire Park, Palm Beach
Wirringulla Reserve, Elvina Bay
Woodlands Reserve, Mona Vale

Note: The following plans of management cover individual natural area reserves.

Bushland:

Angophora Reserve (including Hudson Park and Betsy Wallis Reserve) PoM 2002
Deep Creek Reserve including Woorara Lookout, Lumeah Reserve and Bilarong Sanctuary (pending)
Hewitt Park and Hamilton Reserve (pending)
Irrawong Reserve (pending)
Koorowall Reserve (Winerreremmy Bay PoM 2003) (pending)
McKay Reserve PoM 2001
Narroy Park and Nareen Reserve (pending)
Nareen Creek Rehabilitation Plan 2008
Stapleton Park PoM 1995
Toongari Reserve (pending)

Wetlands:

Warriewood Wetlands PoM Parts 1 and 2 1998
Warriewood / Ingleside Escarpment (North) Ingleside chase) (pending)
Careel Bay Wetlands

Escarpment:

Heydon Reserve PoM 2005
Ingleside Warriewood Escarpment Reserve

Beaches:

Pittwater Ocean Beaches PoM 2005, 2006, 2007
Bungan Beach Reserve incorporating Betty Morrison Reserve

Note: The ocean beaches PoM does not include the headland reserves, various intertidal Protected Areas, natural wave cut rock platforms or the Bicentennial Coastal Walkway.

Table 1.2 Crown Reserves

Crown Reserve No. & Gazette	Public purpose	Lot & DP	Given Name	Address	Management & Miscellaneous Information
R500261 4.7.1941	Public Recreation	Lots 6 to 7 DP 19219	Sunrise Reserve	19 Sunrise Road, Palm Beach	Management - DEVOLVED to Council 4.7.1941 under s.48 LGA 1993. Council cannot issue tenures.
R100205 16.2.1990	Public Recreation	Lots 1-5,8,9,10 DP 19219	Sunrise Reserve	as above	Management - Palm Beach Public Recreation (R100205) Reserve Trust appointed 16.7.2004. Council manages the affairs of the trust.
R67806 12.8.1938	Public Recreation	Lots 348 to 351 DP 16362.	Annie Wyatt Reserve	4a Rockbath Road, Palm Beach	Management DEVOLVED to Council 12.8.1938 under s.48 LGA 1993. Council cannot issue tenures.
R73333 14.10.1949	Public Recreation	Lot 5 DP 260209	Clareville Wharf Reserve	28c Hudson Parade, Clareville	Management - Old Wharf Reserve (R73333) Reserve Trust appointed 7.8.2009. Council manages the affairs of the trust.
R89563 29.8.1975	Public Recreation	Lots 7049 to 7052 DP 93801	Bayview foreshores	1828 Pittwater Road, Bayview	Management - DEVOLVED to Council under s.48 of the LGA 1993 This linear stretch of foreshore includes four land parcels R89563 adjacent to Bayview Yacht Racing Club which are submerged at high tide.
R78588 11.5.1956	Public Recreation	Lot 7059 DP 93799	Botham Beach	10a McCarrs Creek Road, Church Point	Management - Botham Beach (R78588) Reserve Trust appointed 7.8.2009. Council manages the affairs of the trust.
R73168 13.5.1949	Public Recreation	Lot 7067 DP1051226 Lot 1 DP 1094825	Mona Vale Headland Reserve	63 Hillcrest Avenue, Mona Vale	Management - DEVOLVED to Council under s.48 of the LGA 1993. Foreshore area adjacent to Mona Vale Headland Reserve

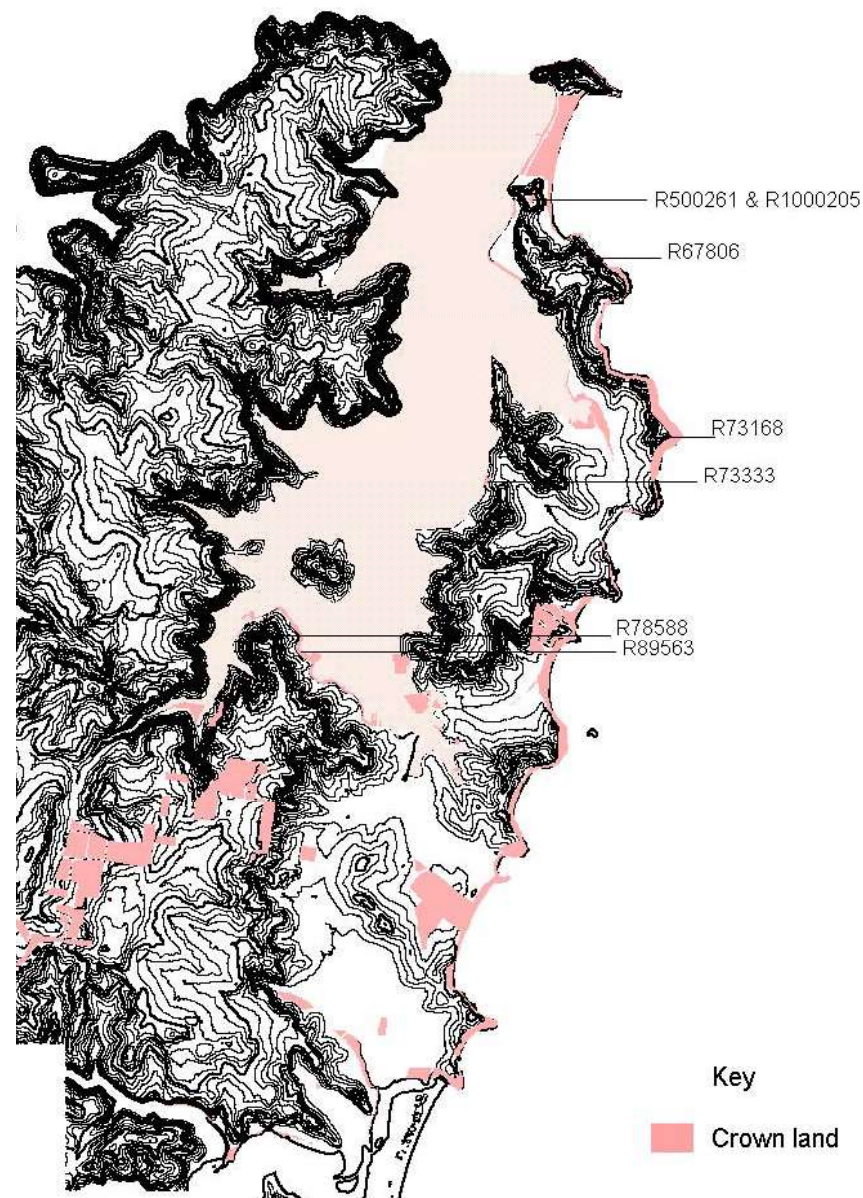


Figure 1.1. Location of Crown reserves covered in this PoM.

2. Key Legislation

This section summarises the purpose of key legislation that has been taken into consideration during the preparation of this PoM.

Legislation may be accessed on www.legislation.nsw.gov.au.

2.1 Crown Lands Act, 1989

Provisions in the *Crown Lands Act, 1989* (CLA) are relevant to Crown reserves contained in this PoM. In particular:

The **Objects of the Act** (s10) are to ensure that Crown Land is managed for the benefit of the people of New South Wales and in particular to provide for:

- a proper assessment of Crown land;
- the management of Crown Land having regard to the principles of Crown land management contained in the CLA;
- the proper development and conservation of Crown Land having regard to those principles;
- the regulation of the conditions under which Crown Land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with;
- the reservation or dedication of Crown Land for public purposes and the management and use of the reserved or dedicated land; and
- the collection, recording and dissemination of information in relation to Crown land.

The **Principles of Crown Land Management** (s 11) which are:

- that environmental protection principles be observed in relation to the management and administration of Crown Land;
- that the natural resources of Crown Land (including water, soil, flora, fauna and scenic quality) be conserved where possible;
- that public use and enjoyment of Crown Land be encouraged;
- that, where appropriate, Crown Land should be used and managed in such a way that both the land and its resources are sustained in perpetuity; and
- that Crown Land be occupied, used, sold, leased or licensed in the best interests of the State consistent with the above principles.

Reservations – Power of the Minister to reserve land (CLA)

This section allows the minister to reserve any Crown land for a public purpose and so provide a public benefit. Uses, activities, development and agreements must be “acceptable” under the declared public purposes of the reserve or additional purpose if applicable. It is permissible to reserve Crown land for one or more purposes. The public purpose broadly defines the uses and activities permissible on Crown lands. The zoning of the lands under Pittwater LEP should be complementary to the declared public purpose.

More specific land uses can be developed under a plan of management prepared under s 112 of the CLA. It should be noted that Crown land unlike community land is not “categorised.” The specific natural and cultural attributes of the Crown land should be identified in the POM.

Reserve Management - under s 98 of the CLA, if a Council is a manager of a reserve trust and the reserve is a public reserve; the trust has all the functions of a council under the LGA. However, the trust has no authority to classify a public reserve or any part of it as operational land under the LGA. Section 98 of the CLA also provides that the CLA prevails over the LGA to the extent of any inconsistency with the LGA in relation to a public reserve. A reserve is defined under s 78 of the CLA.

Reserve Trust Management

A Reserve Trust is a corporation established and appointed by the Minister for Lands to manage a Crown reserve (s 92 CLA). A reserve trust is responsible for the care, control and management of the reserve consistent with provisions in the CLA. In most instances the local council is appointed to manage the affairs of the reserve trust. The Land and Property Management Authority (LPMA) encourages the public to be either directly involved in, or contribute to, the planning and management of the reserve trust system. Most of the Crown reserves subject to this plan are managed by a reserve trust. However, in some instances management devolves on council under s.48 of the Local Government Act, 1993.

Accountability of the Reserve Trust

The *Crown Lands Regulation (2000)* specifies that the reserve trust is required to keep records that will permit dissection of monetary details including revenue, details of improvements and details of all leases and licences. Under s. 106 of the CLA, proceeds received by a trust must be must be spent within the reserve/s for which it is responsible

A reserve trust must furnish to the Minister each year a report on its activities, including financial statements, assets, heritage, works undertaken, insurance, fire prevention OH&S measures, plans of management and tenures (s 22 CLA 89 & *Crown Lands Act Regulation 2006* Clause 32).

Tenures on Crown land

A reserve trust or trustee may issue tenures (lease or licence) for activities on the reserve subject to the terms of the Minister's consent in writing (s 102 CLA.) Revenue generated from tenures on Crown reserves, in the absence of a direction from the Minister, must be directed to the general purposes of the reserve trust (s 106 CLA).

A temporary licence (s 108 CLA) does not require the Minister's consent and can be granted for a maximum period of one year. All leases and licences over Crown land are to be registered with the Department of Lands. Lease agreements should be modelled on the specific conditions applying to the leasing of Crown land (s .34 CLA).

Section 11 of the CLA 89 encourages the “multiple use of Crown land” to ensure the broader community have the opportunity to use the land for public recreation and other activities. On reserves for public recreation the reserve trust manager must ensure that there is access as of right to reserve and its facilities and equity in terms of access by sporting bodies and organisations.

Tenures are listed and authorised in the individual reserve chapters in Part 2 including tenures for rock pools.

Amendments to the Crown Lands Act, 1989

The 2005 amendments to the Crown Lands Act may be applicable in some reserves, particularly foreshore areas including:

- the Minister can now authorise an "additional purpose" for a Crown reserve under s 112A CLA. This can be done by way of a plan of management or by directly gazetting a new purpose under s 121A;
- section 34A allows the Minister to enter into a lease or licence over Crown land that has been reserved for a public purpose. Distribution of proceeds is at the discretion of the minister; and
- Section 92 (6A), (6B) and (6C) allow for the establishment of different reserve trust managers to manage different parts of a reserve or be established to manage a reserve for a defined function. This has allowed the department to establish Regional Crown Reserves throughout the State over broad areas of reserved and leased Crown lands.

2.2 Local Government Act, 1993

The *Local Government Act, 1993*, (LGA) emphasises council's responsibility to actively manage public land and to involve the community in developing a strategy for management. The Act requires that councils classify public land as Operational or Community. The LGA requires a PoM to be prepared for Community land.

The PoM outlines the use and management of Community land. Community land is categorised and subject to separate core objectives as listed in Table 2.1. Part 2 of the PoM separately identifies each reserve, its ownership, classification and category. The reserves can be put into one or more of the following categories:

- natural area (further categorised as bushland, wetland, escarpment, watercourse or foreshore);
- general community use;
- sportsground;
- park; or
- area of cultural significance.

Table 2.1 Land Categories under the LGA

Categorisation of 'Natural Areas'	Further categorisation of 'Natural Areas'
Core objectives LGA 36E	Bushland
<ul style="list-style-type: none"> Conserve biodiversity and maintain ecosystem functions in respect of the land, or the feature or habitat in respect of which the land is categorised as a natural area. Maintain the land, or that feature of habitat, in its natural state and setting. Provide for the restoration and regeneration of the land. Provide for community use of and access to the land in such a manner as will minimise and mitigate any disturbance caused by human intrusion, and assist in and facilitate the implementation of any provisions restricting to use and management of the land that are set out in a recovery plan or treat abatement plan prepared under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994. 	<p>Core objectives - LGA 36J</p> <ul style="list-style-type: none"> Ensure the ongoing ecological viability of the land by protecting the ecological biodiversity and habitat values of the land, the flora and fauna and other ecological values of the land. Protect the aesthetic, heritage, recreational, educational and scientific values of the land. Promote the management of the land in a manner that protects and enhances the values and quality of the land and facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion. Restore degraded bushland. Protect existing landforms such as natural drainage lines, watercourses and foreshores. Retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term. Protect bushland as a natural stabiliser of the soil surface.
	Wetland
	<p>Core objectives – LGA 36K</p> <ul style="list-style-type: none"> Protect the biodiversity and ecological values of wetlands, with particular reference to their hydrological environment (including water quality and water flow), and to the flora, fauna and habitat values of the wetlands. Restore and regenerate degraded wetlands. Facilitate community education in relation to wetlands, and the community use of wetlands, without compromising the ecological values of wetlands.
	Escarpment
	<p>Core objectives LGA s 36L</p> <ul style="list-style-type: none"> Protect any important geological geomorphological or scenic features of the escarpment. Facilitate safe community use and enjoyment of the escarpment.
	Watercourse
	<p>Core objectives – LGA 36M</p> <ul style="list-style-type: none"> Manage watercourses so as to protect the biodiversity and ecological values of the in-stream environment, particularly in relation to water quality and water flows, Manage watercourses so as to protect the riparian environment, particularly in relation to riparian vegetation and habitats and bank stability Restore degraded watercourses. Promote community education and community access to and use of the watercourse, without compromising the other core objectives of the category.
	Foreshore (note: below the high water mark is Crown land)
	<p>Core objectives – LGA s 36N</p> <ul style="list-style-type: none"> Maintain the foreshore as a transition area between the aquatic and the terrestrial environment, and to protect and enhance all functions associated with the foreshore's role as a transition area. Facilitate the ecologically sustainable use of the foreshore, and to mitigate impact on the foreshore by community use.

Additional Land Categories (not Natural Areas) that may apply

General Community Use

Core objectives - LGA s 36

- Promote, encourage and provide for the use of the land, and to provide facilities on the land, to meet the current and future needs of the local community and of the wider public;
 - in relation to public recreation and the physical, cultural, social and intellectual welfare or development of individual members of the public; and
 - in relation to purposes for which a lease, licence or other estate may be granted in respect of the land (other than the provision of public utilities and works associated with or ancillary to public utilities).

Park

Core objectives LGA s 36G

- to encourage, promote and facilitate recreational, cultural, social and educational pastimes and activities, and
- to provide for passive recreational activities or pastimes and for the casual playing of games, and
- to improve the land in such a way as to promote and facilitate its use to achieve the other core objectives for its management.

Area of Cultural Significance

Core objectives – LGA s 36H

- To retain and enhance the cultural significance of the area (namely its Aboriginal, aesthetic, archaeological, historical, technical or research or social significance) for past, present or future generations by the active use of conservation methods.
- Those conservation methods may include any or all of the following methods:
 - the continuous protective care and maintenance of the physical material of the land or of the context and setting of the area of cultural significance,
 - the restoration of the land, that is, the returning of the existing physical material of the land to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material,
 - the reconstruction of the land, that is, the returning of the land as nearly as possible to a known earlier state,
 - the adaptive reuse of the land, that is, the enhancement or reinforcement of the cultural significance of the land by the introduction of sympathetic alterations or additions to allow compatible uses (that is, uses that involve no changes to the cultural significance of the physical material of the area, or uses that involve changes that are substantially reversible or changes that require a minimum impact),
 - the preservation of the land, that is, the maintenance of the physical material of the land in its existing state and the retardation of deterioration of the land.
- A reference in subsection (2) to land includes a reference to any buildings erected on the land.

2.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act, 1979* (EPAA) forms the basis of town planning in New South Wales. The EPAA provides the legislative power for the preparation of State Environmental Planning Policies (SEPPs); Regional Environmental Plans (REPs); and Local Environmental Plans (LEPs.) This includes the *Pittwater Local Environmental Plan, 1993*.

2.4 State Environmental Planning Policy (Infrastructure) 2007

The Infrastructure SEPP includes generic provisions to allow for development to be exempt or require a Part V Assessment. There are 23 classes of infrastructure development where a DA is not required and only a Part V Assessment has to be undertaken. Some of the relevant classes of infrastructure development that may be carried out by or on behalf of council on a public reserve are:

- roads, cycle ways, single storey car parks, ticketing facilities and viewing platforms greater than 100 sq m;
- information facilities such as information boards;
- lighting;
- landscaping, including irrigation schemes;
- amenity facilities; and
- environmental management works.

2.5 (Other) State Environmental Planning Policies (SEPP)

Bushland in Urban Areas (SEPP 19) - protects and preserves bushland within certain urban areas, as part of the natural heritage or for recreational, educational and scientific purposes. The policy is designed to protect bushland in public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

Littoral Rainforests (SEPP 26) - protects littoral rainforests, a distinct type of rainforest well suited to harsh salt-laden and drying coastal winds. The policy requires that the likely effects of proposed development be thoroughly considered in an environmental impact statement.

Koala habitat Protection (SEPP 44) - encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range. The policy applies to 107 local government areas. Local councils cannot approve development in an area affected by the policy without an investigation of core koala habitat. The policy provides the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat.

Coastal Protection (SEPP 71) - aims to ensure that the coastal zone is protected in accordance with the principles of ecologically sustainable development. SEPP 71 defines a category and development assessment process for development in sensitive coastal locations, including land within 100m above mean high water mark of the sea, a bay or an estuary.

Coastal Wetlands SEPP 14 - ensures coastal wetlands are preserved and protected for environmental and economic reasons. The policy applies to local government areas outside the Sydney metropolitan area that front the Pacific Ocean. The policy identifies over 1300 wetlands of high natural value from Tweed Heads to Broken Bay and from Wollongong to Cape Howe. Land clearing, levee construction, drainage work or filling may only be

carried out within these wetlands with the consent of the local council and the agreement of the Director General of the Department and Planning. Such development also requires an environmental impact statement to be lodged with a development application. The policy is continually reviewed. It has, for example, been amended to omit or include areas, clarify the definition of the land to which the policy applies and to allow minimal clearing along boundaries for fencing and surveying.

Fisheries Management Act 1994 - the NSW Department of Primary Industries (DPI) is responsible for the management of fish and marine vegetation, including mangroves. Any development or activity that may harm mangroves must be referred to the NSW DPI for approval and a permit obtained. Their definition of 'harm' includes pull up and cut). Policies and guidelines applicable to the protection of mangroves can be found on the DPI's website.

2.6 Pittwater Local Environmental Plan 1993

The Pittwater Local Environmental Plan (PLEP) contains the land use planning controls and standards to allow the orderly and economic and sustainable development of lands in the LGA. The PLEP is made up of a zoning map and written instrument that categorises development or land uses as either permissible or prohibited. All development must comply with the provisions of the relevant zoning. The PLEP allows development to be carried out without consent when authorised in an 'adopted' POM.

2.7 Other key legislation

Environmental Protection Biodiversity Conservation Act, 2000 - is the Australian Government's key piece of environmental legislation.

NSW Threatened Species Conservation Act, 1995 - identifies and protects native plants and animals in danger of becoming extinct. The Act also provides for species recovery and threat abatement programs.

Protection of the Environment Operations Act, 1997 - is the key piece of environment protection legislation administered by the Department of the Environment and Climate Change. The legislation addresses environmental offences, air quality, water quality, pollution control, and noise control.

3. Council Development and Community Activities

3.1 Vision

Vision statement: "Pittwater's natural areas contribute to the green landscape character of the locality and are valued for their cultural, educational, scientific, economic, environmental and recreational opportunities."

The PoM for Pittwater's natural area reserves has been based on the vision statement. The vision has been developed in consultation with the community. The Vision provides the long term focus for all future decisions affecting natural areas. The vision preserves community values that can be shared with future generations.

3.2 Management Principles for Natural Areas

A set of management principles have been established that will protect, conserve and enhance natural areas including:

- minimise negative impacts on the natural environment;
- continue to review management practices to keep up-to-date with best practices;
- integrated a well-connected network of natural area reserves:
 - dominance of the urban forest
 - maximise wildlife corridors
 - integrate activity nodes in neighbouring parklands; and
- provide a diverse range of recreational, economic and social opportunities in reserves where appropriate, while conserving the natural environment and its ecosystems.

3.3 Council Development and Uses for all Natural Areas

A. Development of Crown Reserves

In the case of development on Crown Reserves, the proposed uses must be acceptable with the declared public purpose. (Refer to table 1.2 Crown Reserves).

- Acceptable land uses on Crown reserves **are determined by the declared public purpose** (s 78 CLA) and not necessarily uses described in the zoning table (s 78 CLA).
- Certain development will be subject to provisions in State Environmental Planning Policy (Infrastructure) 2007
- Land uses identified in the POM should generally accord with generic definitions in the LEP "Interpretation". e.g. recreation areas, refreshment rooms, etc.

B. Development of Community land

Permissible Uses Exempt

In the case of development on Community land any land use must:

1. be for a purpose that promotes or is related to the use and enjoyment of that land;
2. be consistent with the purposes for which the land was reserved or otherwise set aside for public use;
3. does not substantially diminish public use of, or access to that land; and

4. does not adversely affect the natural environment, the heritage significance of the heritage items or heritage conservation areas or the existing amenity of the area.

- In the case of development that is exempt development; an environmental assessment of the development may be required under the EPAA Part V process.

List of Prohibited Uses

- Prohibited activities include, but are not limited to the following list:
- dumping of refuse (including building materials, soil, fill, household waste, etc.);
- private alienation or encroachment;
- recreational motor vehicles, including four-wheel driving, motor bike or trail bike riding or similar, other than use for filming on a short term basis;
- removal of habitat features such as soil, rocks, stones, fire wood, pebbles and the like;
- unleashed dogs and cats; and
- domestic pets are prohibited from designated 'wildlife protection areas'.

C. Specific Development of Individual Reserves

In the case of development at the reserves, some of the reserves may allow; or conversely prohibit, certain development. In these circumstances the development will be listed in the reserve chapter of Part 2.

3.4 Community Activities

The community or a lessee can seek a permit to carry out certain activities. New works and certain activities are subject to Council approval. Guidelines are available in the relevant Council Policies. Policies include, but are not limited to, the following policies:

- Beach and Rockpool Management (Policy No 88)
- Climate Control (Policy No 176)
- Dog Control (Policy No 30)
- Film Permit (Policy No 96) – Amended September 2005
- Flood Risk Management Policy for Pittwater June 2001
- Geotechnical Risk Management Policy for Pittwater – 2008 (Policy No 178) Interim Policy
- Land – Disposal of Surplus (Policy No 92)
- Naming of Streets and Pathways (Policy No 44)
- Parking – Issue of Annual Permits – Waving of Parking Fees (Policy No 18)
- Pittwater Foreshore and Ocean Front Access (Policy No 171)
- Pittwater Sustainability Policy (Policy No 164)
- Plagues in Parks and Reserves (Policy No. 157)
- Prohibited Activities on Council and Public Reserves (Policy No. 86)
- Public Reserves and Other Land – Resumption for Public Utilities (Policy No 56)
- Reserves, Beaches and Headlands Booking Policy No 93)
- Sale of Drainage Reserves (Policy No 57)
- Signs – Council Facilities (Policy No 129) "Signs as Remote Supervision – Best Practice Manual, 1999."
- Storage of Craft – Dinghies / Boats (Policy No. 26)

- Sustainability Policy (Policy No. 164)
- Temporary Storage on Council Reserves (Policy No. 84)
- Urban Stormwater – Integrated (Policy No. 69)
- Volunteer Bush Regeneration- Guidelines (Policy No. 90)
- Watercourse Preservation (Policy No. 67)

Activity Controls

Disturbance Activities that may be Permissible with Consent

Some disturbance activities may be permissible subject to Council authorisation, establishment of a bond and generally the issuing of a licence. The types of activities that may cause disturbance includes commercial activities such as filming, collection of plant propagules and similar material, or other activities as identified by the appropriate Council staff,

Other disturbance activities may also be permissible under SEPP 19 Clause 6 (1) which allows the following activities without development consent:

- bushfire hazard reduction;
- facilitating recreational use of bushland in accordance with a plan of management referred to in clause 8 of SEPP 19;
- lines for electricity or telecommunication purposes;
- pipelines to carry water, sewerage or gas or pipelines licensed under the *Pipelines Act 1977*, or
- constructing or maintaining main roads.

However, a consent authority shall not consent to the carrying out of development referred to in subclause (1) unless:

- it has made an assessment of the need to protect and preserve the bushland having regard to the aims of this Policy;
- it is satisfied that the disturbance of the bushland is essential for a purpose in the public interest and no reasonable alternative is available to the disturbance of that bushland; and
- it is satisfied that the amount of bushland proposed to be disturbed is as little as possible and, where bushland is disturbed to allow construction work to be carried out, the bushland will be reinstated upon completion of that work as far as is possible.

Reserve bookings

Occasionally reserves may be sought for special uses. Any such use is subject to discussions with Council to assess the appropriateness of the site and will attract a booking fee.

Leases, licences and other estates

A lease or licence is issued by Council for activities that either result in exclusive control for a set period or intermittent, short term occupation. Activities need to take into account the direct and indirect adverse impacts of the proposed activity. If the impact is deemed to be beyond the limit of acceptable change for the natural area, the lease or licence for that activity should not be issued.

Council may enter into a lease, licence or tenure for whole or part of the lands covered in this plan provided that:

- management is in accordance with this plan and relevant with Council policies and guidelines as current at the time of application;
- any agreement would be subject to compatible use of the reserve and for the benefit of the wider public;
- granting of the lease or licence is in accordance with the provisions of the *Local Government Act 1993* or the *Crown Lands Act 1989* as applicable (refer to Tenures of Crown Land under Chapter 3 Legislation); and
- granting of a lease or licence is in accordance with the aims and objectives of *State Environmental Planning Policy 19 - Bushland in Urban Areas*.

This PoM authorises all existing leases and licences applying to the reserves covered in the PoM until the expiry of their current term or amendment.

Tenures (leases, licences) on Crown Reserves require approval from the Minister for Lands. The activities (including activities of a commercial nature) must ensure that:

- the conservation, economic, recreation and social values of the reserve are recognised, protected and enhanced for public enjoyment by current and future generations; and
- the public's right of choice, access and equity is recognised and preserved.

4. Resource Overview

This Chapter describes the natural environment of the Pittwater LGA. It aims to provide an understanding of the local landscapes, their ecology and their significance for society. This background material provides an ethical basis for stewardship.

4.1 Value Statement

Pittwater's rugged topography, waterways and large stretches of natural areas provide the underlying scenic quality and visual appeal of the local government area. Pittwater's natural areas are valued by the community for their contribution in providing the green landscape character of the locality and for their heritage, educational, scientific, environmental and recreational opportunities.

The natural areas represent and provide:

- Cultural and natural heritage
- Biodiversity
- Flora and fauna including rare and threatened species
- Visual amenity
- Educational and scientific resources
- Buffer zones – sun, wind, dust, noise, pollution
- Water quality control
- Passive recreational opportunities

4.2 Indigenous History

Pittwater is within the homeland of the Gu-ring-gai people whose traditional country extends from Narrabeen Lagoon to Broken Bay and possibly to the Central Coast. Clans associated with Pittwater include the Garigai. The diverse flora and fauna, rock overhangs, sandstone outcrops, large trees and other natural features provided for both the spiritual and physical needs of the Aboriginal peoples.

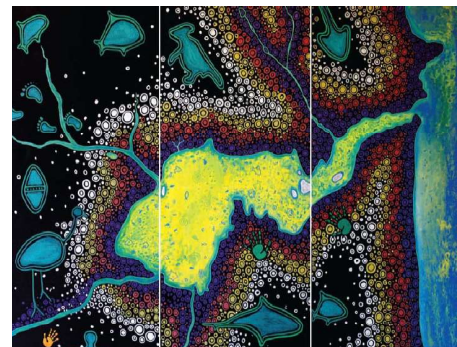
Today, there are 116 known Aboriginal heritage sites within Pittwater Council's direct or indirect planning and assessment responsibility (that is excluding the National Parks.) The most frequently recorded items are engravings; which tend to occur on ridge tops and occasionally along the foreshore or in creeks, then shelters which generally occur on the slopes.

The Aboriginal Heritage Office consider many of these sites to be in remarkable condition. They hold an important part of the local area's Aboriginal and Australian history providing evidence of Aboriginal people's past and way of life before colonisation. In addition to known sites, there are many areas that hold great potential for uncovering further archaeological evidence, particularly in bushland and foreshore areas. Aboriginal heritage sites are diverse and include:

- Shelters with art (drawings and stencils)
- Shelters with midden (including archaeological remains)
- Deposits in rock shelters or overhangs
- Middens or deposits consisting mainly of shells – found near sea coasts beside estuaries and on the banks of lakes and rivers.
- Open campsites consisting of surface scatters of stone, charcoal or bone fragments or slightly raised hearths.

- Sacred trees (used to extract canoes, shields, containers and other items) and carved trees.
- Quarries and axe-grinding grooves
- Paintings
- Rock engravings (engravings are the most frequently recorded Aboriginal heritage items in bushland areas)
- Burial sites
- Sacred trees

The Land retains its cultural values for indigenous peoples and the whole landscape is of importance with high points and cliff tops linking sight lines. There is much in the Indigenous context of belonging to the land that is yet to be known and appreciated by the current population generally.



The Guringai Aboriginal Educational Consultative Group (GAECG) is based on the Northern Beaches and run by Aboriginal people living locally. The Garua Centre, at Brookvale TAFE, contains information on Aboriginal culture and artefacts from the region including the Pittwater local government area.

Figure 4.1. Local artist Jessica Birk's interpretation of the Narrabeen Lagoon Catchment and coastal and cultural links.

4.3 Non-indigenous History

In May 1770 Captain James Cook sailed past the Hawkesbury River estuary and named the inlet Broken Bay. In March 1788 Captain Arthur Phillip and a small party discovered the southern arm of Broken Bay and named it Pittwater in honour of the then British Prime Minister William Pitt the Younger. This was only six weeks after Phillip arrived at Sydney Cove.

By the 1800s, the Pittwater area contained a number of satellite farming communities that supplied produce and raw materials to the settlement at Sydney Cove. Timber was harvested from the steep slopes and fish were taken from the estuary while wheat, oats, potatoes, fruit and vegetables were grown.

Between 1840 and 1870, cargoes of shells were transported from Pittwater to Millers Point to produce lime for the building industry. Other early industries included fish drying at Snapperman Beach, ship building at Careel Bay and Clareville and boatbuilding and saltworks on Scotland Island. In 1894 Ku-ring-gai Chase was dedicated as a national park.

However it wasn't until after the post war period, with the completion of road transport links, that there was a marked increase in suburban development and therefore, most European heritage sites are from the early to mid twentieth-century period.

The list of cultural items is located in a number of Council documents including the 'Pittwater Local Environmental Plan' (LEP) and 'Living Pittwater, Our cultural Plan, Cultural Assets and Resource Inventory 200-2011'. Apart from listings of individual artefacts or sites, there are several conservation areas that are listed in the LEP schedule 9 (see Appendix A).

4.4 Landform

Pittwater's visual and scenic amenity stems from its rugged topography, vast bodies of water and vegetated hillsides. The landform is varied and includes dune systems, headlands and cliffs, tidal mudflats and estuaries, escarpments, plateaus, valleys, sheltered gullies, an island and a tombolo. The varying landforms and environmental conditions have resulted in a range of vegetation types including littoral rainforest, freshwater wetlands, coastal heathlands and open forests.

A dominant feature of the Pittwater area is Pittwater Estuary - a drowned river valley with former deltas and islands located near the mouth of the Hawkesbury-Nepean River system. The estuary covers a surface area of 17.5 square kilometres bound by 77 kilometres of foreshore. The landscapes of the foreshore areas include sandy beaches, creek inlets, steep embankments, rocky shores, tidal flats and sandy shoals (as both fluvial deltas and flood tide marine shoal). The estuary provides a range of habitats including mangrove wetlands, saltmarsh, mudflats and seagrass meadows. The foreshores are highly vulnerable because they are impacted by a range of physical processes including wave run-up, erosion, sea level rise, etc.

The eastern shores of the estuary rise to form Barrenjoey Peninsula. The peninsula ends in a well-defined tombolo that connects Palm Beach to Barrenjoey Headland and its historic Barrenjoey Lighthouse. The peninsula's narrow ridge contains five flat-topped plateaus at Newport, Bilgola, Avalon, Whale Beach and Palm Beach reaching elevations of 100 metres. The western side of the plateau extends from Elanora Heights to West Head and reaches elevations of about 150 metres (McGregor et.al.).

Across the estuary, Ku-ring-gai Chase National Park occupies the deeply dissected Lambert Peninsula. The Park occupies more than 50% of the estuary's catchment and contains extensive eucalypt forest and several small residential settlements adjacent to the foreshore areas. At the southern end of the estuary is Scotland Island, which is 52.5 hectares in size and distinctive in that the native vegetation is all composed of the Pittwater Spotted Gum Forest, an Ecologically Endangered Community.

Pittwater LGA's open ocean coastline extends for 18 kilometres which accounts for 25% of Sydney's coastline. It extends from Barrenjoey Headland in the north to Narrabeen Lagoon in the south. The coastline includes ten sandy beaches - Palm, Whale, Avalon, Bilgola, Newport, Bungan, Bongin Bongin, Mona Vale, Warriwood, Turimetta and Narrabeen. Ten coastal headlands are located between the beaches - Barrenjoey, Little, Careel, Bangalley, Avalon, Bilgola, Bungan, Mona Vale, Turimetta and Narrabeen. Some of the headlands form offshore reef systems which has created a series of closed embayments off most of the beaches. Associated with the rugged headlands are ten wave-cut rock platforms and areas of intertidal rocky shores. Pittwater LGA contains two Intertidal Protected Areas at Bungan Headland and Mona Vale Headland and two Aquatic Reserves at Barrenjoey Headland and Narrabeen Headland.

The southern part of the Pittwater area includes Ingleside Plateau, escarpments and Warriewood Valley, a low lying, partially disturbed estuarine wetland formed from the infill of a coastal inlet over the last 6,000 years.

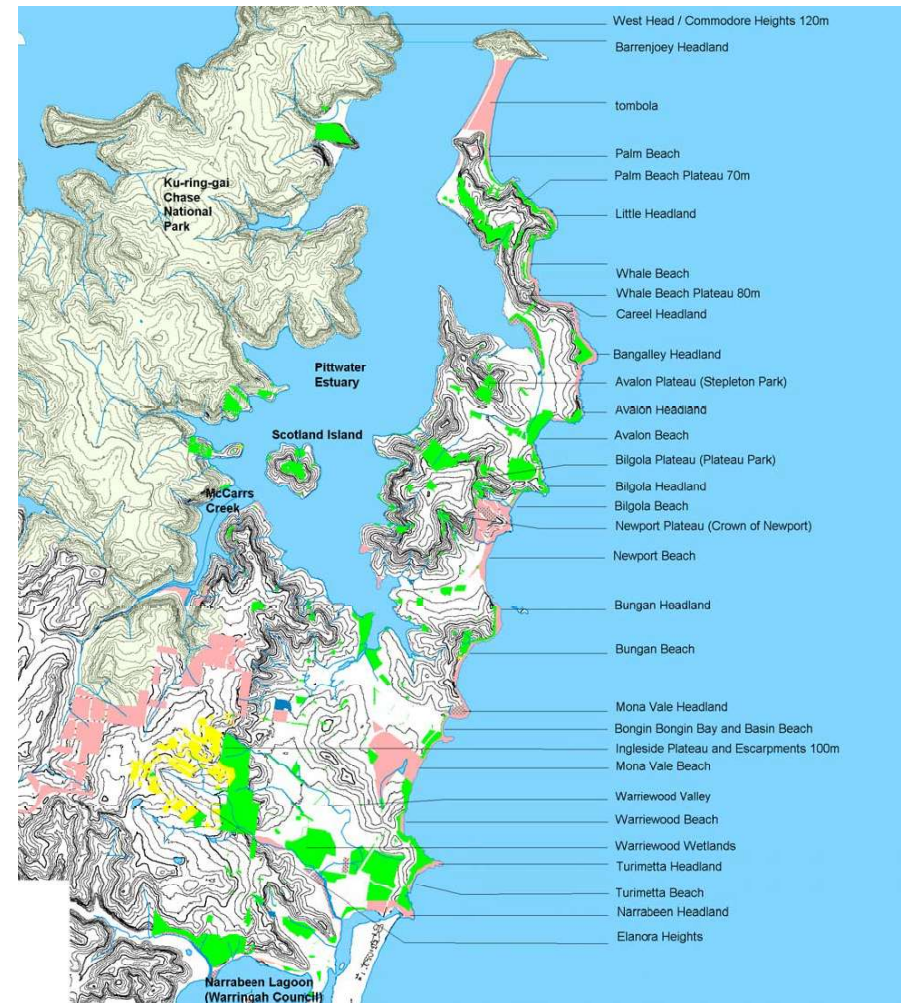


Figure 4.2. Landform.

4.5 Geology and Soil

The geology of the Pittwater LGA is underlain by a near-horizontally bedded sequence of sedimentary rocks of the Triassic Age. Erosion of the rocks has produced a surface profile with a flat crest above steep slopes with relatively narrow terraces, often underlain by sandstone.

The flat-capped ridges are formed by Hawkesbury Sandstone while the slopes surrounding the plateaus are underlain by an interbedded sequence of laminate, siltstone, shale and quartz sandstone of the Narrabeen Formation. On the slopes these rocks are overlain by talus that has fallen from the sandstone uphill and by clayey colluvium derived by weathering of the siltstone and shale. On the lower slopes rock is overlain by Quaternary Age alluvial and marine sands (Mac Gregor et. al. 2007).

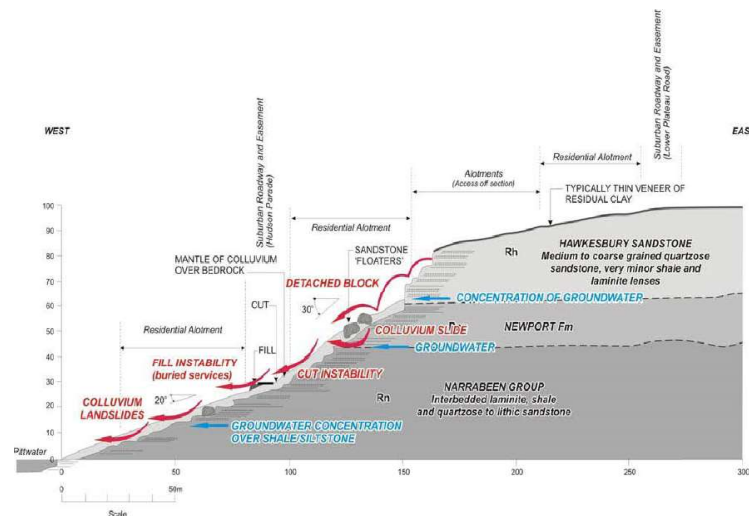


Figure 4.3. Section showing the typical geology of Pittwater (MacGregor et. al. March 2007).

Table 4.1. Soil landscapes.

Soil landscapes are grouped by soil type as described in this Table.

Type	Soil Names and Codes
Residual and Colluvial	Watagan (Wn) and Somersby (So)
Erosional	Gymea (Gy) and Lambert (La)
Erosional	Erina (Er)
Swamp, Colluvial, Fluvial	Hawkesbury (Ha), Warriewood (Wa), Oxford Falls (Of), Deep Creek (Dc)
Disturbed	Disturbed terrain (xx) fill areas commonly capped with sandy loam soils or compacted clay over fill materials
Marine	Woy Woy (Ww) (Palm Beach only) Narrabeen (Na) (beaches)
Aeolian	Newport (Np)
Aeolian	Tuggerah (Tg)
Estuarine	Mangrove Creek (Mc) (Careel Bay only)

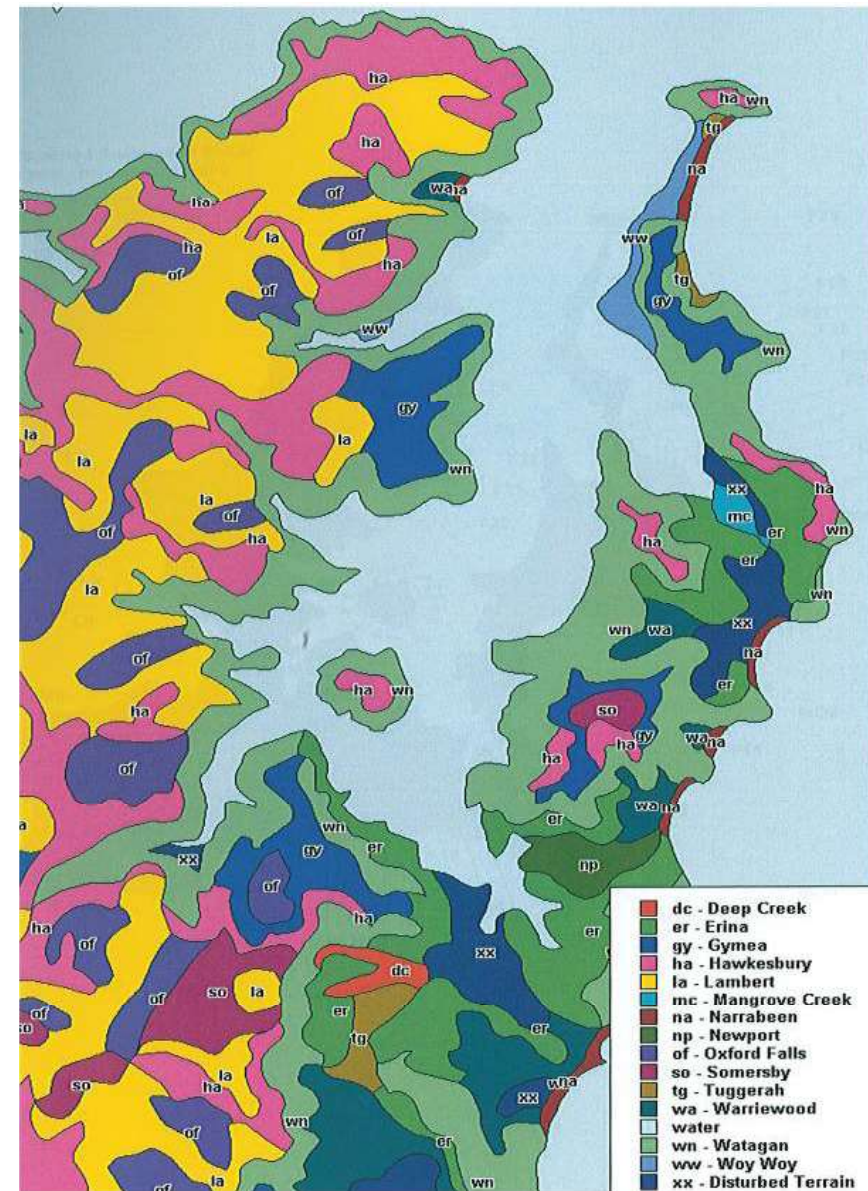


Figure 4.4. Soil landscapes of the Pittwater LGA (Lawson and Treloar, 2002).

4.6 Plants and Plant Communities

A plant community is a group of plants that commonly occur together such as forests and woodlands dominated by trees, heaths dominated by shrubs, and grasslands dominated by grasses.

The vegetation communities of the Pittwater area are currently being assessed and mapped to take into consideration recent listings of Endangered Ecological communities as listed under the *Threatened Species Conservation Act 1995*, and to provide accurate vegetation maps for future planning and conservation purposes. In the meantime the following list is a summary of the dominant vegetation communities found in the Pittwater area.

Detailed information on plant communities is available on Pittwater Council's website, including interactive maps showing the location of vegetation communities and a list of plant species for each community.

Plant communities

2. Angophora floribunda Open Forest
3. Avalon Open Forest/Woodland
4. Cabbage Tree Palm Forest
5. Coastal Clay Heath
6. Coastal Dune
7. Coastal Sandstone Woodland
8. Coastal Shale Forest
9. Coastal Shale Stringybark Forest
10. Estuaries
11. Hawkesbury Sandstone Gully (Closed Forest)
12. Hawkesbury Sandstone Low Woodland
13. Hawkesbury Sandstone Open-forest
14. Heathland
15. Lower Ingleside Escarpment Forest
16. Mangroves
17. Moist Shale Forest
18. Mona Vale Forest
19. Red Bloodwood-Scribbly Gum Woodland
20. Sandstone Heath
21. Sandstone Rocky Heath
22. Sandstone Wet Heath/Hanging Swamp
23. Sea grasses
24. Shale Forest
25. Wetlands
26. Yellow Top Ash Low Woodland



Figure 4.5. Soil map.
The map provides an indication of the location of vegetation types in the Pittwater LGA. Vegetation mapping is currently being undertaken.

Endangered Ecological Communities

- Coastal Saltmarsh - Known
- Duffy's Forest Ecological Community - Known
- Freshwater Wetlands on Coastal Floodplains - Known
- Littoral Rainforest - Known
- Pittwater Spotted Gum Forest - Known
- River-Flat Eucalypt Forest on Coastal Floodplains - Known
- Swamp Oak Floodplain Forest - Known
- Swamp Sclerophyll Forest on Coastal Floodplains - Known
- Sydney Freshwater Wetlands - Known
- Sydney Turpentine-Ironbark Forest - Predicted
- Themeda Grassland on Sea cliffs and Coastal Headlands - Known

Endangered Fungi

- *Camarophyllopsis kearneyi* - Endangered - Predicted to occur in the area
- *Hygrocybe anomala* var. *ianthinomarginata* - Vulnerable - Predicted
- *Hygrocybe aurantipes* - Vulnerable - Predicted
- *Hygrocybe austropratensis* - Endangered - Predicted
- *Hygrocybe collucera* - Endangered - Predicted
- *Hygrocybe griseoramosa* - Endangered - Predicted
- *Hygrocybe lanecovensii* - Endangered - Predicted
- *Hygrocybe reesiaae* - Vulnerable - Predicted
- *Hygrocybe rubronivea* - Vulnerable - Predicted

Shrubs

- Netted Bottle Brush (*Callistemon linearifolius*) - Vulnerable - Known
- *Darwinia biflora* - Vulnerable - Known
- *Epacris purpurascens* var. *purpurascens* - Vulnerable - Known
- Caley's Grevillea (*Grevillea caleyi*) - Endangered - Known
- *Haloragodendron lucasii* - Endangered - Known
- *Leptospermum deanei* - Vulnerable - Known
- Deane's Paperbark (*Melaleuca deanei*) - Vulnerable - Known
- Curved Rice-flower (*Pimelea curviflora* var. *curviflora*) - Vulnerable - Known
- Glandular Pink-bell (*Tetratheca glandulosa*) - Vulnerable - Known
- Narrow-leaved Wilsonsia (*Wilsonia backhousei*) - Vulnerable - Known
- Bynoe's Wattle (*Acacia bynoeana*) - Endangered - Predicted
- Sunshine Wattle (*Acacia terminalis* subsp. *terminalis*) - Endangered - Predicted to occur in the area
- *Hibbertia puberula* - Endangered - Predicted to occur in the area
- Magenta Lillypilly (*Syzygium paniculatum*) - Vulnerable - Known
- Hairy Geebung (*Persoonia hirsuta*) - Endangered - Known

Threatened Plants in Pittwater



Herbs and Forbs

- Coastal (Sand) Spurge (*Chamaesyce psammogeton*) - Endangered - Known

Mallees

- Camfield's (Heart-leaved) Stringybark (*Eucalyptus camfieldii*) - Vulnerable - Known

Orchids

- Angus's Onion Orchid (*Microtis angusii*) - Endangered - Known
- Botany Bay Bearded Orchid (*Pterostylis* sp. *Botany Bay*) - Endangered - Predicted
- Bauer's Midge Orchid (*Genoplesium baueri* R.Br.) - Vulnerable - Predicted
- Slaty Leek Orchid (*Prasophyllum fuscum*) - Vulnerable - Predicted to occur in the area

4.7 Local Fauna

The Pittwater area is rich in fauna species due to the extent of natural areas, large array of habitats and the close proximity to national parks. Over 350 native species (excluding marine fauna and invertebrates) have been recorded locally including 252 bird species, 40 mammals, 23 reptiles and 16 amphibians. Of these, 48 species are listed as threatened and two are listed as endangered - the Koala and Squirrel Glider (under Schedule 12 of the *NSW National Parks and Wildlife Act 1974*.) Council is currently updating the Native Animal Management Plan and Wildlife Corridors Plans – these documents will provide improved accuracy data of native animals in Pittwater.

Threatened Animals in Pittwater



Amphibians

- Giant Burrowing Frog (*Heleioporus australiacus*) - Vulnerable - Known
- Red-crowned Toadlet (*Pseudophryne australis*) - Vulnerable - Known

Aquatic Invertebrates

- Adam's Emerald Dragonfly (*Archaeophya adamsi*) - Vulnerable - Known
- Giant Dragonfly - Endangered - Known

Bats

- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) - Vulnerable - Known
- Eastern Freetail-bat (*Mormopterus norfolkensis*) - Vulnerable - Known
- Large-footed Myotis (*Myotis adversus*) - Vulnerable - Known
- Grey-headed Flying-fox (*Pteropus poliocephalus*) - Vulnerable - Known
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) - Vulnerable - Known
- Little Bent-winged Bat (*Miniopterus australis*) - Vulnerable - Known
- Large-eared Pled Bat (*Chalinolobus dwyeri*) - Vulnerable - Known

Birds

- Japan Australia Migratory Bird Agreement (JAMBA) and China Australia Migratory Bird Agreement CAMBA and other migratory fauna
- Australasian Bittern (*Botaurus poiciloptilus*) - Vulnerable - Known
- Bush Stone-curlew (*Burhinus grallarius*) - Endangered - Known
- Sanderling (*Calidris alba*) - Vulnerable - Known
- Great Knot (*Calidris tenuirostris*) - Vulnerable - Known
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) - Vulnerable - Known
- Glossy Black-cockatoo (*Calyptorhynchus lathami*) - Vulnerable - Known
- Greater Sand-plover (*Charadrius leschenaultii*) - Vulnerable - Known
- Lesser Sand-plover (*Charadrius mongolus*) - Vulnerable - Known
- Eastern Bristlebird (*Dasyornis brachypterus*) - Endangered - Known
- Sooty Oystercatcher (*Haematopus fuliginosus*) - Vulnerable - Known
- Pied Oystercatcher (*Haematopus longirostris*) - Vulnerable - Known

- Black Bittern (*Ixobrychus flavicollis*) - Vulnerable - Known
- Swift Parrot (*Lathamus discolor*) - Endangered - Known
- Black-tailed Godwit (*Limosa limosa*) - Vulnerable - Known
- Cotton Pygmy-goose (*Nettapus coromandelianus*) - Endangered - Known
- Barking Owl (*Ninox connivens*) - Vulnerable - Known
- Powerful Owl (*Ninox strenua*) - Vulnerable - Known
- Osprey (*Pandion haliaetus*) - Vulnerable - Known
- Little Shearwater (*Puffinus assimilis*) - Vulnerable - Known
- Flesh-footed Shearwater (*Puffinus carneipes*) - Vulnerable - Known
- Painted Snipe (*Rostratula benghalensis*) - Endangered - Known
- Little Tern (*Sterna albifrons*) - Endangered - Known
- Masked Owl (*Tyto novaehollandiae*) - Vulnerable - Known
- Regent Honeyeater (*Xanthomyza phrygia*) - Endangered - Known
- Terek Sandpiper (*Xenus cinereus*) - Vulnerable - Known
- Eastern Curlew (*Numenius madagascariensis*) - Vulnerable - Known
- Bar-tailed Godwit (*Limosa lapponica*) - Migratory
- Grey-tailed Tattler (*Heteroscelus brevipes*) - Migratory
- Common Greenshank (*Tringa nebularia*) - Migratory
- Little Penguin (*Eudyptula minor*) - Endangered - Known

Marsupials

- Eastern Pygmy-possum (*Cercartetus nanus*) - Vulnerable - Known
- Spotted-tailed Quoll (*Dasyurus maculatus*) - Vulnerable - Known
- Southern Brown Bandicoot (*Isodon obesulus obesulus*) - Endangered - Known
- Koala (*Phascolarctos cinereus*) - Vulnerable - Known
- Squirrel Glider - Vulnerable - Known

Reptiles

- Green Turtle (*Chelonia mydas*) - Vulnerable - Known
- Leather Turtle (*Dermochelys coriacea*) - Vulnerable - Known
- Broad-headed Snake (*Hoplocephalus bungaroides*) - Endangered - Known
- Rosenberg's Goanna (*Varanus rosenbergi*) - Vulnerable - Known
- Loggerhead Turtle (*Caretta caretta*) - Endangered - Predicted

Endangered Populations

- Koala population in the Pittwater LGA (*Phascolarctos cinereus*) - Known
- Squirrel Glider Endangered Population on Barrenjoey Peninsula - Known

5. Management Issues and Policies

This chapter contains a discussion on 15 issues. The issues are considered to be the most important in order to protect, conserve and enhance the natural area reserves in the Pittwater LGA. (The actions that address the issues are contained in the Action Table in Chapter 6). The issues relating to each vegetation type (e.g. bushland, wetland, escarpment / headland, watercourse and foreshore) will be discussed in detail in Part 2 with the relevant reserve chapters.

5.1 Sustainability

Statutory Considerations

Protection of the Environment Operations Act, 1997 - the key piece of environment protection legislation administered by the Department of the Environment and Climate Change. The legislation addresses environmental offences, air quality, water quality, pollution control and noise control.

The Inter-Governmental Agreement on the Environment – has committed all Australian Governments to the concept of ecologically sustainable development in the assessment of natural resources, land use decisions and approval processes.

Pittwater Sustainability Policy, 2006. Council has a vital role to play at the local level in promoting sustainable development in order to contribute towards creating a sustainable society. Council will advance and strengthen the three interdependent and mutually reinforcing pillars of sustainability – economic development, social development and environmental protection in the Pittwater Local Government Area.

Pittwater's Community Strategic Plan is the blueprint for sustainability in Pittwater. *Council's Management Plan 2008 – 2012* - contains the Sustainability and Climate Change Coordination Strategy to implement this blueprint.

Sydney Coastal Councils Group (SCCG.) Pittwater Council is a member of the SCCG which was established in 1989. The Group aims to identify key interventions that can be made to assist councils improve their capacity to adapt to climate change through future management decisions. Programs include: Climate Change Legislating Project, *Strategic Plan*, and *Geotechnical Investigations*.

The *Environmental Planning and Assessment Act, 1979* requires authorities to consider coastal and flooding hazards in planning and development making.

The NSW Coastal Policy, 1997 aims to protect and conserve coastal values. Recognise and accommodate coastal processes and hazards including the potential effects of climate change in the planning and management of coastal development.

Local Government Act, 1993 s. 733

Sea Level Rise Policy Statement Department of Environment and Climate Change NSW.

Discussion

Pittwater's natural area reserves are to be managed according to the ethos contained in the Pittwater's 2020 Strategic Plan. The Strategic Plan is the overarching document that will guide all future planning and direction and sets out the community vision of what Pittwater should be in 2020. The vision that underpins the strategic direction is

"to be a vibrant sustainable community of connected villages inspired by bush, beach and water".

This vision was developed by the community through a series of forums and workshops. To achieve the vision, the strategic plan outlines five key directions:

- Supporting & connecting our Community - the need to enhance the health and wellbeing of the community by supporting a sense of community and a friendly and creative lifestyle.
- Valuing & Caring for our Natural Environment - the need to be a model community, leading the way towards sustainable living by reducing our ecological footprint, protecting and enhancing our bush, beach and waterways as well as achieving long-term sustainability and biodiversity.
- Enhancing our Working and Learning - the need to create a thriving local economy which maintains a beautiful environment in which to live, work and learn.
- Leading an Effective & Collaborative Council - the need to have a transparent and accountable decision-making process including enhancing participation and engagement, fostering community partnerships and providing support to the community.
- Integrating our Built Environment - the need to create a sustainable and relaxed living environment including appropriate development, effective transport choices and efficient support services.

Climate change and Sea Level Rise

"Over the last century, Australia has experienced an average warming trend of about 0.9°C."¹ The predicted impacts of global warming include the severity and frequency of many natural disasters such as bushfires, cyclones, hailstorms and floods as well as health, heritage, biodiversity (shifts in the distribution of plants and animals) and sea level rise (due to thermal expansions of the oceans.)

"Over the twentieth century, global sea levels have risen by 17 cm and are continuing to rise. . . . The best national and international projections of sea level rise along the NSW coast are for a rise relative to 1990 mean sea levels of up to 40 cm by 2050 and 90 cm by 2100 . . . "² The predicted rises in sea levels will increase the severity of coastal hazards including tidal inundation and coastal erosion, flooding of low-lying coastal land, loss of wetlands, saltwater intrusion and loss of beach width. These processes will impact on buildings and infrastructure, recreational facilities social amenity and access.

1. Australian Government, Department of Climate Change

2. NSW Sea Level Rise Policy Statement October 2009, Department of Environment and Climate Change NSW

Strategies

Refer to Table 6.1 on page 40.

5.2 Research, Education and Community Training and Participation

Statutory Considerations

- Occupational Health and Safety Act, 2000 (and Regulation 2002)
- Code of Practice for Agencies involved with Volunteer Staff (Volunteer Centre of NSW)

Discussion

Public awareness

Effective management of natural areas requires a sympathetic public informed about the attributes of natural areas and the impacts society can have on its viability. The level of awareness and sympathy towards natural areas varies considerably within the community. Some of the more obvious symptoms of the lack of awareness or disregard for bushland values include:

- dumping of domestic and garden refuse in the bush;
- encroachment of private properties into bushland or open space (retaining walls, tracks, steps);
- destruction and damage to tracks and signs;
- lack of control of domestic pets in bushland;
- unauthorised clearing of bushland understorey;
- unauthorised poisoning and lopping of trees;
- planting of inappropriate species in, or on the boundaries of reserves;
- discharging water from swimming pools into bushland; and
- discharging water from tennis courts, roofs, other hard surfaces and gardens into bushland.

Contractors

Contractors are appointed by Council to work in natural areas for bush regeneration, weed control, general maintenance and facility installations such as walking tracks.

Community Volunteers

Volunteer groups also play an active role in local environmental projects that aim to deliver cleaner beaches, healthier waterways and the conservation of urban bushland. Programs include community gardens, bush care groups, CEC Eco Team volunteers, corporate volunteers, creek care program, wildlife watch and participating in National Tree Day. It is believed that community involvement may reduce incidents of vandalism by increasing a sense of public ownership and self regulation.

The local community are informed of environmental issues through Cooee Environmental e-newsletter and brochures provide environmental news, dates for upcoming events, and articles focusing on local regenerators and regeneration projects. Educational programs are provided, particularly at the Coastal Environmental Centre.

Strategies

Refer to Table 6.1 on page 41.



Volunteers carrying out bush regeneration work at the Crown of Newport Reserve.



Volunteers mulch and plant the embankment at the Old Wharf Reserve, Clareville



Volunteers installing tree guards around tube stock plantings to protect seedlings from rabbits.



Volunteers plant Careel Creek to create a vegetation and habitat corridor.

Plates 10 – 13. Examples of projects by community volunteers.

5.3 Encroachments

Statutory Considerations

- LGA – disturbance of bushland is not to be undertaken without Council's consent or an assessment of impacts (Clause 6 (1) and 6 (4) SEPP 19.
- LGA - Community lands are to be managed for community benefit. Section 47D (1) prohibits the exclusive occupation / use of Community land by a person unless in accordance with a lease, licence or estate. However, section 47B precludes the granting of lease or licence for private residential purposes on land categorised as a natural area. Section 124, Orders 27 to 29 provides Councils with regulatory mechanisms to assist the protection or repair of public places.
- *Environmental Planning and Assessment Act, 1979*. under s 149A a Building Certificate is issued by councils to the owner of a building, the owner's agent, or purchaser. The certificate certifies that council will not make orders to have work carried out on the building or the building demolished for the next seven years. The certificate does not provide protection against unlawful uses of the building or site and it is recommended that purchasers obtain a records search if there are doubts regarding the lawful use of the site. Council may consider documenting encroachments on Council issued Building Certificates.

Discussion

Encroachments are illegal extensions of private property boundaries and / or structures onto public land and generally occur within the interface zone. Encroachments include stormwater run-off, drainage channels and pipes, weed invasion, plantings and gardening, mower creep, rubbish dumping, disposal of lawn clippings and structures such as paths, steps, retaining walls and even gazebos.

At an individual level, encroachments seem minor, but collectively they are responsible for degrading hectares of community land. The problems caused by encroachments include, but are not confined to the following:

- structures may not comply with the relevant Australian Standards, and therefore threaten public safety;
- potential disturbance of Aboriginal heritage – this can occur unknowingly because sites are unknown or their location has not been disclosed to the public;
- compromise the integrity of the reserve;
- alienate the public due to unclear boundary definition;
- jeopardise public safety and increase liability;
- create social inequity
- impede fire management; and
- divert resources / funding.

Residents of properties that are subject to an encroachment are to remove the encroachment. Residents should contact Council for technical assistance, particularly for regenerating the vegetation.

Strategies

Refer to Table 6.1 on page 41.

5.4 View Conservation and Management

Statutory Considerations

- *Pittwater Development Control Plan C1.3 View Sharing*. Views and vistas from roads and public places to water, headland, beach and/or bush views are to be protected, maintained and where possible, enhanced. Canopy trees take priority over views.
- Relevant controls – views are not to be obtained at the expense of native vegetation. Where there is potential for view loss to adjoining developments and / or public viewing points, an assessment of the view loss, supported by a clearly documented photographic analysis shall be provided.
- Urban Forest Policy - adopted by the NSW Local Government Association recognises the significance of urban forests as a community asset worthy of retention, protection and expansion.
- *Pittwater Council's Tree Preservation Order* - it is an offence to contravene the tree preservation order under s. 125 of the *Environmental Planning and Assessment Act, 1979* and s 629(1) of the *Local Government Act, 1993*.
- *Native Vegetation Act, 2003* s 43 (1), s12(1) and s 42(2) - it is an offence to clear native vegetation.
- *Pesticides Act, 1999* s 7(1)(b) and s 10(1)(b) - it is an offence to willfully or negligently use a pesticide that injures the property of another person. It is also an offence to use registered pesticide in contravention of approved label under s 15(1) of Act.

Discussion

The rugged topography and location of the Pittwater local government area between the Tasman Sea and Pittwater Estuary affords a variety of views including:

- topographic features - escarpments, headlands and low lying wetlands;
- vegetation – Ku-ring-gai Chase National Park, Garigal National Park, urban forests; and
- water bodies – Pittwater Estuary, Narrabeen Lagoon and the Tasman Sea / South Pacific Ocean.

Visual Amenity of Natural Area Reserves

Natural Area Reserves Providing Scenic Amenity - natural area reserves provide the scenic backdrop for many of Pittwater's villages and urban areas. A good example is Stapleton Reserve at Avalon.

Views and Vistas from Reserves – reserves; especially those along the Coast and estuaries, provide views from the reserves. Good examples can be seen from most of the reserves along the Bicentennial Coastal Walkway. Council provides lookouts in some areas to better facilitate appropriate access to viewing locations.

Views from Private Residence through Reserves - vegetation management relating to retention of views will be addressed on a case by case basis. The overarching priorities of natural area reserves will be the principals by which decisions are guided along with the input from the wider Pittwater community. Council generally does not plant tall growing trees into existing views lines except in cases where the planting is to replace trees that have been illegally cleared.

Strategies

Refer to Table 6.1 on page 42.

5.5 Bushland on Private Property

Statutory Considerations

- SEPP 19 – clause 9 - Council must ensure that the impact of development on adjoining land (private or public) is considered when granting development approvals.
 - NSW *Threatened Species Conservation Act, 1995* - bushland on private property is protected when it is part of an endangered ecological community or if it contains threatened flora species or is the habitat for threatened fauna.
-

Discussion

Role and Value of Bushland on Private Property

The original residential developments of the Pittwater area retained large blocks with remnant bushland, particularly at Bayview, Bilgola, Avalon, Clareville, Whale Beach and Palm Beach. Some of the adverse impacts of development on bushland include:

- soil erosion and sedimentation – refer to topic soil erosion and sedimentation;
- nutrient enrichment – refer to topic urban runoff and stormwater discharge;
- weed invasion and degradation of plant communities – refer to topics plant communities, bushland restoration and regeneration; and
- reduction in habitat or fragmentation of habitat areas by clearing.

Bushland on private property fulfils many beneficial roles including:

Scenic and Environmental Protection - large sections of residential development in the Pittwater LGA are on steep, visually prominent lands and foreshores. Bushland remaining on these lands contribute significantly to the visual character of the area whilst assisting with the prevention of erosion and land-slip.

Biodiversity - the Pittwater Spotted Gum Forest occurs on private properties from Palm Beach to Careel Bay, Church Point, Scotland Island and on the Western foreshores, while Littoral Rainforest occurs on private properties along the coast from Palm Beach to Narrabeen. These areas provide habitat and nesting sites for coastal fauna and migratory birds.

Wildlife Habitat and Corridors - the backyard bushland provides habitat for fauna and corridor linkage. Over recent decades the urban forest has reduced in size and fragmentation of bushland has resulted in more difficult environmental conditions for species to move between prime habitat areas. The retention and maintenance of non-reserve food trees is vital to the continued survival of many species.

Council provides support and guidance to residents who would like to maintain or create maintain bushland on their property through the Backyard Bushcare Program. The program is based on encouraging natural regeneration of the bushland or revegetation of the by planting local indigenous plants.

Strategies

Refer to Table 6.1 on page 42.

5.6 Lands Managed by Other Authorities

Statutory Considerations

SEPP 19 –other authorities do not necessarily require development consent from Council for works on public land; however, Council is committed to develop management and restoration agreements of natural areas with other authorities.

Discussion

Other authorities that manage large areas of bushland in the Pittwater local government area are listed below:

- Sydney Water
- Roads and Traffic Authority
- Department of Planning NSW
- Department of Lands
- Minister for Education
- Energy Australia
- NSW National Parks and Wildlife Service - Ku-ring-gai Chase National Park, Barrenjoey Headland
- Commonwealth Government
- Department of Land and Water Conservation
- Katandra Bushland Sanctuary is a Crown Reserve administered by the Department of Land and Water Conservation and managed by Katandra Bushland Sanctuary Trust.

Strategies

Refer to Table 6.1 on page 42.

5.7 Water Catchment

Statutory Considerations

- SEPP 19 - Urban run-off and stormwater discharges can disrupt the natural condition of bushland and are classified as a "disturbance" under SEPP 19. As such, Council cannot consent to a development that directly or indirectly discharges run-off or stormwater into bushland areas without taking into account the aims, objectives and procedures of the policy (particularly Clauses 6 and 9).
- *Water Management Act, 2000* - covers water management and protection of water sources, floodplains, drainage and dependent ecosystems including wetlands and the social and economic benefits to the community which should be maximised.
- *NSW Soil Conservation Act 1938* - prevent and rectify sites of significant soil loss under the *Protection of the Environment Operations Act, 1997*
- *Flood Risk Management Policy for Pittwater* – implements floodplain development controls over flood affected properties

Discussion

In the Pittwater LGA there are three major aquatic bodies that receive stormwater and surface runoff from 23 primary sub-catchments. The three aquatic bodies are Pittwater Estuary, Narrabeen Lagoon and the Tasman Sea. All are heavily used for recreation by residents and visitors to the area. Key issues relating to the condition of the water catchment systems include:

Water quantity. Flooding is a natural hazard. Given the steep terrain of Pittwater, flooding tends to be flash flooding associated with intense thunderstorms. There are 2460 flood prone properties in the LGA, on seven floodplains.

Water quality. Creeks with the highest water quality tend to be associated with the least disturbed catchments while poorer water quality is associated with rain, and generally experienced after a heavy downpour. The water qualities of the water bodies are continuing to improve due to the installation of facilities to control pollution at the source.

Degradation of habitats. Creeks provide valuable habitat for a range of fauna including frogs, small mammals, reptiles and birds. For instance, Careel Bay estuary contains a high diversity of vegetation types including healthy seagrasses, saltmarsh and mangroves. Careel Bay mudflats are prime habitat for migratory and local species. However some local creeks are degraded by weeds, sedimentation and poor water quality. Native seagrass beds in the Pittwater Estuary are currently being lost and degraded by the impact of boat moorings and the spread of the noxious marine algae, *Caulerpa taxifolia*.

Pittwater's aquatic bodies vary from almost pristine (the upper reaches leading to Ku-ring-gai National Park) to highly degraded areas including those re-directed, covered and piped. Sections of the aquatic bodies are being identified for remediation works including riparian (waterside) vegetation, weed removal and control of factors leading to sedimentation. Bank remediation is required in many areas. Some major projects have been completed at Narrabeen Creek and Fern Creek. At these sites the riparian vegetation has been recreated and piped sections have been removed. Pittwater has an active creek care community group who are involved in monitoring water quality and other aspects of creek health.

Strategies

Refer to Table 6.1 on page 42.

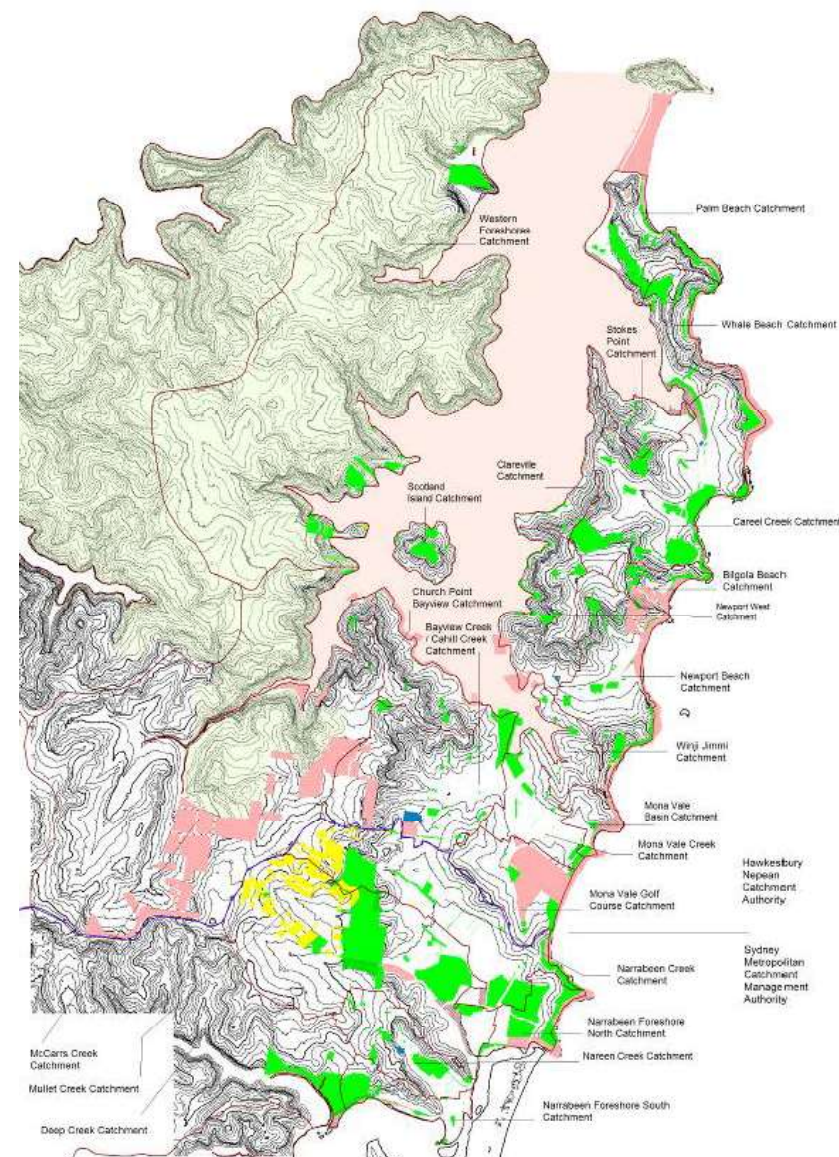


Figure 5.1. Water catchments.

5.7.1 Stormwater and Surface-runoff

Discussion

The quantity and quality of stormwater runoff can impact negatively on the environment. The quantity and quality of stormwater runoff is generally associated with urban development. Increasing the built environment leads to increased flow volume and flow rate. The Pittwater Development Control Plan aims to control stormwater quantity and quality from developed sites. The plan aims to maintain flow volume and flow rates to pre-development rates by recommending the installation of stormwater harvesting devices such as onsite stormwater detention systems and water tanks, placing controls on how water is discharged into the natural systems, and dissipating water velocity.

It is more difficult to control stormwater quantity and quality in older established areas than new areas where water sensitive urban design (WSUD) principles are being incorporated into the broader design. For instance, at Warriewood Valley treated stormwater enters the rehabilitated creek lines which mimic the natural systems. High volume water flows are slowed down by water harvesting and nutrients are held back by measures such as gross pollutant traps, bioswales and wetlands.

Outside development controls, the most effective means to control stormwater quantity and quality is through community awareness and encouraging the community to treat their own stormwater before leaving the site.

Another method to lessen the negative impact of stormwater on natural areas is to treat stormwater at the source point. Stormwater is usually collected and piped to the closest watercourse. Many watercourses are located in reserves and suffer from erosion at the junction of the drain inlets with the creeks. This is a result of inadequate dissipation of stormwater velocity at this point. As water discharges from pipes into the bush, it fans, increasing the moisture content and potential for erosion.

Pollutants in stormwater run-off

Stormwater, particularly heavy flows, brings gross pollutants (rubbish) and oils into the watercourses. Seepage from septic systems, run-off and stormwater are almost always nutrient enriched particularly during low flows at the ingress points to bushland, from sediment, roadway pollution, dog and cat faeces, break-down of building products, chemical fertilisers, pesticides, soil and garden litter.

This concentration of water into natural areas can alter the environmental conditions that dictated the original vegetation type due to high levels of plant nutrients (especially phosphorus) and pollutants in the water. Phosphorus impacts negatively on indigenous vegetation, particularly on soils derived from Hawkesbury sandstone which tends to be very low in phosphorus.

Strategies

Refer to Table 6.1 on page 43.

5.7.2 Soil Erosion and Sedimentation

Discussion

Creek line Soil Erosion

Soil erosion in watercourses is related to increased stormwater flow. This is generally due to the increase in impervious surfaces associated with development. High velocity water flows can impact on natural areas by dislodging plant material and transporting solid matter and sediments into watercourses where they can destroy aquatic habitats. Erosion is variable depending on the soil landscape type. Soil erosion in watercourses can be treated by the following measures:

- reduce the quantity of stormwater leaving developed areas to a level approximating pre-development hydraulic conditions;
- treat creek lines and discharge points to reduce velocity and stabilise areas of erosion; and
- retain and maintain riparian vegetation.

Sedimentation Arising from Other Activities

A major source of sedimentation is the result of activities within the catchment, particularly construction activities that involve stockpiling building materials and vehicular movement on a disturbed site. Other sources include clearing vegetation, topsoil removal, quarrying, landscaping and the installation of infrastructure including roads, power lines, pipelines and telephone lines. Some of these impacts can be mitigated through sensitive building layout and construction techniques as well as site management as outlined in the Pittwater Development Control Plan.

Erosion can occur on walking tracks and vehicle tracks due to water being retained rather than dissipating. When tracks become drainage ways, new tracks are sometimes created as a passage around the problem areas. At these sites, erosion and sediment control can be managed through planned construction, maintenance and track upgrades.

Bushfires and control burns can create erosion and soil loss. Erosion and soil loss can be managed by reducing public access and, maintaining buffer strips and maximum surface roughness to capture soil loss. The extent of any controlled burn should be the minimum size possible to achieve the management objective and the site should be monitored until the soil surface has stabilised.

Foreshore erosion

Activities associated with erosion and sedimentation of foreshore areas include land clearing, high velocity discharges associated with stormwater outlets, wind-generated waves and uncontrolled access to the foreshore (as well as boat wash which is a major cause of foreshore erosion).

Strategies

Refer to Table 6.1 on page 43.



Figure 5.2. Locations where erosion is most severe (Lawson and Treloar, 2009).

Tonnes of Exported Suspended Solid
(Average year - per subcatchment)

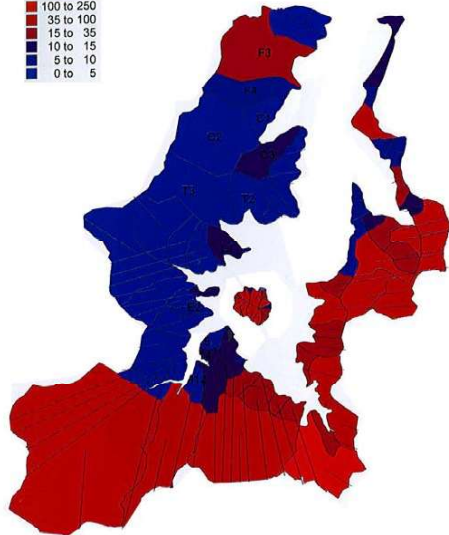


Figure 5.3. Sedimentation of Pittwater Estuary (Lawson and Treloar, 2002).

5.7.3 Flooding

Discussion

In the Pittwater LGA, the combination of steep terrain, flat coastal areas, and the proximity of development to major stormwater drains and waterways has resulted in the area being susceptible to both flash flooding in the upper catchments and ponding of floodwaters in lower catchments. Flash flooding results from relatively short intense bursts of rainfall, and because of the speed with which it occurs, there is generally little or no time to take actions to minimise flood losses.

The negative impacts of flooding on natural areas include topsoil loss, depositing of topsoil, the loss of vegetation and habitat and degradation of the water quality of receiving water bodies. Following natural events such as floods and severe storms, habitats recover slowly by gradual regeneration and by species spreading from nearby areas.

Only the primary floodplain areas in Pittwater have been mapped so far. They are located in the following areas:

- Narrabeen Lagoon foreshore
- Nareen Creek, North Narrabeen
- Mona Vale / Bayview
- Newport Beach
- Careel Creek, Avalon
- Great Mackerel Beach
- Warriewood Valley

The ocean and estuary foreshores are also subject to variable water levels. Extremely high water levels can occur during severe ocean storms when wave action and tidal inundations present a significant natural hazard.

Strategies

Refer to Table 6.1 on page 43.

5.8 Geotechnical Risk Management

Statutory Considerations

- Development under Part 4 of the *Environmental Planning and Assessment Act, 1979* (EPAA) – Geotechnical risk management within Pittwater is managed under the Pittwater 21 Development Control Plan Control 33.1 Geotechnical Hazard, B3.4 coastline (Bluff) Hazard and B8.1 Construction and Demolition – Excavation and Landfill. All three controls refer to the Geotechnical Risk Management Policy for Pittwater, 2009 and applies to all development under Part 4 of the EPAA undertaken by utility authorities and public authorities including Pittwater Council on public land where identified on the Pittwater 21 Development Control Plan Map (P21DCP – BC – MDCP087) (Geotechnical Areas) and (P21-DCP-BC-MDCP017 (Bluff Area)
- Development under Part 5 of the *Environmental Planning and Assessment Act, 1979* – Geotechnical Risk Management within Pittwater for project works by Council on public lands managed through the Part 5 assessment or review of environmental factors where all environmental factors affecting or affected by the project is assessed. Where requiring a geotechnical assessment is undertaken as part of the Part 5 Assessment and considered in the context of managing public risk.

Discussion

The risk of landslide in the Pittwater LGA has been known and documented through risk management policies since the 1970s when the area was administered by Warringah Council.

There have been 193 reported landslides in nine local suburbs with most occurring in Newport, Church Point, Bayview and Avalon. Of the landslides, 25 have been rock falls from coastal cliffs, 161 have been from cuts and fills and seven have been from 'natural' slope failures (McGregor et. al. 2007). Areas most at risk include sloping ground with colluvial cover and the risk of landslide increases with slope modifications such as cuts, fills and walls.

Strategies

Refer to Table 6.1 on page 43.

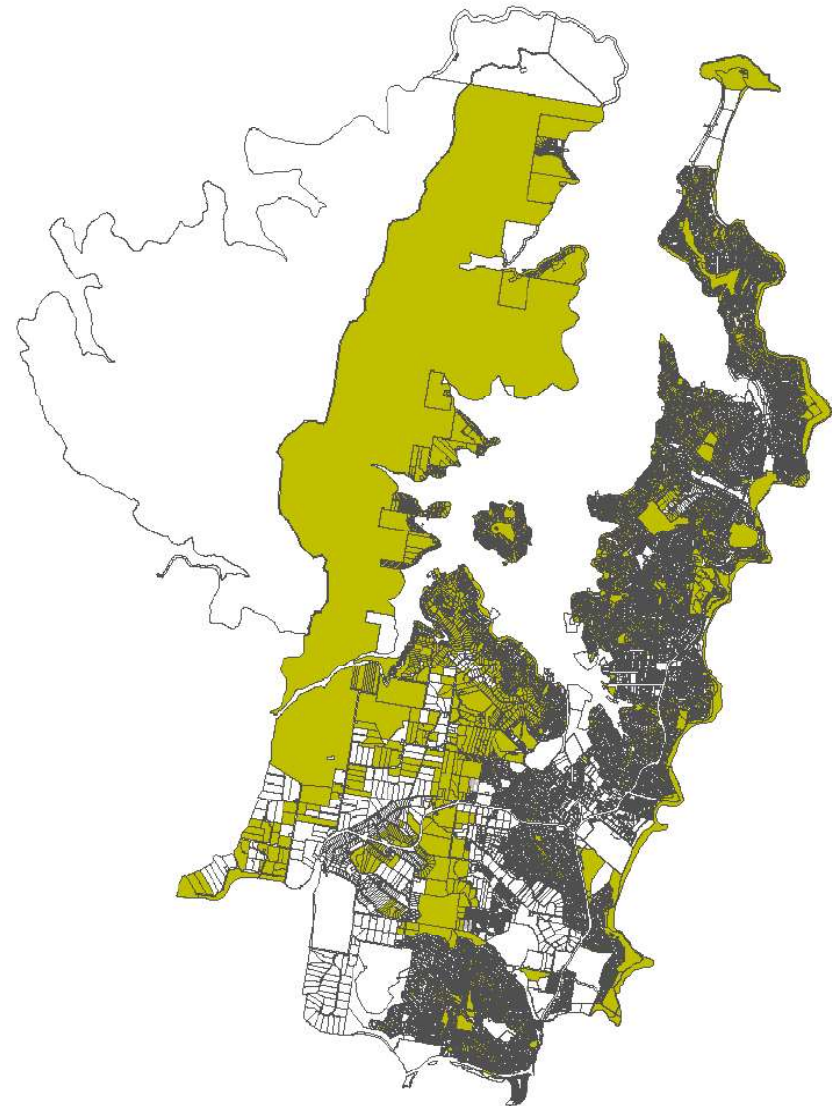


Figure 5.4. Areas subject to geotechnical risk management.

5.9 Biodiversity

Statutory Considerations

- *Local Government Act, 1993*
- *Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (recovery plans)*
- *Environmental Planning and Assessment Act, 1979*
- *Environmental Protection Act, 1986 (and Regulations 2004)*
- *Threatened Species Conservation Act, 1995 (NSW)*
- *Endangered Fauna (Interim Protection) Act, 1991*
- *Heritage Act, 1977*
- *Pittwater Tree Preservation and Management Order*
- *Pittwater environmental Values Statement*
- *Pittwater Habitat and Wildlife Corridors Conservation Strategy*
- State of the Environment Report - all councils in NSW are required to prepare an annual report that provides a summary of the attributes of the local environment and the human impacts on that environment.

Discussion

Biodiversity can be summarised as the variety within and among living organisms and of the ecological systems they comprise.

The increasing awareness of the threat posed by human activities to the planet's biodiversity was recognised by the signing in 1992 of the International Convention on Biological Diversity. The Sydney region is internationally recognised as an area of high biodiversity. The Pittwater LGA, in common with other Sydney municipalities with a bushland character, exhibits a high degree of biodiversity.

Strategies

Refer to Table 6.1 on page 44.

5.9.1 Plant Communities

Statutory Responsibilities

- *NSW Environmental Planning and Assessment Act 1979* - directs state, regional and local planning
- *NSW Threatened Species Conservation Act, 1995 (Amended 2004)* - provides for the nomination and listing of ecological communities that are critically endangered, endangered or vulnerable.
- *NSW Threatened Species Conservation Act, 1995* requires that the '8-point test' under Section 5A of the EPAA, 79 be carried out for developments occurring within or in the vicinity of listed endangered ecological communities.
- *Australian Environmental Protection and Biodiversity Conservation Act, 1999* - provides for the nomination and listing of ecological communities as critically endangered, endangered or vulnerable.
- *SEPP 19 Claus 2 (2) (a)* - protect remnants of plant communities that were once characteristic of land now within an urban area.

Discussion

Significant Vegetation Communities

Significant vegetation communities include either:

- tree or vegetation groupings that are considered to have significant ecological, cultural or amenity value; or
- communities scheduled as Endangered Ecological Communities under the Threatened Species Conservation Act, 1995 e.g. The Pittwater Spotted Gum Forest.

Maintaining Genetic Integrity

Maintaining diversity in plant species and communities requires the development of appropriate management and practices for individual sites and plant communities. A key management component is the reduction of degrading influences and the maintenance of natural ecological processes associated with the plant community.

A major benefit in retaining local indigenous plants is that they are generally more genetically adapted to the growing conditions of the locality and provide the original food and habitat for local fauna. The management principles for maintaining local indigenous plants include:

- preventing the introduction of native species that are not locally indigenous to the Pittwater area being introduced or spreading into bushland areas;
- maintaining a preference for regeneration (rather than revegetation) of bushland when possible; and
- using plant material that has been propagated from local sources for revegetation.

Threats to Plant Communities

Eucalyptus Dieback

Eucalyptus dieback has been identified as a major problem in the Pittwater LGA. The most commonly affected local trees species include Sydney Peppermint (*Eucalyptus piperita*), Red Bloodwood (*Corymbia gummifera*) and

Apple Gum (*Angophora costata*) and to a lesser extent, Spotted Gum (*Corymbia maculata*), Grey Gum (*Eucalyptus punctata*) and Swamp Mahogany (*Eucalyptus robusta*). Dieback is a detrimental to biodiversity. For instance the animal species that are reliant on eucalypts include koalas, flying foxes, possums and squirrel gliders.

Dieback is caused by a range of natural and manmade factors including increased soil nutrient levels arising from:

- washing detergents for clothes, dishes and cars containing nutrients such as phosphorous and boron;
- dumped garden rubbish/lawn clippings;
- over application of fertilisers;
- nutrients leached from building materials;
- introduced land fill; and
- septic seepage.

Other factors affecting tree health that can contribute to dieback include:

- damage and disturbance to the roots in the tree's dripline by cutting and loss of roots from construction, loss of water and soil compaction, or the build up of soil;
- increased water runoff from roads, driveways, pavements and gutters directed into stormwater drains;
- pool discharges (both chlorine and salt water discharge) into bushland;
- increased water tables due to excessive use of irrigation systems;
- tree loss opens the canopy, allowing wind turbulence to damage leaves and branches; and
- removal of understorey plants during urban development can cause wind pruning and tree or limb loss.

Dieback may be associated with *Phytophthora cinnamomi* which is a microscopic organism that lives in soils and invades plant roots. The organism spreads by producing motile zoospores that are dispersed through stormwater and drainage water to infect new hosts or spread through activities such as bushwalking.

Control of *P. cinnamomi* is dependent upon mapping the location of dieback sites. Sites should be managed according to the *Best Practice Management Guidelines* by the Royal Botanic Gardens Sydney, which is based on the 'precautionary approach' to land management.

Rare and Threatened Species

Vegetation communities are currently being assessed and mapped to take into consideration recent listings of Endangered Ecological Communities and to provide accurate vegetation maps for future planning and conservation purposes.

Significant Trees

Generally trees with a girth greater than 500mm and a canopy spread of 6m radius would be considered significant. Significant trees are:

- listed as heritage items in Schedule 9 of the Pittwater Local Environmental Plan 1993; and / or
- contribute substantially, either individually or as a component of a tree group, to the landscape character, amenity, cultural values or biodiversity values of their locality.

Strategies

Refer to Table 6.1 on page 44.

5.9.2 Vegetation Restoration

Statutory Considerations

SEPP 19 clause 4 (4) - management plans must identify specific measures to be taken to "... restore and regenerate areas of bushland".

Discussion

There are two methods used for establishing plant cover – regeneration and revegetation.

Regeneration

Regenerating the bushland is the most commonly used approach to rehabilitate local indigenous vegetation. Bush regeneration is defined as "... the practice of restoring bushland by focusing on reinstating and reinforcing the system's on-going natural regeneration processes" (**Australian Association of Bush Regenerators**).

The process involves removing the weeds and encouraging regeneration from *in situ* seeds therefore it is only suitable for sites that are 'structurally intact' (as defined by SEPP 19).

2. Revegetation

At severely degraded, filled or cleared sites, the plant community is generally 'revegetated'. This involves broad scale planting which is very expensive and only carried out when necessary. The process involves:

- retention – retain what indigenous bushland remains;
- restoration – improve degraded vegetation; and
- revegetation – establish vegetation where little to none exists.

Determining the appropriate method for establishing plant cover requires a thorough assessment of the site by suitably qualified persons. Works are undertaken or closely supervised by staff, contractors or volunteers with the appropriate training.



Plates 14 – 16. Revegetation / regeneration works.

A list of suitable plants for revegetation is available on Pittwater Council's web site

Strategies

Refer to Table 6.1 on page 44.

5.9.3 Weed Management

Statutory Considerations

Noxious Weeds Act, 1993 - Council must reduce the negative impact of weeds on the economy, community and environment by establishing control mechanisms (s 3) for public and private land, and through the issuing of *weed control notices* (s 7). The Act divides weeds into five control categories as follows:

- Class 1. State Prohibited Weeds - noxious weeds – harmful to agriculture, human health and the community. These plants must be eradicated and the land kept free of the plant. The control authority must be notified of new outbreaks.
- Class 2. Regionally Prohibited Weeds. These plants must be eradicated and the land kept free of the plant. The control authority must be notified of new outbreaks.
- Class 3. Regionally Controlled Weeds. These plants must be fully and continuously suppressed and destroyed.
- Class 4. Locally Controlled Weeds. These plants must be controlled according to measures specified in the management plan for the weed, as available on Council website under the environment tab, plants and annuals – weeds.
- Class 5. Restricted Plants. These plants can't be sold. Control authority must be notified if discovered.

Discussion

Source of weeds

Weeds generally appear once an area has been disturbed due to:

- physical disturbance such as construction activities, clearing or mowing;
- increased soil moisture due to urban run-off;
- increased nutrients from urban run-off and garden refuse dumping;
- increased light levels where trees are killed or lopped often for views; and
- Increase in weed propagules and seed dispersal agents.

Control of weeds

- Weed control needs to focus on treatment of the cause and replacement of that weed with an appropriate plant species rather than merely destroying the weeds. Weed infestations are managed using techniques that will minimise negative environmental impacts or techniques that aim to reduce re-infestation of undesirable species through the establishment of more favourable plant species.

There are three stages to weed control:

1. Primary weeding – initial removal of weeds – this can be can be hard work and time consuming involving large woody weeds.
2. Secondary weeding – removal of herbaceous weeds or seedlings. This stage may require several sessions.
3. Long term maintenance – regular inspections and control of rogue or persistent weeds.

Council conducts annual weed spraying in some areas. When poisons are being used signage is placed at the site when poisons are being used to warn people (and protect pets) from drinking or swimming in the water the targeted areas.

An A – Z list of Weeds is available on Pittwater Council's web site.

Strategies

Refer to Table 6.1 on page 44.

5.9.4 Local Fauna and Introduced Animals

Statutory Considerations

- *NSW National Parks and Wildlife Act, 1974* – consider impacts on fauna in the assessment and granting of approval or development consent and in the implementation of Council activities. This is particularly the case with species listed under Schedule 12 of the Act.
- *Local Government Act 1993 s 36B Community land comprising the habitat of threatened species*
- *Threatened Species Conservation Act, 1995*
- *National parks and Wildlife Act, 1974*
- *Environmental Planning and Assessment Act, 1979 – s 5*
- *Endangered Fauna (Interim Protection) Act, 1991 (and amendments)*
- *Heritage Act, 1977*

Companion Animals Act, 1998 - Under this Act, a dog that is in a public place must be under the effective control of a competent person by means of leash (s. 13). Dogs are prohibited in some public places (s. 14) including in and within 10 metres of play apparatus, food preparation areas, and public bathing areas. Dogs are also prohibited within specific locations as determined by councils such as wildlife protection areas and public bathing areas.



Discussion

This report considers terrestrial animals only. A list of local fauna is contained in Chapter 4 under Item 4.7

The Pittwater area is rich in fauna and flora species due to the diversity of natural areas, large array of habitats and the close proximity to national parks. Despite the abundance of fauna, it cannot be considered 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). Over the past five years sightings of less than 10 kolas have been recorded. 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 that 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 brush tail possums and lorikeets have a higher ability to cope with increased development.

Fauna Habitat and Populations

The fragmented nature of urban bushland and the considerable impacts on these areas has reduced the populations of all native animals. Therefore Council has given protective status to species and their habitats that are considered to be 'well conserved' or 'common' as well as species considered to be 'endangered' to ensure that the long term viability of all populations are not compromised. Recovery plans for endangered species also provide strategies that aim to prevent animals from becoming locally, regionally or nationally extinct.

Vegetation and habitat corridors

Council has identified a number of vegetation and habitat corridors in the Pittwater LGA. The corridors create connectivity between natural area reserves and provide the following benefits for wildlife:

- allow increased migration rates of species / individuals (protects genetic and species diversity);
- decrease the likelihood of local extinctions and prevents inbreeding;
- provide increased foraging area for species with large ranges e.g. Koalas;
- provide refuge from predators such as domestic pets;
- widen the variety of habitat and nest sites available;
- provide refuge from disturbed habitat e.g. fire affected bushland;
- limit urban sprawl and abate noise; and
- provide escape routes in times of disaster such as fire and flood.

The corridors offer the most assistance to fauna when they allow movement between reserves and private properties with denser vegetation and canopy cover. Corridors mostly benefit species that inhabit the tree canopy, particularly birds, bats and insects. Local species that rely on the corridors include small birds such as the White-cheeked Honeyeater, Eastern Spinebill and Superb Fairy-Wren and larger predatory birds including the Southern Boobook Owl, the Powerful Owl (threatened) and the Pacific Baza (Crested Hawk). Mammals include Squirrel Gliders, Sugar Gliders and Koalas.

Despite the benefits of vegetation and habitat corridors, they continue to be impacted by residential development which is considered one of the major treats to Pittwater's wildlife management and conservation. Other pressures include:

- unsympathetic landscaping and street tree planting of species not indigenous to the area;
- predation by domestic pets and feral animals;
- weed invasion;
- barriers to movement including fences, major roads and loss of continuous habitat such as canopy and understorey vegetation;
- death or injury caused by vehicles; and
- pollutants, chemicals and poisons.

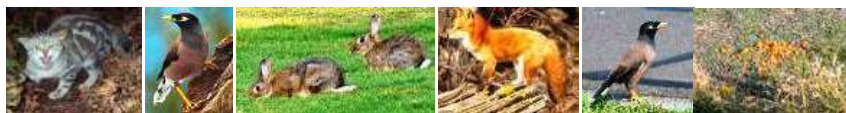
There are many ways that the community can help to protect local fauna, including:

- Protect and enhance native bushland on private property. Plan with neighbours for larger bushland areas if possible. Even small isolated areas can provide vital stepping stones for more mobile species.
- Recreate habitat on private property by planting local indigenous plants. Refer to 'Creating a Habitat for Wildlife and Birdscaping your Garden' is available on Pittwater Council website.
- Retain bushland on road reserves / nature strips. In some areas these corridors are the last remaining examples of local bushland. They are increasingly being lost to formal landscaping with very little or no habitat value.
- Retain safe, dead canopy trees as hollow nesting sites. These vital habitat features are becoming increasingly rare in urban areas. Nest boxes can also provide habitat.
- Retain natural soil profiles to protect biodiversity.
- Retain groundcovers, fallen logs and leaf litter as cover and habitat for ground dwelling animals.
- Join the Volunteer Bushcare Program or the Backyard Bushcare Program.
- Attend a course on how to create habitat for native animals in private gardens. Refer to the Events page on Pittwater Council website for upcoming courses.
- Report injured animals to official wildlife careers such as Sydney Metropolitan Wildlife Service Incorporated or WIRES (Wildlife Information and Rescue Service Incorporated), or take the animal to a vet who should not charge to treat it.
- Contain your pets on your property and keep your pets on leads in public places (unless designated off-leash areas).

Strategies

Refer to Table 6.1 on page 45.

5.9.5 Introduced Animals - Feral Animals /Domestic Pets



The large areas of local bushland provide feral animals with favourable shelter, nest sites and food supplies.

The main feral animals Sydney's Northern Region, including Pittwater includes:

Non indigenous species:

- rabbits;
- foxes (*Vulpes vulpes*)
- cats (*Felis catus*)
- Indian Mynar (*Acridotheres tristis*)
- House Sparrow (*Passer domesticus*)

Non locally indigenous native species

- Sulphur Crested Cockatoos
- Galahs
- Rainbow Lorikeet
- Glossy Black or Scaly Breasted Lorikeet

These species compete for food and shelter with local species and can carry infectious diseases

Impacts of Feral Animals

Environmental Impacts

- Compete with wildlife for food and shelter. For example, Indian Mynas can displace small native birds by taking over nesting habitats.
- Destroy wildlife habitat.
- The larger vertebrate pests such as cats and foxes prey on ground dwelling mammals and reptiles as well as amphibians and birds. Cats can kill prey up to their own body size. Anecdotal evidence has shown that cats have impacted on the local Squirrel Glider population in Avalon.
- Cause soil erosion – particularly rabbits.
- Transmit infectious diseases such as *Toxoplasmosis* and *Sarcosporidiosis* (Beak and Feather) which can debilitate and kill native animals and possibly affect human health.

Social Impacts

- Feral pests such as rabbits can destroy suburban gardens.
- Introduced birds leave droppings near buildings. Local shopping areas, particularly food outlets and cafes, have been inundated with Indian Mynas, becoming a nuisance to the local community. Sulphur Crested Cockatoos have been known to destroy property.

Economic Impacts

- Funding to control feral animals currently costs approximately \$25,000 a year particularly for rabbit control. Fox control commenced in 2000 and a program has been trailed for Indian Mynar control in the past.

Impacts of domestic pets

Domestic pets can also be a threat to wildlife. Pets allowed to roam freely in natural areas can prey on native animals. Pets increase weeds due to the high nutrient content of their faeces, especially phosphorus which is not well-suited to indigenous plants. Further, off-leash dogs can create a nuisance for other park users if they are not under the control of their owners. Just the presence of cats and dogs in bushland areas can disturb native animal feeding and breeding patterns. The rabbit population can increase due to escaped pets. Pet rabbits should be desexed as rabbits outside cages can breed with the feral population.

Pets bring many benefits to individuals and the community and with commitment from pet owners, the community can prevent them from harming local fauna. However, pet owners must retain control of their pets at all times, particularly on public or community land. The responsibilities of pet owners include the following:

- keep pets indoors between sunset and sunrise;
- attach two bells to the collar of cats;
- desex cats and dogs to minimise their desire to wander;
- keep pets away from tidal flats to prevent disturbance to the many migratory birds;
- ensure pets do not injure a person or other animal or damage property;
- ensure pets do not enter wildlife protection areas;
- ensure pets are identified and registered and
- ensure pets do not become a nuisance or threat to other people or pets by wandering.

Wildlife Protection Areas

Council has designated 22 significant bushland reserves as Wildlife Protection Areas (Companion Animals Act 1998 s 14 H) where dogs and cats are prohibited as follows in the list below:

Table 5.1. Wildlife Protection Areas.

Aquatic Reserves: Barrenjoey Headland Narrabeen Headland	Intertidal Protected Areas – Bungan Headland Mona Vale Headland
Algona Reserve	Irrawong Reserve
Angophora Reserve	Kanimbla Reserve
Attunga Reserve	Loquat Valley Reserve (Pindari Reserve)
Bangalley Head	McCarrs Creek Reserve (Outside the trial unleashed dog exercise area)
Betty Morrison Reserve	McKay Reserve
Bushrangers Hill	Minkara Reserve
Careel Bay	Narrabeen Creek (Boondah Reserve East)
Elizabeth Park	Palmgrove Park
Epworth Park	Stapleton Park
Fern Creek	Sunrise Reserve
Great Mackeral Beach Reserve	Warriewood Wetlands
Hewitt Park	

Strategies

Refer to Table 6.1 on page 45.

5.10 Fire Management

Statutory Considerations

- *Local Government Act, 1993*
- *Crown Lands Act, 1989*
- *Warringah Pittwater Bush Fire Risk Management Plan (currently under review)*
- *Bushfire Environment Assessment Code*
- *Rural Fires Act, 1997*
- *Rural Fires Regulation, 2008*
- *Planning for Bushfire Protection, 2006*
- *Environmental Protection and Biodiversity Conservation Act, 1999*
- *Environmental Planning and Assessment Act, 1979*
- *State Environmental Planning Policy 19 – Bushland in Urban Areas*
- *Threatened Species Conservation Act, 1995*
- *National Parks and Wildlife Act, 1974*
- *Pittwater Local Environmental Plan, 1993*
- *Pittwater Council Geotechnical Risk Management Plan, 2008*

Discussion

Local Bushfire Statistics

Historically the main bushfire threat identified in the Pittwater area comes from the national parks which are owned by the state.

The Warringah / Pittwater area is affected by small scale fires annually and large scale, intense wild fires about once every ten years (1943, 1957, 1968, 1979, 1990, 1994 and 2004.) The statutory wildfire season occurs between 1 October and 31 March each year. This may be extended if weather conditions lead to increased fire danger outside this period. In December and January strong north westerly winds, low humidity, high temperatures and drought-affected fuels can combine to create severe wild fire conditions. Bush fires can also be a significant problem between August and December when dry windy conditions are also experienced.

Management Responsibilities

The NSW Rural Fire Service (RFS) is responsible for providing advice on hazards to councils and managing bushfire complaints under s 66 of the Rural Fire Act, 1997 (RFA). The RFS is also responsible for suppression of fires in Rural Fire district. The NSW Fire Brigade is responsible for the suppression of fire and issuing permits to burn in Fire Brigade areas. Fire management is coordinated locally by the Warringah Pittwater Bush Fire Management Committee who prepared the *Bush Fire Risk Management Plan 2000 (currently under review.)* Overall management of Council managed open spaces and the reserves in this plan are the responsibility of Pittwater Council.

Bush Fire Management Issues

Fire management in urban bushland needs to ensure that the risk of bushfire is reduced while protecting the qualities of natural areas. However, the Australian environment has adapted in some ways to fire, for instance many of the plant species have characteristics that enable them to regenerate after wildfires.

Bush fire protection measures include a combination of the following measures, depending on geographic location, site circumstances and the nature of the proposed use including:

- emergency management arrangements;
- water supply and utilities;
- provision of access;
- Asset Protection Zone (APZ);
- Strategic Fire Advantage Zone (SFAZ);
- Fuel Reduction Zone (FRZ); and
- building construction and design.
- public awareness

Constraints Limiting the Application of Fire Management Practices

The constraints limiting the application of fire management actions include:

- climate
- steep slopes (generally greater than 18 degrees);
- geotechnical hazard (a rating of H1 is almost certain, likely or possible to experience land slip in the near future);
- vegetation – degree of fuel load
- vegetation dominated by Endangered Ecological Communities;
- rainforest vegetation;
- available access; and
- limited options to create control lines.

Asset Protection Zones (APZ)

Asset Protection Zones reduce the threat of fire. APZs are located between assets and bushfire hazards and are generally located on private land, but may be located on public land. APZs are either fuel free or fuel reduced with the width of the zone and fuel reduction treatment being determined by the aspect, slope and existing assets in accordance with the publication 'Planning for Bushfire Protection' by the NSW Rural Fire Service. After obtaining a Hazard Reduction Certificate from the RFS ground fuel loads are generally reduced through weeding, slashing, bush regeneration, raking and burning where appropriate. In establishing the zones within reserves, the existing natural features, cleared areas and tracks should be used where available.

Home owner's responsibilities

Residents are responsible for reducing fuel on their own land, for instance wood piles should not be located adjacent to buildings, roof gutters should be regularly cleared of leaf litter and litter build-up around the house should be removed. Biodiversity, landslip and other risks also need to be considered.

Council and the RFS are liaising to provide educational material for residents in high risk areas which will be obtainable on-line from www.rfs.nsw.gov.au.

Note: Provisions relating to APZ only apply to dwellings approved after the gazettal of the 'planning for bushfire protection guidelines' on 1 August 2001. However, owners of properties with dwellings approved before this date should maintain APZ, after receiving a HRC from RFS, according to the *planning for bushfire protection guidelines 2006* which provides guidelines including: "bushfire protection measures that are essential to a development must occur on the site of the proposed development unless the most exceptional circumstances apply."

Pittwater's Bushfire Prone Land Map is currently under review. The document will include APZ.

Additional Issues to Consider in Bushfire Management

Catchment management

The occurrence of intense fires over broad areas may produce large quantities of ash and expose soils to erosion potentially resulting in sedimentation and contamination of natural waterways as well as damage to the scenic and catchment qualities of the area.

Vegetation types

- Dry sclerophyll and heath vegetation – high intensity during extreme fire conditions placing lives and property at high risk. It is therefore extremely important that hazard reduction plans are prepared for these areas.
- Tall Open Forests – generally low intensity bush fires (high fuel loads but moist) but supporting high intensity bush fires during and after extended dry periods.
- Open Forest / Woodlands – low intensity bush fires in most years particularly with hazard reduction, with the potential to support high intensity bush fires
- Heathland – high intensity bush fires
- Closed Forest – rarely support wild fires
- Fresh water and estuary – generally do not support bush fires, however there is the potential for grass fires across wetland areas
- Threatened plant and animal species and endangered ecological communities – require specific fire regimes to facilitate survival of individual species. The precautionary principle should apply to areas containing these species until specific requirements are identified in Species Recovery Plans.

Weeds

The interaction between fire and weeds include:

- increased fuel – some species are particularly flammable, particularly grasses and dead vines;
- decreased effect of fire reduction burns due to fire retardant species such as Privet;
- potential for weed mortality by fire; and
- increased proliferation of weeds due to seed simulation and bare ground following fire.

Fauna

Native animals have evolved and adapted to fire exposure and low intensity controlled burns can be beneficial to fauna by providing and providing and shaping their habitat (hollows in trees) and regenerating vegetation, particularly the understorey for ground dwelling animals to provide habitat and protection as well as food sources for herbivorous mammals.

In low intensity fire, many ground dwelling animals can evade flames and move off quickly, particularly in small area control burns. Ground dwelling animals, such as reptiles can shelter under logs or in hollows. Birds and other flying species can fly away quickly.

In contrast to low intensity fires, intense wild fires can lead to large scale loss, particularly for arboreal mammals such as pigmy possums and sugar gliders who live in the canopy. Further, in a much scorched environment, it can take years before regrowth can provide benefits.

Increased hazard risks

Fire, particularly followed by intense rain can increase the risk of landslides, fallen trees and dislodged boulders.

Fire trails and tracks

Fire trails and tracks are to be maintained in accordance with the Bush Fire Co-ordinating Committees' Policy No. 2/2007 Fire Trails. Additionally a Fire Trail Register is maintained by the Warringah Pittwater Bushfire Management Committee.

Heritage

European and Aboriginal heritage sites can be damaged by wildfire and even hazard reduction / ecological burns. Most damage to Aboriginal sites is caused indirectly by bushfires through the accelerated weathering and erosion and sedimentation of soils. Refer to areas as identified and mapped by Chapman and Murphy (1989) Conroy, B. 1994.) Rock engravings and stone arrangements are most susceptible to direct fire damage due to their location, generally on sandstone rock outcrops on ridges. Intense bushfires may cause exfoliation of the sandstone particularly vertically oriented rock outcrops. Although very uncommon, wooden aboriginal implements and scattered trees have been recorded in the area and should be protected where they are known.

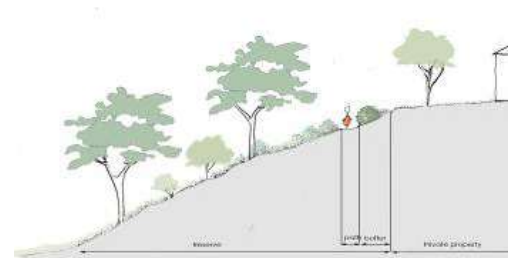


Figure 5.5. Fire buffer.
A buffer area is located between private properties and bushland areas.

Strategies

Refer to Table 6.1 on page 46.

5.11 Recreational Uses

Statutory Considerations

Council is required to "... promote the management of bushland in a manner which protects and enhances the quality of the bushland and facilitates public enjoyment of the bushland compatible with its conservation." SEPP 19 – Bushland in Urban Areas (Clause 2 (2) (n))

Discussion

Appropriate Uses of Natural Areas

Council's *Open Space Bushland and Recreation Strategy, 2000* identifies natural bushland areas as the third most preferred recreational setting in Pittwater. The types of activities generally considered most suitable for natural areas include:

- bushwalking - walking tracks, boardwalks and viewing platforms;
- areas for nature study;
- bush regeneration;
- picnicking;
- foreshore areas – boating and related facilities, swimming, fishing; and
- relaxing - viewing / scenery.
-

In appropriate areas, the following facilities and activities may also be suitable:

- rest rooms;
- playgrounds;
- dog walking (leashed);
- boat storage facilities;

Current Land Use

A list of recreational facilities and activities in Pittwater's reserves is contained in the Pittwater Open Space, Bushland and Recreation Strategy 2000 pp. 108 – 124 which is available on the Pittwater Council website.

The distinctive topographical features of the Pittwater LGA draw people into some natural area reserves for a range of passive and active recreational activities. In these areas additional management practices are required in order to lessen the impact of the activity on the environment. Examples of these activities include:

- weddings - headlands at Turimetta, Mona Vale and South Mona Vale;
- paragliding - Mona Vale Headland;
- rock climbing;
- kite flying and model planes - South Mona Vale Headland and the area above Warriewood Beach;
- hang-gliding - South Mona Vale, South Bilgola and Turimetta Headlands; and
- painting and photography – coastal headlands

Active Sporting Facilities

Active sporting facilities are generally considered to be incompatible with the conservation of natural areas. Turfed areas that require irrigation and fertilisation such as playing fields, turf leaches nutrients into adjoining lower areas. In these instances, measures need to be taken to lessen the impact of the development on the environment. The Pittwater LGA does not have designated areas in bushland reserves for trail bike riding or horse riding.

Facilities in foreshore reserves

Foreshore reserves are popular for recreational uses and require specific management practices to lessen the impact from recreational activities and developments. In the past, modifications to some foreshore areas has resulted in the loss of habitat and associated estuarine communities. Modifications include rock and concrete retaining walls; particularly along the south-eastern foreshore, and structures including wharves and jetties. The current facilities in foreshore areas include:

- 27 public wharves / jetties;
- one regional trailer boat launching facility;
- four light duty boat launching ramps;
- four tidal bathing enclosures;
- foreshore parking areas including two major car parks that service offshore communities;
- around 15 kilometres of seawalls, revetments and managed foreshores;
- ten watercraft foreshore storage facilities for over 700 boats / dinghies with additional required;
- an emergency water supply service for Scotland Island; and
- three kilometres of multi-use foreshore paths

Signage

Signage provides a means to lessen the impact of human activities on the environment. However, care needs to be taken to not clutter the landscape with signage. Signage is in accordance with Council Policy – No 129 incorporating 'Signs as Remote Supervision – Best Practice Manual' (August 1999). Factors considered in determining signage include:

- the level of development (establishing signage category);
- amount and frequency of use;
- facility visitation rate to ascertain the type and level of signage;
- adequacy of the facilities current signage; and
- establish and design the most appropriate sign.

Refer to Chapter 3 for information on park usage, leases, permits, bookings and development and activity controls.

The inclusion of facilities in natural areas is dependent on the ability of the reserve to accommodate usage without detrimental impacts. Factors to consider include:

- the facility should be located sensitively to minimise fragmentation of the reserve, or the impact on sensitive sites such as ecological endangered communities or heritage sites;
- where possible, existing facilities should be rationalised or combined to reduce any negative impacts;
- public use should be promoted in natural areas with appropriate management to prevent negative site disturbances such as weed spread.

Strategies

Refer to Table 6.1 on page 47.

5.12 Developed Open Space

Statutory Considerations

- *Local Government Act, 1993* – Community land is categorised as natural area, sportsground, park, area of cultural significance or general community use. Natural areas must be further categorised as bushland, wetland, escarpment, foreshore or watercourse. (Refer to Table 2.1). Whilst most of the lands relevant to this PoM fall into the category of natural areas, some areas will be categorised as park, area of cultural significance or general community use.
- The *Pittwater Open Space, Bushland and Recreation Strategy, 2000* provides an overall strategic direction and framework for the planning and development of open space, bushland and recreation in the Pittwater LGA. The document is based on five goals:
 - Recreation - provide a diverse range of recreation opportunities that best satisfy the needs of the community and manage open space in a manner consistent with industry standards
 - Environment - conserve and enhance the unique natural environmental qualities of Pittwater and manage the environment in a manner consistent with industry best practice.
 - Visual Quality - protect the visual quality of the open space system.
 - Community Focus - provide the opportunity for collective community involvement in, interaction with and ownership of the open space system.
 - Access - where possible, ensure that all of the open space system is accessible to the community.
- *Plan of Management Parks and Playgrounds, 2000* includes background information and management issues that are common to all parks and playgrounds in the Pittwater LGA. The *PoM Parks and Playgrounds, 2000* should be consulted for management of parkland areas in the reserves covered in the *Pittwater Natural Areas PoM*.

Discussion

Planning and managing for a series of landscape types within a reserve

Pittwater's open space network provides a diversity of recreational opportunities and facilities across a variety of settings for a population of approximately 57,000 residents as well as visitors to the area. Collectively, the open space network provides landscape amenity, cultural values, biodiversity, habitat corridors and specific natural environments such as wetlands and rainforests.

An integrated approach to the planning and management of the open space network is required particularly as a number of parklands adjoin natural areas. Managing the various landscape types involves providing adequate recreational settings while retaining the dominance of the urban forest as the central landscape character of the Pittwater LGA and lessening the impact of human activities on the natural environment.

The classification of recreational open space is based on the predominant setting(s) that best reflects the use, character and facilities of the land. Some areas of open space incorporate a number of different settings. Each setting within these areas may require a separate set of management principles. For example many reserves that comprise mostly bushland may also include a playground area with lawn and seats etc.

Areas of parkland with good public access provide valuable recreation areas for residents and visitors for a wide variety of uses including as picnics, playgrounds, sport, fishing and relaxing should be retained. Flat areas that are

unimpeded by trees are particularly useful as recreational areas. These areas should be retained as open space as they are scarce due to the steep topography of the region. Open uninterrupted spaces provide flexibility of uses, particularly for future generations. A good network of walking or cycling trails should also be available to provide recreational opportunities and links to local facilities.

There are a number of issues to consider in order lessening the impact of parkland on natural areas:

Where parkland adjoins natural areas it is important to retain and / or create a visual and environmental relationship between the landscape types. Parkland should complement adjoining natural areas through appropriate landscaping, choice of vegetation, view considerations (including bushland views and water views), drainage (away from natural area) and pedestrian connections (direct traffic flow away from sensitive areas). In order to lessen the impact of parkland on adjoining natural areas, the central area of parkland should provide the major focus and elements that interpret the natural and cultural history through text, motifs and sculpture can be incorporated into the landscape.

Where a watercourse transverses through parkland, a riparian corridor should be established if possible.

The negative impacts of developed open space, and related human activities on adjoining natural areas can be addressed through maintenance practices, particularly in the interface area. Mown parkland provides the opportunity for weeds and rubbish to enter adjoining bushland, to combat this parkland edges could be planted with dense planting. Grade developed open space away from adjoining natural areas and / or install swales to help prevent rainwater runoff from entering bushland. This is particularly important where natural areas are located downhill of turfed areas such as sportsfields. Turfed areas that are fertilised leach high levels of nutrients. Dog off-leash areas should be located away from natural areas due to the high phosphate content in dog faeces.

New and upgraded facilities are to incorporate ecologically sustainable design principles.

Strategies

Refer to Table 6.1 on page 47.

5.13 Walking Tracks, Vehicle Access and Parking

Statutory Considerations

Vehicle Access

- SEPP 19 - PoMs for reserves are required to include the assessment and determination of appropriate vehicular and pedestrian access
- Local Government Act, 1993 - where private access is provided on community land, the issuing of leases or licences may be required

Pedestrian Foreshore Access

Privately owned land is located above the mean high water mark. Land below the mean high water mark belongs to the Crown, the body of water is managed by the Department of Primary Industries and activities on the surface of the water are managed by NSW Maritime. The granting of leases for foreshore structures such as wharves or jetties are generally conditional to the lessee agreeing to a number of conditions including the retention of public access along the foreshore.

Crown Lands Act, 1989 s 34. The Land and Property Management Authority (LPMA) issues easements, rights-of-way, licences or permits to individuals, businesses and community organisations for a number of purposes, including waterfront structures (e.g. jetties, boat ramps and slipways). Licences are subject to a number of conditions which are set out in the licence agreement. This includes domestic waterfront licences for the use of submerged and tidal Crown land where private landowners request direct access to Crown land. By managing built structures on the waterways through appropriate licensing, the LPMA can ensure that waterways are not overcrowded and are balanced with the public's right to foreshore access.

Further information is available on the Land and Property Management Authority's website, available on: http://www.lands.nsw.gov.au/crown_land/leases/licences/waterfront_licences

Discussion

Vehicular Access and parking

Private vehicle access is generally not permitted in public reserves. However, access may be allowed under certain conditions which are outlined in the Action Table. Should parking be necessary, verge parking along the reserve street frontage provides the least impact on natural areas. Parking should be designed for low impact such as crushed sandstone and native grass edges.

Existing Walking Tracks in the Pittwater Local Government Area

Studies by NSW Health indicate that 35.1% of the adult population in NSW do not exercise. Of the people who do exercise, the 2006 Census by the Australian Bureau of Statistics revealed that the most popular recreational activity for adults is walking. Due to the popularity of walking, governments and walking groups have pressured for the creation and upgrading of walking tracks that provide a range of walking experiences. Examples include:

- various durations - short walks / day walks / overnight walks
- walks linking to facilities such as a café, playground, picnic ground, ferry.
- walks linked to adventure activities such as kayak hire or scenic flights
- walking for fitness
- nature trails with interpretative signage or information brochures
- historic walks
- walks to specific environments including foreshores, oceans
- close to home

Walking trails can be jointly planned by a number of government bodies. 'Walking Coastal Sydney' is a partnership project between the Sydney Coastal Councils Group, walking volunteers and State and Federal Governments. The project provides a series of mapped walking trails that extend from Barrenjoey to the Royal National Park. The walk joins to the Great North Walk as well as a series of side walks of various duration and difficulty.

There is an opportunity to create new walking trails, particularly walks that are close to home to enable the community to take full advantage of the existing trails. Existing walking trails in the Pittwater LGA are listed below:

Regional

- Sydney's Great Coastal Walk – Barrenjoey to the Royal National Park
- Bicentennial Coastal Walkway / Northern Beaches Walk

Great Walks through Pittwater

- From the Crown to the Sea - linking Bilgola Plateau and Newport Beach
- Beach to Bay - through four reserves at Palm Beach

Northern Ward Walking Tracks

- McKay Reserve & Dark Gully Park
- Great Mackerel Beach
- Bilgola North Headland
- Bilgola South Headland
- Attunga Reserve

Central Ward Walking Tracks

- McCarrs Creek Foreshore
- Bungan Headland

Southern Ward Walking Tracks

- Warriewood Wetlands
- Irrawong Reserve
- Kundibah Reserve
- Bilarong Sanctuary
- Deep Creek Reserve
- Turimetta Headland
- Narrabeen Creek
- Mona Vale Headland



Figure 5.6. Main walking tracks - existing and proposed.

Proposed walking track network

While this PoM seeks to improve public access to natural area reserves and link the walking track system to other facilities, the foremost aim is to protect, conserve and enhance the biodiversity of natural area reserves.

The walking track system in the Pittwater LGA can be accessed by public transport (buses and ferries), private vehicles, private watercraft, pedestrians and cyclists. The walking track system can be linked to public spaces, foreshores, scenic areas, viewing platforms / lookouts and recreation facilities where appropriate.

The walking track network should have minimal impact on the natural environment provided it is well designed and located. Some natural areas have been modified over the years to accommodate human needs at the expense of the natural landform, with inappropriate terracing, steps and paths. This damage should be repaired when the opportunity arises. Signage should also be minimal to avoid impacting negatively on the landscape.

Public Access to Foreshore Areas

Although there is good public access to the ocean beaches public access to Pittwater Estuary is limited. Whilst the Bayview area affords easy access to the southern foreshores, access to the eastern foreshore; between Newport and Avalon, is limited due to the steep topography of the area.

Stretches of privately owned residential properties are common around the perimeter of Pittwater Estuary. Where there is continuous foreshore access it is abruptly interrupted by private property. In some instances sea walls have resulted in loss of beach width and amenity. These issues are discussed further in Foreshore Usage Management Options – Appendix B.

Watercraft access is limited to areas where there are beaches, gently sloping edges or constructed access such as pontoons and jetties.

Access strategies

Strategies for managing foreshore access consider the following issues:

- local amenity;
- track design – minimal impact;
- roadside links;
- intertidal access;
- permissive occupancies;
- watercraft access;
- signage; and
- safety

Strategies

Refer to Table 6.1 on page 48.

5.15 Heritage

Statutory Considerations

- The *Heritage Act, 1977* protects items that are of state or regional heritage significance. Items that are more than fifty years old are assessed and required to be managed in accordance with the principles contained within the Burra Charter.
- The *Pittwater Local Environmental Plan, 1993* contains a list of heritage items in the Pittwater LGA. Heritage in Pittwater encompasses buildings, monuments, archaeological sites, jetties, wharves in addition to natural environment and Aboriginal heritage.
- *Pittwater 21 Development Control Plan*. Part B Heritage Controls lists what must be addressed when development occurs on land listed as heritage in of the PLEP Schedule 9 or the land is located in the vicinity or within a heritage conservation area. Development must also address Aboriginal Heritage significance.
- Legislative protection of Aboriginal heritage is administered by the *National Parks and Wildlife Act 1974* (NSWA) and the *Environmental Planning and Assessment Act 1979* (EPAA). Aboriginal sites and places of significance have legal protection under the NPWA whether they are known or discovered in the course of carrying out works. Therefore, when works of any kind are being planned or undertaken, there is a protocol of considering what actions are needed to be taken to secure the protection of known Aboriginal heritage and review the potential of works disturbing unknown sites. The primary function of the EPAA is to consider environmental impacts in land use planning and decision making. The definition of 'environmental impacts' under the EPAA includes Aboriginal heritage.

Discussion

Heritage in Pittwater encompasses buildings, monuments, archaeological sites, jetties, wharves in addition to natural environment and Aboriginal heritage.

Aboriginal heritage

Identification of sites

The Pittwater area contains 116 known Aboriginal relics or sites. There is a high potential for Aboriginal sites to be present in undisturbed natural areas. Further investigation is warranted if the landscape also contains the following typological elements:

- Creek or watercourse
- Foreshore
- Cliff higher than one meter
- Overhangs in any of the cliffs
- Level sandstone outcrops greater than two square meters

Interpretation of Sites

The level of interpretation that is required for sites of heritage significance requires specialist experience. If an Aboriginal site or relic is discovered, it should be reported immediately to Council who will arrange for the Aboriginal Heritage Office to inspect the site.

Site management and protection

Aboriginal communities treat the use of Aboriginal site information with great sensitivity and it is important to respect information relating to the site. Some information is confidential. Council cannot disclose or promote the location of sensitive sites, nor provide public tours to sites, without Aboriginal Heritage Office endorsement.

Non-aboriginal heritage

Non-aboriginal archaeological items are rare in the Pittwater area. The majority of evidence dates from the twentieth-century and mainly in the form of standing structures such as buildings jetties, pools, roads, gardens, and landscape features such as retaining walls. However, a major part of Pittwater's heritage is the natural environment which provides a sense of place. Natural elements include headlands, escarpments, wetlands, foreshores, water bodies and endemic and culturally significant trees and vegetation. These elements are of paramount concern in assessing any change to landscape items of heritage.

The Pittwater LGA contains three conservation plans and four identified Heritage Conservation Areas (refer to Appendix A). Developments in reserves in conservation areas should reflect the identified heritage of the built environment through interpretation of the characteristics of the area. This can be achieved through the use of scale, materials and design will ensure the sense of place is preserved and enhanced for future generations.

Direct and Indirect Impacts on Heritage Items

Heritage items can be damaged by natural processes such as wind, water, erosion and fire; and human related processes including urban development, recreation and vandalism. Aboriginal heritage is particularly vulnerable because the location of the site may not be promoted or the site could be concealed under topsoil. Causes of indirect or direct damage may include:

- encroachments - particularly along foreshore areas where Aboriginal occupation was concentrated;
- stormwater drains - concentrated water flows can directly affect Aboriginal carvings, artwork, middens and habitation sites through erosion;
- weeds – the control of weed infestations can have a direct physical impact on sites;
- walking tracks – if inappropriately located, walking tracks can directly disturb sites through physical damage or removal, or indirectly through alteration of natural water flow or impact from increased visitation levels; and
- fire – most damage to aboriginal sites is caused indirectly by bushfires through the accelerated weathering and erosion and sedimentation of soils, particularly in areas mapped by Chapman and Murphy (1989).

Strategies

Refer to Table 6.1 on page 50.



Figure 5.7 *Angophora costata*.



Figure 5.8 Elanora Estate 1930s (E. Barnett Local History Resource Unit, Warriewood).



Plates 17 – 22, Pittwater's natural heritage.



Figures 5.9 and 5.10 Aboriginal rock engravings.

5.15 Risk Management and Public Safety

- Council's *Risk Management Coordination Strategy* is available in the *Pittwater Council Management Plan 2008 to 2012*. Identified risks will be assessed and where appropriate, controlled by appropriate means, depending upon a number of factors including the type of risk, the rating, and the cost of mitigation. Control measures will be monitored periodically for effectiveness.
- Council Policy No 129 Signs – Council's Facilities: (Signage: compliance, directional, interpretive, identification)
- *Signs as Remote Supervision – Best Practice Manual*, prepared by Statewide Mutual Limited. Signage is used to direct, advise or warn of hazards. This document provides a process for assessment, selection and placement of signs at beaches, pools, parks and reserves. Where appropriate, Standards such as AS 2416 – 2002 Design and Application of Water Safety Signs are referenced where applicable.
- Council has adopted AS 4360 – Risk Management as a guiding document. This will change to ISO 31000 in the near future.
- A hazard is defined as "something that has the potential to cause harm". A risk is "the chance of something happening, measured in terms of likelihood and consequence". An unstable cliff face is a hazard. The risk is that it might collapse and cause injury.
- A duty of care is defined as "a requirement that a person acts reasonably towards others and the public with reasonable watchfulness, attention, caution and prudence to avoid acts or omissions that could expose people, for whom there is responsibility, to a reasonably foreseeable risk of injury". In any consideration of the management of risks, the question of what is reasonable will invariably come to the fore.

Pittwater's natural area reserves cover a diverse range of landscape topographies, including bushland, headlands, escarpments, wetlands, watercourses and foreshore areas. Natural areas are highly regarded by the public for their environmental, scenic and recreational values. They make a large contribution to the 'green' landscape character of the Pittwater area, and provide the means to conserve local fauna and flora species as well as providing opportunities for passive and active recreation - from quiet, contemplative lookouts to exhilarating, windswept cliff tops.

In general terms, the five key risk exposures Council will consider, in no particular order are;

1. Public Safety
2. Bushfire
3. Geotechnical
4. Climate Change
5. Flooding

Managing risks, particularly those relating to public safety presents a complex array of challenges for Local Government. Council must attempt to balance the public's right to free and open access to our reserves whilst managing identified hazards in a manner consistent with financial considerations, community needs, expectations and reasonableness.

To quote the then Chief Justice (Mason J) "The perception of the reasonable person's response (to risk) calls for a consideration of the magnitude of the risk and the degree of the probability of its occurrence, along with the expense, difficulty and inconvenience of taking alleviating action and any other responsibilities....."

Following legislative changes in 2002, members of the public are now expected to exercise reasonable care for their own safety in avoiding "obvious" hazards. There is generally no duty to warn persons of the hazards involved in all manner of recreational activities, nor is there a liability for the materialisation of an inherent risk. Risk warning signage is now accepted as a viable risk mitigation technique.

Council will follow the risk management guidelines as noted the Australian Standard. Briefly, the steps are;

1. Identify stakeholders
2. Establish the context – both internal and external
3. Identify the risks – source and impact
4. Assessment of the risk – analyse (rate) and evaluate
5. Consider treatment options – in terms of cost, difficulty, conflict, inconvenience
6. Monitor and review – have the controls been effective.

Once risks have been identified and assessed, those having negative consequences and considered as unacceptable, must be controlled. There are five broad classes of control measures;

1. Avoid or eliminate the risk
2. Change the likelihood of it occurring
3. Change the consequence if it does occur
4. Share the risk (contract out – insurance)
5. Retain (accept) the risk.

Risk control measures will be properly determined in the wider community context. Factors such as risk appetite, cost, legal and social responsibility, values and perceptions of stakeholders and the consequence of an occurrence should be objectively considered. "Decisions should take into account the need to consider carefully rare but severe risks that may warrant risk treatment actions that are not justifiable on strictly economic terms."

To illustrate, a dangerous cliff face on the coastline may present any number of hazards to visitors, with the risk varying with the age and experience of the person concerned. Whilst isolating the cliff face from the public with fencing presents as the best mitigation technique (eliminating the risk), fencing construction and maintenance are expensive. Other groups intent on maintaining access may well repeatedly damage the fence. Fencing may impede existing views and a fence may not be aesthetically pleasing. In this case, warning signs and re-vegetation would probably provide for cost effective treatment.

In respect to signs, Council has also adopted the *Best Practice Manual - Signs as Remote Supervision* prepared by our legal liability insurer, Statewide Mutual Limited. The document provides guidance and a simple, systematic approach to determining appropriate signage for Council facilities, including reserves and beaches. The Manual provides a formula to calculate the Frequency Visitation Rate (FVR) that assists in the selection, production, and location of site specific signage.

Council signs will aim to provide sufficient knowledge on the risks particular to a location so that a person acting reasonably might make informed decisions to protect their general safety. Signs will, where appropriate, provide a general idea of the main hazards associated with an area. For identified high risk areas, Council will consider the use of Risk Warning signs as referenced in Section 5 of the Civil Liability Act 2002 (NSW).

An issue of concern is that of encroachments, that tend to be more prevalent in waterfront reserve areas. As the public's right of access to open space continues to increase, so will the public/private lands interface. Often,

adjoining landowners construct paths and/or steps through reserves to access the foreshore (refer to 5.3 Encroachments). Private land owners often harbour an unrealistic view that increased public access to waterfront reserves will increase their individual risk exposure. Council will be pro-active in dispelling those fears and deal with each particular area on its merits.

Strategies

Refer to Table 6.1 on page 50.

6. Management Practices

This section provides the prescribed strategies (Table 6.1) to protect enhance and restore the natural area reserves covered in this PoM as described in Sections 4 and 5. The commencement and completion of any proposed works are dependent on available Council resources and funding.

6.1 Strategies

The Strategies addresses the LGA requirements to:

- identify the desired outcomes or objectives with regard to each issue;
- develop actions for the achievement of these objectives; and
- develop performance measures or mechanisms for the measurement of success.

Table 6.1. Strategies

All strategies are to be in accordance with the statutory considerations.

Issue	Strategies / Actions	Performance Measures
Land Ownership and Management		
Correct possible land identification, ownership and management anomalies	<p>Review the land categorisation of natural area reserves.</p> <p>Ensure management is in accordance with Community land categories and the public purpose/s of Crown Reserves.</p> <p>Amend the title of any unnamed reserves and ensure registration with the Geographical Names Board.</p> <p>Consolidate land by amalgamating allotments where possible.</p>	Any land identification, ownership and management anomalies corrected
General Management Issues		
General	<p>Protect, conserve and enhance the natural geophysical landforms by limiting constructions and changes, particularly on headlands. Limit terracing, signage, fencing, seating, artificial lighting and bitumen or concrete.</p> <p>Protect, conserve and enhance biodiversity.</p> <p>Protect, conserve and enhance watercourses and waterbodies.</p>	Natural environment protected, conserved and enhanced
5.1 Sustainability		
Promote sustainable practices and development	<p>Continue to update facilities in accordance with best practice for sustainable principles and designs.</p> <p>Technologies relating to sustainable development are continually being reviewed and improved.</p> <p>Current options for consideration as funding allows:</p> <ul style="list-style-type: none"> • Orientate buildings for solar access • Plant shade trees or install shade structures near amenities • Install rainwater tanks, particularly for amenity buildings for reuse for toilet flushing. • Install half-flush toilet flushing • Install automatic shut off or timed functions in taps • Install water sensitive urban design options for stormwater runoff • Replace lighting with solar power photo-voltaic lamps • Use sustainable and recycled products • Install recycle bins • Conserve and create local indigenous plant species and wildlife habitat and corridors • Monitor the impacts of climate change on foreshore reserves e.g. storm surges, landslips and potential change in flora. 	Sustainable outcomes achieved

Strategies to address sea level change are based on promoting adaptive risk-based management practices, including:

- Regularly review NSW Sea Level Rise benchmarks to ensure planning is based on latest scientific information
- Identify scenarios - predict possible impacts and take precautionary action.
- Monitor biophysical changes.
- All works shall accommodate the projected impacts of SLR on coastal hazards and flooding through appropriate site planning and design.

5.2 Research Education and Community Training and Participation

Research and Education

- Promote education and scientific research in natural areas.
- Increase public awareness and understanding of human impacts on these vulnerable ecosystems.

Research and Education

- Comply with statutory responsibilities under the LGA and CLA to integrate community consultation into the production of Plans of Management for natural area reserves.
- Encourage the use of natural area reserves for environmental and scientific study where appropriate.
- Scientific researchers wishing to carry out studies in natural areas are to notify and obtain approval from Council's Environmental Officer and obtain permission of the National Parks and Wildlife Service (NPWS) and from their organisation's Animal Ethics Committee if research is carried out on wildlife.
- Continue to develop and distribute interpretive materials - leaflets, booklets, newsletters display boards, field days and courses covering vegetation, fauna and natural areas management.
- Promote the use of Pittwater's Coastal Environment Centre for education and research programs on natural areas.

Research and Education

- Increased quality of services and resources available to the community, educational and scientific institutions.
- Improved community involvement in the management of natural area reserves.
- Improved communication between Council and the community.
- Impacts associated with educational use remain within acceptable limits for specific reserves.

Contractors and Community Volunteers

- Provide a high level of planning, support, training and supervision for volunteers.
- Ensure that the use of contract and community volunteer labour results in the best conservation practices and undertaken within established guidelines and performance targets.

Contractors and Community Volunteers

- Council acknowledges the valuable role community volunteers play in the management of bushland areas and Council is committed to raising the public profile and support for volunteers.
- Resource the planning, support, training and supervision of all existing volunteer projects. Further volunteer programs will not be established if adequate resources for planning, support, training and supervision of the projects are unavailable.
- Council's Bushcare program is to be used as the basis of establishing and maintaining a professional volunteer program.
- Engage contractors based on a planned program and in accordance with Council's Contract Bush Regeneration Guidelines.
- All contractors engaged by Council are to be fully insured to a level determined by Council officers.
- Contractors must be engaged in a manner that is consistent with the aims and objectives of this policy and to a satisfactory level.
- No member of the community can carry out any work within a public reserve without written permission from an appointed Council officer or under the Pittwater Council Volunteer Bushcare Program.

Contractors and Community Volunteers

- Increase in the number of volunteers participating in ongoing, well planned, supported, trained and supervised volunteer programs.
- Increase in expressed satisfaction from volunteers about the outcomes of volunteer programs.
- Work outcomes and targets as identified in individual contracts achieved.

5.3 Encroachments

Maintain the integrity of natural area reserves by reducing boundary impacts.

Establish clear policies for appropriate location, management and maintenance of boundaries to natural area reserves. This will enable the existing flora and fauna to survive in the long term and promote wildlife corridors and vegetation links, particularly with other natural area reserves.

- Many encroachments occur in the interface zone. To control encroachments, and for fire protection, it is recommended that the interface zone be managed differently to the core area of the reserve which is protected for its conservation and amenity values. Management practices in the interface zone include clear boundary definition, establishment of public access paths and fire management strategies (providing access, reduced fuel loads) as well as removing and prohibiting encroachments.
- Where necessary, define boundaries with pegs, signage.
- Where urban impacts from neighbouring properties are a major issue plant edges densely to create a buffer or fence.
- Encourage a sense of custodianship from the local residents, particularly adjacent residents who benefit directly from the open space.
- Encourage neighbours to become involved with the Volunteer Bush Regeneration Program.
- Issue a notice to residents who have encroached into a reserve, to request the removal of the encroachment. The highest priority is to remove structures that do not comply with the relevant Australian Standards, particularly paths and steps that could be dangerous to the public.
- Council may document encroachments on Council-issued Building Certificates or withhold a 149 Certificate until any

- Improved integrity of natural area reserves through reduction in boundary impacts.
- Clear policies established for the appropriate location, management and maintenance of interface zones and the elimination of encroachments.
- Stronger sense-of-ownership by the wider public

encroachment has been removed. (Fair Trading Act 1987).

5.4 View conservation and management		
Retain existing views	<p>Vegetation management relating to the retention of views will be addressed on a case by case basis</p> <p>The overarching priorities of natural area reserves will be the principles by which decisions are guided along with input from the wider Pittwater community</p> <p>Council generally does not plant tall growing trees into existing view lines except in cases where the planting is to replace trees that have been illegally cleared.</p>	Conservation of the beach, bush and water character of the Pittwater LGA by considering views.
5.5 Bushland on Private Property		
Encourage the retention and appropriate management of bushland on private property in accordance with the aims and objectives of SEPP Policy 19.	<p>Identify and document areas of local private bushland.</p> <p>Develop a community based strategy and program to maintain and enhance the function of private bushland for its wildlife corridor and habitat values</p> <p>Develop a joint bushland conservation and management agreement between Council and private landholders.</p>	Decrease in direct and indirect impacts on natural areas from adjoining development.
Mitigate the impact of development on adjoining natural areas.	<p>Assess impacts arising from a proposed development on the natural environment and address this in the approval determination process.</p> <p>Continue to enforce Council's Tree Preservation Order.</p> <p>Encourage property owners adjoining natural areas to become involved in the Bush Regeneration Program.</p>	
5.6 Lands Managed by Other Authorities		
Integration of bushland management practices and policies with other land management organisations.	<p>Develop co-operative management practices and policies with other organisations that own or are responsible for the management of natural areas in the Pittwater Local Government Area.</p> <p>Council should develop co-operative management agreements (including mitigation and restoration standards) with authorities or corporations that require permission from Council to carry out activities in reserves such as construction, operation and maintenance of lines for electricity or telecommunications, pipelines carrying water, sewage or gas and the construction and maintenance of main roads.</p> <p>Council's expertise in bushland management practices should be available to other authorities if required (on a fee for service basis) to reduce the impact of site works.</p>	<p>Integration of bushland management practices and policies with other land management organisations.</p> <p>Reduced impact on natural areas through positive working relationships with other authorities.</p>
Reduced impact on natural areas through positive working relationships with other authorities.		
5.7 Water Catchment		
Water Catchment Issues <ul style="list-style-type: none"> Continue to improve catchment based management practices. 	Water Catchment Issues <p>Continue to allocate resources to manage and mitigate the impacts of urbanisation on water catchment systems through planning controls (DCP / LEP), improved stormwater management, restoration of creekline corridors and catchment remediation.</p> <ul style="list-style-type: none"> Enforcement of the <i>Protection of the Environment Operations Act, 1997</i> Raise community awareness about the need to reduce pollution at its source. 	Water Catchment Issues <p>Total catchment management achieved.</p>
Stormwater and Urban Run-off <ul style="list-style-type: none"> Control the quality and quantity of water entering reserves. Maintain natural hydrological 	Stormwater and Urban Runoff <ul style="list-style-type: none"> Reduce gross pollutant and sediment loads in stormwater through the installation and maintenance of additional in-line gross pollutant and sediment traps. 	Stormwater and Urban Run-off <ul style="list-style-type: none"> Reduction in levels of gross pollutant, sediment and

- processes where possible and minimise degrading influences of both low flow and peak flow stormwater in creek-lines.
- See also policies relating to mitigation of urban run-off.
- Improve water quality where appropriate with wetland filters, artificial wetlands, gross pollutant traps or similar structures.
- Reduce urban run-off by:
 - reducing the quantity of stormwater leaving developed areas of the catchment to a level approximate pre-development hydraulic conditions;
 - maintaining permeable surfaces wherever possible including retention of grassed curbs and gutters;
 - promote on-site absorption of stormwater, for example through the installation of absorption trenches, wherever practicable, in non landslip areas, or water tanks; and
 - stabilise and monitor stormwater outlets where required.
- Support the existing program of water sampling and monitoring for nutrients in creeks and estuaries.
- In situations where the drainage of urban run-off into natural areas is unavoidable, the specific ecological requirements for maintaining the affected vegetation community (as identified by Council) will be the overriding consideration used in determining the nature of the stormwater treatment. Adopting as few drainage lines as possible may apply in situations where the native plant community is not adapted to urban influenced hydrological changes. The effect increased water flow on the stability and erosion potential of the natural area will be considered.
- Storm-water drains are not to be terminated in wetlands or in areas other than creeklines or water bodies.
- Prohibit and prevent the draining of swimming pools into natural areas and seek the retrospective connection of existing pools to the sewer system through Sydney Water.
- Ensure that septic tank effluent is effectively treated on private lands.
- Council is to liaise with Sydney Water to reduce the frequency and occurrence of sewage discharges arising from sewer mains.
- nutrient enriched stormwater and septic tank effluent entering natural area reserves. Reduction in measurable nutrient levels in stormwater discharges, particularly Nitrogen and Phosphorus.
- The development of a systematic stabilisation and monitoring program for stormwater outlets.
- Reduction in quantity of stormwater leaving developed areas of catchments.
- Maintenance or improvement of creek line stability and plant community health.
- Reduction in volume of stormwater entering reserves during peak flows.
- Prohibit additional stormwater outlets that discharge into reserves.
- Reduction in weed infestations due to urban run-off from both point and diffuse sources.
- Reduction in the frequency and occurrence of sewage discharges arising from sewer mains.
- An increase in the number of existing swimming pool discharges that are connected to sewer lines.

Soil Erosion and Sedimentation

- Conserve soils and protect against erosion.
- Ensure that the ongoing build-up of sedimentation does not compromise the ecological value of natural areas and their habitats.
- Create and maintain conditions in which natural creek and drainage lines are protected from increased erosion and / or sedimentation due to urban impacts.
- Create and maintain stormwater drains, internal roads, parking areas and tracks that can withstand loss of sedimentation during periods of normal and extraordinary run-off.

Soil Erosion and Sedimentation

- Maintain soil integrity through regeneration or revegetation.
- Investigate stormwater run-off to prevent loss of topsoil
- Stabilise and monitor all creek lines that have been identified as eroding and requiring attention.
- Limit sedimentation arising from other activities:
 - develop a policy on sediment/erosion control for sites both public and private where soil disturbance will occur as a result of construction, development and redevelopment;
 - maintain regular street sweeping within developed catchments with the aim of reducing sediment deposits; and
 - site specific sediment and erosion control plans be produced for sites prior to construction development or re-development.
- Ensure fire reduction activities have considered the implications for soil erosion and that strategies are in place to mitigate any identified potential for erosion.
- Rationalise the number and location of tracks and vehicular access within and adjacent to natural areas.
- Remove illegal tracks to address loss of topsoil and erosion.
- Designate and form pedestrian paths, particularly with foreshore access where required and monitor to limit loss of topsoil due to erosion.
- All track and vehicular trails within and adjacent to natural areas are to be designed, constructed and maintained to minimise soil loss and remedial action taken to address erosion problems should they arise.

Soil Erosion and Sedimentation

- Soils conserved and protected against erosion
- Reduction in levels of sedimentation and bank instability on creek lines.
- Reduced sedimentation arising from other activities.
- Minimal loss and or movement of soil as a result of fire.
- Minimal erosion and soil loss from walking tracks, fire trails and access tracks.
- Reduction in the maintenance required for tracks, trails and waterways.

5.8 Geotechnical Risk Management

- Development and project works must not adversely affect or be adversely affected by geotechnical hazards and coastal processes.
- Determine whether the site has been identified on the current Pittwater Geotechnical Risk Management Map as affected by landslide or within the coastline (bluff) hazard areas prior to any works being undertaken.
- Assess as to whether Part 4 or Part 5 of the EPAA applies.
- All development under Part 4 (EPAA) on land subject to land slide must comply with the requirements of the current Geotechnical Risk Management Policy for Pittwater.
- All project works under Part 5 (EPAA) on land subject to landslide, the Geotechnical Risk management must be considered
- Reduced risk to people, assets and infrastructure in areas subject to geotechnical hazards and coastal processes.

- People must not be at risk due to geotechnical hazards and coastal processes.
- as Part of the Part 5 assessment and where considered required, a geotechnical risk assessment undertaken.
- Install Signage as appropriate. Refer to 5.15 Risk Mitigation and Public Safety.

5.9 Biodiversity		
Conserve biodiversity and maintain ecosystem functions	<p>Ensure all natural areas are appropriately zoned to ensure ongoing protection of the land. Survey and Identify the extent and values of natural areas and review the land categories – bushland, wetland, escarpment, foreshore, and watercourse for appropriate management.</p> <p>Continue to implement bushfire management regimes.</p> <p>Provide for creek rehabilitation / riparian zone remediation, stormwater quality improvements.</p> <p>Reduce weeds</p> <p>Manage and interpret natural areas in a manner that protects, conserves and enhances natural landforms and features such as rock outcrops.</p> <p>Explore practical ways to improve biodiversity:</p> <ul style="list-style-type: none"> • Increase the size of patches of remnant vegetation • Increase connectivity using corridors and stepping stones for habitat • Increase vegetation cover • Prioritise works – focus restoration on areas that offer the best prospect for expansion for the lowest costs. Restore and reconnect sites in the best condition. • Provide buffers around remnant vegetation to reduce impact particularly invasion by weeds, stormwater runoff 	Biodiversity is maintained and enhanced.
5.9.1 Plant Communities		
Ensure the ongoing ecological viability and habitat values of the land, the flora and fauna (including vertebrates, fungi and micro-organisms) of the land and other ecological values of the land.	<p>Plant community and species diversity:</p> <ul style="list-style-type: none"> • Manage natural areas in a manner that maintains optimum locally indigenous species and plant community diversity • Maintain natural ecological processes and mitigate degrading influences • Prepare and implement a management program that remove threats – weeds, illegal paths and illegal structures; and strengthen plantings. • Undertake regeneration or revegetation as required. <p>Genetic integrity</p> <ul style="list-style-type: none"> • Use local genetic material • Control non-indigenous plants <p>Eucalyptus dieback - <i>Phytophthora cinnamomi</i></p> <ul style="list-style-type: none"> • Reduce known factors influencing dieback through implementing policies relating to Urban Impact Mitigation and Fire Management. • Monitor dieback and apply latest research methods. • Adopt the 'Best practice Management Guidelines' by the Royal Botanic Gardens, Sydney for management practices. 	<p>Plant Community and Species Diversity: Current plant community and species diversity is maintained and enhanced where possible.</p> <p>Genetic Integrity: Management programs are based on local genetic material and non-indigenous plants in natural areas are reduced.</p> <p>Degrading influences on plants are ameliorated.</p>
Maintain and enhance local indigenous plant communities and species diversity.		
Maintain genetic integrity		
Maintain natural ecological processes.		
Ameliorate degrading influences on plant communities.	<p>Rare and Threatened Species</p> <ul style="list-style-type: none"> • Map the locations of all significant, rare or threatened vegetation communities and plant species. • Ensure all personnel undertaking site works are fully informed of the vegetation and provided with species descriptions and location map. • Carry out targeted searches prior to carrying out work on sites containing rare or threatened species. • Maintain and create habitat for significant flora and fauna when known to occur within a reserve or local area. 	Significant, rare and threatened plant communities are identified and protected
Identify and protect any significant, rare or threatened vegetation communities and plant species.		
5.9.2 Vegetation Restoration		
Continue to assess the condition of bushland and provide an appropriate ongoing renewal program.	<p>General principles:</p> <p>Assessment and works are to be carried out or supervised by suitably qualified persons.</p> <p>Identify and protect threatened species and their habitat.</p> <p>Prepare ongoing management plans.</p>	Bushland is continually monitored and maintained.

Use registered, low impact, non-residual, organic rather than chemical fertilisers.
Ensure the use of herbicides is kept to a minimum and used in the safest possible manner.

Revegetation

Revegetate to establish new areas of vegetation.
Plant vegetation at locations where species are absent or do not have the chance of naturally reoccurring.
Rehabilitate disturbed sites and damaged areas to conserve soil and remaining vegetation.
Inhibit weed growth.
Stabilise soils and banks, and stabilise edges.
Extend and link wildlife corridor.
Green developments.

Preferred techniques: tubestock planting, direct seeding or assisted regeneration
Direct seeding, rather than planting maybe more appropriate in some areas
Preference for locally collected plant stock
Plan to create a diversity and mixture of native plant species and types
Plant in block or round shapes, rather than long narrow strips where possible

Regeneration

Undertake bush regeneration and weed management programs in line with relevant best practice guidelines and Council policies.
Continue to remove targeted noxious and environmental weeds as a high priority.
Supplement weed removal with funding and the assistance of volunteer groups.
Work with adjacent property owners to reduce and coordinate weed control.
Develop appropriate vegetation management practices specific to the site.

5.9.3 Weed management

Implement measures to control and manage the sources of weeds.	Develop weed control programs that addresses the causes of the weed infestation and the infestation itself. Minimise negative environmental impacts and reduce re-infestation of weeds by establishing favourable plant species or communities.	Noxious Weed classifications and control actions are regularly reviewed and application lodged with the Minister for Agriculture for amendment when necessary.
Identify and control new plant species that pose a potential threat to natural areas.	Where appropriate carry out bush regeneration as a preferable alternative to broad scale herbicide applications. Use registered, low impact, non-residual, organic fertilisers (as an alternative to chemical fertilisers) Implement an integrated weed control program with adjacent land managers that are based on catchment management principles. Work with adjoining councils and landholders to coordinate weed control programs and education.	Reduction in the frequency and spread of declared noxious weeds.
Promote community awareness relating to weeds.	Community assistance <ul style="list-style-type: none"> Implement a public awareness program relating to community responsibility (Refer Noxious Weed Act, 1993.) Address edge impacts (dumping of lawn clippings) that encourages weed growth. Engage neighbours - produce newsletters, emails alerts on weeds and updates on the progress of works and working bees etc. Provide community interpretive materials on noxious weeds and their control on private lands. Encourage the public to be involved in the Bush Regeneration Program. 	Reduction in the frequency and spread of declared noxious weeds from private land to other land. Cessation of sale of declared Noxious Weeds in local nurseries.

5.9.4 Local Fauna and Introduced Animals

<ul style="list-style-type: none"> Encourage fauna surveys and research that complies with legislation and animal ethics. 	<ul style="list-style-type: none"> Encourage volunteer groups and individuals to conduct fauna surveys including population monitoring and species identification. Permission to undertake fauna research in Council reserves will be considered on merit and approval is conditional on 	<ul style="list-style-type: none"> Habitats protected, maintained and enhanced. Impact from domestic and feral animals reduced.
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- Protect, maintain and enhance native fauna populations and habitats.
 - Control domestic and feral animals where impacting on native fauna populations.
- Council receiving a copy of the findings on completion of the research. Permission is required from the NPWS.
 - Council will generally support compilation, identification and monitoring of species and habitat.
 - Reserves are to Include provision for wildlife habitat creation, enhancement and management.
 - Manage site works to mitigate impact on fauna.
 - Encourage private landholders to improve /create wildlife habitat.
 - Fauna releases will only be permitted in areas from which the fauna originated or within the expected home range of the species. Releases will not be permitted in reserves without Council approval.
 - Investigate an integrated control program to control pest animals with minimal off-target impact on native flora and fauna.
 - Identify, retain and expand fauna corridors
 - Collaborate with adjoining landowners and the local community generally to achieve effective and acceptable control and management of pets:
 - dogs are required to be on a leash and under effective control in a public place; unless a designated off-leash area. The person responsible for the dog is to pick up any dog faeces;
 - pet owners are encouraged to keep dogs and (particularly) cats in an enclosure in the evening/night.
 - horse riding is generally prohibited in natural areas to prevent soil erosion, weed spread and loss of vegetation.
 - Fauna corridors identified, retained and expanded.

5.10 Fire Management

- Integrate fire management practices and policies to protect life and property and where appropriate to enhance biodiversity and habitat.
- Fire management is to be in accordance with the Warringah Pittwater Bush Fire Risk Management Plan.
- Use NSWRFs under the Rural Fires Act to ensure that property owners manage fire hazard on their property, including the removal of fuel. Action will be taken against landowners who create fire hazards by dumping fuels into reserves.
- Encourage residents to reduce fire hazard on their properties and continue to provide information on how to achieve this.
- Provide and maintain AFZs between natural areas and assets; e.g. houses, schools, etc.
- Monitor fuel loads as part of the asset management system, with guidelines from the RFS.
- Avoid planting inappropriate vegetation in APZ (e.g. long grass, stringy barks etc.)
- Fuel reduction will be undertaken the where there is a risk to life and property or required by the natural and cultural values of the reserves. Fuel reduction programs undertaken along property boundaries will be implemented in a manner that protects biodiversity, public access and amenity.
- Council will not endorse hazard reduction programs that are not accompanied by a relevant environmental assessment, are inconsistent with an adopted plan of management or are deemed by Council to have an unacceptable impact on the environment.
- Continued active support and participation in the Warringah / Pittwater Bush Fire Management Committee.

Ecological management

The dual aims of fuel reduction and biodiversity conservation will be achieved where possible by the following strategies:

1. Appropriate review of environmental factors be completed and incorporated in the burn plan prior to undertaking prescribed burns.
 2. Developing a mosaic pattern of burning based on the fire period threshold as detailed in the Warringah Pittwater Bushfire Risk Management Plan.
 3. Undertaking fuel reduction burns in a manner that promotes germination (achieved through timing and degree of fire intensity.)
 4. Undertaking physical fuel reduction in APZ and strategic fire advantage zones where prescribed burning would be outside the vegetation community fire period.
 5. These works will focus on retaining biodiversity via manual fuel reduction and targeting weed species.
- Biodiversity of plant and animal communities, in hazard reduction areas maintained.
 - Hazard reduction or ecological burns in areas known to contain rare or endangered plants or significant fauna habitat will be supported by current best practice methods.
 - Broad-scale hazard reduction burns should retain patches of unburnt vegetation as determined in the review of environmental factors.
 - Heritage items are protected from adverse impacts of fire and fire sensitive species are identified and protected.

- Continue to review bushfire risk management plans on a five yearly basis
- Protect water quality by limiting control burning to outside the watercourse riparian zone or within 20m of a watercourse where possible.

Cultural management

- All sites with cultural or historic values will require a fire impact assessment to be conducted during the review of environmental factors.
- Walking tracks will be located in areas that provide a boundary between assets and areas of risk.

The strategy for planning hazard reduction considers:

- Completion of required environmental planning and assessment - Bushfire Management Plan
- Protection of assets and infrastructure on both public and private land
- Flora and fauna - endangered ecological communities, endangered populations, threatened species, locally or regionally significant species
- Cultural significance - Aboriginal non-Aboriginal sites
- Geotechnical hazard and slopes

5.11 Recreational Uses

<ul style="list-style-type: none"> • Provide recreation facilities consistent with the need to facilitate public enjoyment of natural areas compatible with conservation. • Ensure that recreational facilities are maintained to the highest possible standard. 	<ul style="list-style-type: none"> • The location and maintenance of existing and proposed recreation facilities will aim to reduce reserve fragmentation and other adverse impacts on the bushland and heritage relics. • Construction materials and techniques for facilities and structures in natural areas will be visually and environmentally sympathetic with the site. • Where active sporting facilities are located upslope of and adjoining bushland reserves, the management practices for those facilities will be reviewed and modified to reduce existing or potential impacts on the bushland area. • Where necessary, implementation of bushland restoration and regeneration works in areas adjoining recreation facilities and structures. • Also see" Fauna and Introduced Predators" 	<p>Prevent the reduced deterioration of natural areas as a result of the installation or maintenance of recreational facilities.</p> <p>Management practices for active sporting recreation facilities modified to be sympathetic with adjoining bushland management.</p>
<p>Leases and licences</p> <ul style="list-style-type: none"> • Ensure that leases and licences issued for activities undertaken in or adjoining bushland areas do not adversely impact on biodiversity. 	<p>Regulation of Activities</p> <ul style="list-style-type: none"> • Council may regulate activities in the reserves under s 632 of the LGA 93. • Regulation requires sign posting of prohibited activities. • Regulation is carried out by Council rangers or on witnessing activities and is subject to on-the-spot fines. 	
	<p>Leases and Licences</p> <ul style="list-style-type: none"> • Leases and licences for public and non-public activities in natural areas will not be issued if the direct or indirect adverse impacts of the activity on the reserve are deemed by Council to be detrimental to the area. • Leases and licences will clearly identify the extent and nature of approved activity and will not be transferable. • All leases and licences will be performance based and will be reviewed against relevant criteria. • A fee will be applied to all leases and licences based on commercial rates and of sufficient amount to restore unanticipated impacts on natural areas. The fee may be directed into bushland management and restoration activities. • All leases and licences will require full insurance cover as determined by Council. 	<p>Leases and Licences</p> <p>No deterioration of bushland conditions as a result of leased or licensed activities.</p>
	<p>Signage</p> <ul style="list-style-type: none"> • Refer to 5.15 Risk Mitigation and Safety 	
	<p>Safety</p> <p>Refer to 5.15 Risk Mitigation and Safety</p>	

5.12 Developed Open Space

Manage developed open space	<ul style="list-style-type: none"> Developed open space (parkland) is to be managed in accordance with the <i>Plan of Management Parks and Playgrounds, 2000</i>. Incorporate the interpretation and the protection of important natural or cultural values of the reserve and its surrounds for a defined sense of place - provide landscape elements that interpret the natural and cultural history through text, motif and sculpture Ensure developments are compatible with adjoining land uses Where possible, locate the central parkland area so that it will provide the major visual focus and locate activities away from adjoining natural areas Retain flat open areas unimpeded by trees for uses such as kite-flying, kicking a ball, dog walking Retain uninterrupted space that provides flexibility of layout and can cater for new facilities, particularly for future generations Ensure developments respond to public needs Provide equitable and safe access and provision for people with special needs (mobility/sight-impaired, prams/strollers) Provide sun protection, safety fencing, paving, lighting, seating, drinking water, etc Incorporate ESD principles 	Considerations given to the issues for both natural areas and developed open space for a cohesive open space network.
Minimise the impact of developed open space on natural areas	<ul style="list-style-type: none"> Locate activity nodes in areas that will have the least negative impact on natural areas. Revegetate / regenerate sensitive areas or degraded areas in parklands. Create habitat areas and corridors between existing areas of developed open space. Protect and enhance biodiversity, creek-corridor, wildlife corridors etc. Establish riparian zone plantings to watercourses where possible Grade developed open space away from adjoining natural areas and /or install swales to help prevent rainwater runoff from entering bushland (particularly areas of fertilised turf and dog off-leash areas) Protect natural areas by managing the interface zone between parkland and bushland: <ul style="list-style-type: none"> Line the interface between parkland and bushland with dense plantings to help prevent weed and rubbish from spreading into bushland Install barriers between the parkland and bushland interface if necessary Position walking tracks / cycle paths in developed open space area of the interface zone where possible 	

5.13 Walking Tracks, Vehicle Access and Parking

Remove non-essential pedestrian and vehicular access and restore affected areas.	<p>Vehicle Access</p> <p>Rationalise the presence of vehicular access to those deemed essential for management or recreational purposes.</p> <p>Map the location for vehicular and pedestrian access through and adjacent to public reserves and conduct annual audits.</p> <p>Construct and maintain vehicular access routes for approved access into or adjoining natural areas in a manner that will minimise the impact on these areas.</p> <p>Private vehicle access is generally not permitted in public reserves. Council may consider private access under the following conditions subject to approval:</p> <ul style="list-style-type: none"> Private residential access on informal (but gazetted) roads; Private residential access on easements; Service vehicle access for other authorities service management; and Temporary access to private lands for essential purposes <p>Parking</p> <p>Should parking be necessary, investigate verge parking with crushed sandstone or similar low profile surface. Incorporate WSUD to tread stormwater run-off.</p>	Minimal adverse environmental impact on natural areas due to vehicle and pedestrian access tracks.
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Continue to plan overall network of connected walking trails for public health and wellbeing.

A. Walking Track network

Provide linkages to connect existing tracks and develop a priority list for works to commence.

Construct / upgrade tracks to the relevant Australian Standards. Australian Standard AS 2156 – 2001 Walking Tracks aims to provide a unified approach, including track classification and signage, intended to minimise risk, preserve natural features and enhance recreational opportunities. The Standard defines a series of categories of access and specifies requirements for surface treatment width and path gradient / accessibility and single use and multiple uses (combining walking and cycling.)

Promote social equity – ensure tracks cater for a wide range of user groups including people with special needs.

Locate walking tracks and facilities in least environmentally sensitive areas that are outside habitat corridors.

Locate walking tracks in asset protection zones where possible.

Highlighting track entrances and upgrade access points.

Provide linkages to connect to existing tracks, public facilities; bus stops and ferry wharves.

Design and materials shall respond to the applicable track category.

Investigate existing drainage and road reserves for their potential to accommodate walking track and be landscaped or revegetated (as appropriate) for improved amenity to the walking track system.

Where possible, provide access through open grassed areas by suggesting the track route (rather than installing a well defined track) for variation in walking experience (broad scale landscapes / sky.)

Consider boardwalks, pontoons or similar structures on land below mean high water mark where necessary to provide useable pedestrian links between accessible foreshore locations. However, boardwalks are to be considered only as a last choice due to high capital costs, high maintenance costs and possible impacts on adjoining private landowners. Generally NSW Maritime does not support water based boardwalks due to the potential visual impacts (from land and water) potential for environmental impacts, high capital and recurrent maintenance.

Roadside links

For roadside sections of the walking routes, upgrade the surface and provide amenity shade tree planting and conserve or highlight views.

Intertidal access

Provide continuous foreshore access for as far as possible including intertidal areas where appropriate.

Generally pursuit of inertial access will be focused on high priority missing links between open spaces along the foreshore,

Where privately owned land directly adjoins the mean high water mark, and where the foreshore provides sandy beaches or rock platforms, temporary access at low tide can be achieved

Rights of way across jetties or around boat sheds may include steps or ramps to facilitate pedestrian passage.

Intertidal zone access areas must be signposted.

Council will liaise with the NSW Maritime for the ongoing implementation of these connections.

Refer to Foreshore Usage Management Options in Appendix A for additional strategies

Watercraft access

Ancillary to walking access to the foreshore is physical storage and launching of watercraft, tenders for private vessel access, kayaks and canoes. In some areas informal boat storage is causing environmental degradation. The provision of ongoing formalised storage bays is an ongoing project.

Provide stopping points for people exploring the foreshores by small boats.

Signage

A well defined walking track network is established that provides a public benefit by highlighting natural and cultural features.

The impact of the walking track on the natural environment is minimal.

	<p>Provide minimal signage by using symbols and combining information onto one sign.</p> <p>Provide signage that shows clear boundary definition (maps) and the location of tracks and facilities.</p> <p>Provide interpretative signage to highlight natural and cultural heritage where appropriate.</p> <p>Provide electronic maps for downloading from Council's website.</p> <p>Track Classifications are to be displayed at all entry points for walking tracks in accordance with AS 2156.1.</p> <p>Refer to 5.15 Risk Mitigation and Public Safety</p> <p>Safety</p> <p>Identify areas of poor visual safety and security through site inspection and public reporting.</p> <p>Provide low-level lighting that will not disturb wildlife where required.</p> <p>Align tracks away from steep edges.</p> <p>Plant vegetation away from tracks to prevent cuts and scratches and minimise tick nuisance.</p> <p>Review operational implications of intertidal access with NSW Maritime – confirm responsibilities.</p>	
5.14 Heritage		
Develop a comprehensive register of heritage items located in natural areas.	<p>Continue to register heritage items on the State Heritage Inventory.</p> <p>Provide heritage information on Council's website, including information for owners of heritage listed properties.)</p>	Completion of systematic study of natural areas to identify heritage relics.
Increase community appreciation of heritage items through appropriate interpretation.	<p>Known and Potential Sites</p> <ul style="list-style-type: none"> Continue with the systematic implementation of archaeological surveys of reserves to identify and record sites of heritage significance. Refer to the <i>Pittwater Aboriginal Site Management Report 2008 (confidential)</i> for the location and management of Aboriginal Heritage Sites. 	Sites interpreted in accordance with agreed strategies of National Parks and Wildlife Service and Metropolitan Aboriginal Land Council.
Conserve and appropriately manage items of Aboriginal and European heritage significance.	<p>Interpretation of Aboriginal Heritage Sites</p> <ul style="list-style-type: none"> Prior to the implementation of interpretive programs or facilities for items of Aboriginal heritage significance located in natural areas, Council will liaise with the NSW National Parks and Wildlife Service and the Metropolitan Aboriginal Land Council to determine the appropriateness of the program or facility. <p>Direct and Indirect Impacts</p> <ul style="list-style-type: none"> Prior to the implementation of management practices, and new developments, in and near bushland areas, the assessment of the site for items of heritage significance will be undertaken and all measures taken to reduce or remove direct and indirect adverse impacts on known and unknown heritage items. 	No unacceptable direct or indirect impact on known sites of heritage significance
5.15 Risk Mitigation and Public Safety		
The overall principal for managing natural areas will be public safety.	<p>Overall principal</p> <p>The overriding consideration will be the safety of residents and visitors to the area.</p> <ul style="list-style-type: none"> Undertake a physical inspection of all parks and reserves and review major natural and built features for each location. Hazards will be assessed in accordance with AS/NZS 4360. Consider the use of appropriate signage for each location based on a risk assessment and relevant guidelines such as the 'Signs as Remote Supervision' manual provided by Statewide Mutual Limited. <p>Tracks</p> <p>Refer to 5.14 Access and Walking Tracks.</p> <p>Encroachments</p>	

Refer to 5.3 Encroachments.

Headlands, Cliff Tops and Escarpments

All mown grassed areas (passive recreation areas) that adjoin a cliff area is to have a physical vegetation barrier and /or appropriate fencing at a distance away from the hazard, as determined by geotechnical constraints and relevant Standards. The hazard may be further highlighted by the use of signage.

All natural areas, particularly headlands with formal walking tracks that are located in close proximity to a cliff edge shall have a vegetation barrier. Where this vegetation barrier has been removed or cut through at pinch points the non-vegetated areas will be assessed and control measures appropriate to the location implemented. The control measures may include temporary track closure or the use of physical barriers and/or signage.

Hazard / warning signage is to be located at any formal entry points to an identified high risk area. Signage is to be inspected at regular intervals and records retained of those inspections.

Natural Hazards - Rockfall and Landslide

- Install appropriate signage – directional, interpretative and risk warning. Refer to signage strategies outlined below.
- Refer to 5.8 Geotechnical Risk Management

Signage

Signage will be used to direct, advise or warn members for the public of inherent risks at the location they are visiting.

Maintain a full and detailed inventory of all facilities and carry out regular inspections to review hazards and any control measures associated with each facility.

Ensure signage is appropriate to the situation, is placed in an appropriate position, and is legible and in good condition.

Signage is to be based on the procedures set out in the Statewide Mutual 'Signs As Remote Supervision – Best Practice Manual' for the assessment, selection and placement of signs. Council may determine the style and layout of its signs.

Signage is to be in accordance with the relevant Australian Standards regarding heights and locations / frequency standards.

Signs currently not meeting the current best practice and / or Australian Standards shall be replaced as funds permit, in priority order based on the severity of the hazard and degree of public use.

Signage is to be consistent throughout the LGA and consistent with other Coastal Councils of NSW and Australia. For example the 'rock fall' pictorial sign is different on Bicentennial Coastal Walkway (BCW) bollards to the new anodised entry signs and pictorials on 'totem' pole signs.

Signage may be provided where there is an identified gap in a physical barrier – vegetative or fencing.

Signs currently not meeting the current best practice and / or Australian Standards shall be replaced as funds permit, in priority order based on the severity of the hazard and degree of public use.

Signage is to be consistent throughout the LGA and consistent with other Coastal Councils of NSW and Australia. For example the 'rock fall' pictorial sign is different on BCW bollards to the new anodised entry signs and pictorials on 'totem' pole signs.

The information on each side of a sign including the 'three-sided totem pole' needs to be the same on all sides to provide necessary information despite the direction that a person is travelling.

Signage is to be provided where there is a formal gap in a physical barrier – vegetative or fencing.

Signs shall be located in front (on the formal reserve side) of any barrier (fence or vegetation.)

Major works program

The Major Works Program for natural area reserves includes:

1. Actions in accordance with; but not limited to, the Pittwater Council Management Plan 2008-2012.
2. Specific works are also contained in the individual reserve chapters in Part 2.

Table 6.2 Pittwater Council Management Plan 2008-2012

Pittwater Council Management Plan 2008-2012	
Actions are listed, but not limited to the following areas:	
1. Supporting and Connecting our Community	
	<ul style="list-style-type: none">• Building Communities• Recreational Management
2. Valuing and Caring for Our Natural Environment	
	<ul style="list-style-type: none">• Beach and coastal Management• Biodiversity• Sustainability and Climate Change Coordination• Vegetation• Waste Management and Pollution Control• Water Management Strategies
3. Enhancing our Working and Learning	
	<ul style="list-style-type: none">• Community Learning• Economic Development
4. Leading and Effective and Collaborative Council	
	<ul style="list-style-type: none">• Business Management• Community Engagement, Education and Awareness• Disaster and Emergency Management• Information Management• Risk Management Coordination
5. Integrating our Built Environment	
	<ul style="list-style-type: none">• Asset Management Coordination• Energy Efficiency• Land Use and Development• Town and Village• Traffic and Transport

Implementation

Works will be implemented according to priorities and budget allocations assigned Council as a part of the process of annual review of the Pittwater Management Plan. Funding is dependent on available Council resources and must be assessed against the other priorities of Council.

Select Bibliography

Cardno, Lawson, Treloar, 2009. *Pittwater Estuary Management Study*, Pittwater Council, August 2009.

Lawson and Treloar Pty Ltd., Pittwater Estuary Processes Study Report J1942/R1945. Gordon. November, 2002.

McGregor P. et. al. (2007). *Assessment of Landslide Likelihood in the Pittwater Local Government Area*. Australian Geomechanics Vol. 42 No 1 March 2007.

NSW Rural Fire Service, 2006. A Guide for Councils, Planners, Fire Authorities and Developers - planning for bush fire protection.

Australian Government Department of Climate Change

Available on: <http://www.climatechange.gov.au/climate-change/trends/temperature.aspx>
Strategies

Draft Sea Level Rise Policy Statement Department of Environment and Climate Change NSW

Department of Environment and Climate Change Technical Note: Scientific Basis of the 2009 Sea Level Rise Benchmark.

Appendix A.

Heritage Studies and Heritage Conservation Areas

Heritage Studies

- Barrenjoey Peninsula and Pittwater Heritage Study, by McDonald McPhee Pty Ltd, 1989 – covers all land generally north of Mona Vale Road
- Warringah Heritage Study by Hughes Trueman Ludlow – applies to South of Mona Vale Road, being the area not included in the above study by McDonald McPhee.
- Ingleside / Warriewood Urban Land Release Heritage Study – by Tropman & Tropman Architects 1993 - applies to the urban release areas of Ingleside / Warriewood.

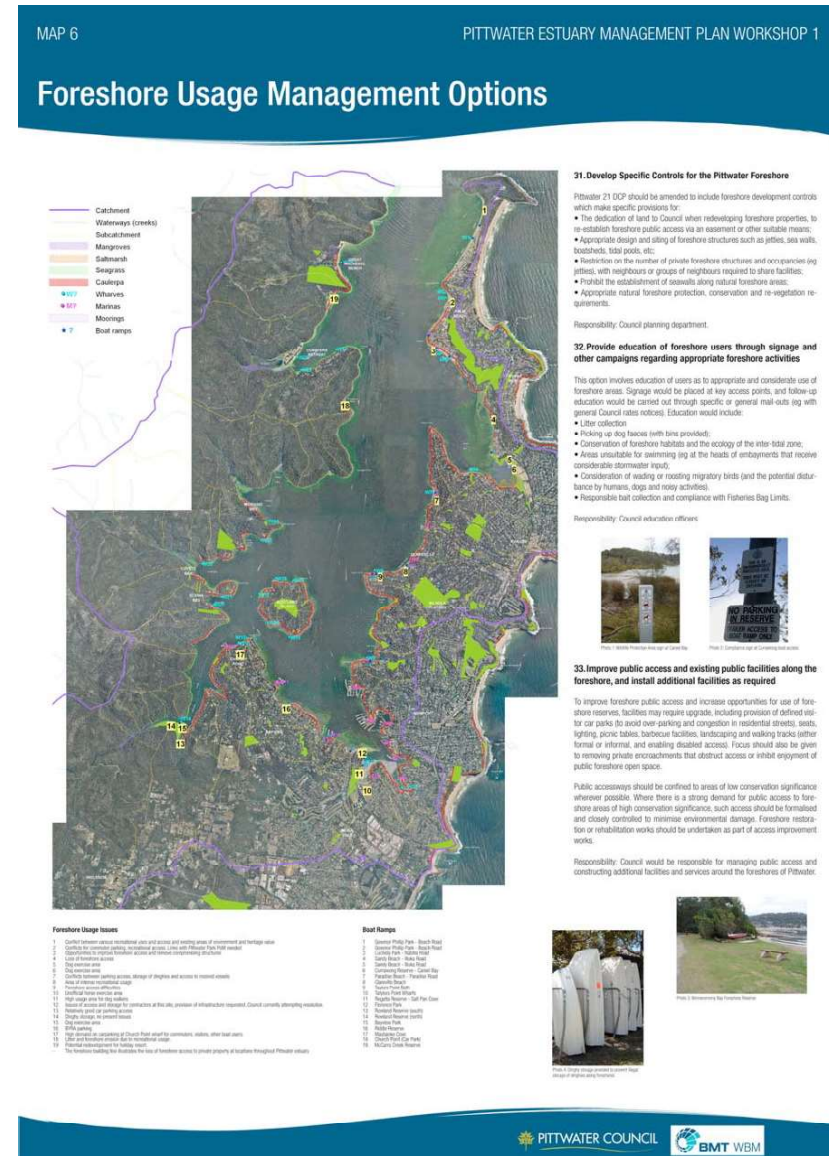
Heritage Conservation Areas

- Barrenjoey Conservation Area, Palm Beach is a natural conservation area consisting of the Barrenjoey Headland and the sand isthmus that links the headland to the Palm Beach Mainland. This area is listed on the register of the National Estate for its strong associational significance with early settlement of Sydney, transportation and the river trade, being the site of the first Custom's House in the Colony.
- Sunrise Hill Conservation Area is important for the common architectural characteristics of the early to mid twentieth-century cottages and holiday houses.
- Florida Road Conservation Area / Ocean Road Conservation Area, Palm Beach is relatively consistent with Sunrise Hill Conservation Area.
- Ruskin Rowe Conservation Area, Avalon consists of a 43 lot residential subdivision that was created in 1950 by Harry Ruskin Rowe. Rowe was a prominent Sydney architect of the early twentieth-century whose vision for the subdivision was to enable the vegetation to dominate over the houses. A covenant over the estate has protected the area from development, providing vegetation, wildlife corridor and measures to enhance the feeling of being within a rural setting. Any proposed developments in reserves in this area should blend with the environment by using dark, non-reflective colours.
- Currawong Heritage Conservation Area - Upper Western Foreshores is the most intact remaining example of a mid-twentieth century, union-organised workers' holiday camp in NSW and probably Australia as well as its historical association with the post-war union movements. It was listed on the State Heritage Register in May 2009. Council also nominated the site for listing on the National Heritage List but this was rejected by the Federal Government. It also provides local significance due to evidence of early land grants, the farming phase (evidenced by the cottage 'Midholme') and its location adjoining the National Heritage listed Ku-ring-gai National Park

Additional Individual Studies

Additional individual studies are available from the Local Studies section of Mona Vale Library.

Appendix B.



Glossary

Masterplan - describes a design and generally includes a list of strategies and a plan-view illustration. The illustration identifies the location of the existing and proposed elements on the drawing. Masterplans tend to take a 'broad-brush' approach to design with the proposed changes being conceptual and subject to detailed design work prior to construction.

Acid sulfate soils are widespread in estuarine areas such as mangroves, tidal flats, salt marshes or tea-tree swamps. In these areas the soil should not be disturbed to release the acid conditions.

Advertising - means a display by the use of symbols, messages or other devised for promotional purposes for conveying information, instructions, directions or the like, whether or not the display includes the erection of a structure or the carrying out of a work.

Asset Protection Zone – related to bushfire hazard and is an area around a development providing protection to reduce the threat of bushfire. It can consist of an inner protection area and an outer protection area. Hazard reduction techniques include slashing, raking, burning and bush regeneration.

Catchment – the boundary of a river basin defined naturally by the watershed line along the tops of the ridges that separate it from a neighbouring valley. Precipitation from the area within the catchment drains into local waterways.

Community or public facilities – means a building or place that accommodates publicly accessible community, social, recreational, cultural or civic activities and services, and where activities may be provided by a range of organisations including government agencies, charitable institutions, non profit associations or commercial operators. Use of the building is generally limited to casual bookings or yearly hiring agreements. In specific instances leases or licences may be granted subject to the use being consistent with the community land categorisation and compliance with relevant statutory requirements.

Crown land - land that is vested in the Crown or was acquired under the Closer Settlement Act as in force before their repeal, not in either case being:

land dedicated for a public purpose, or

land that has been sold or lawfully contracted to be sold in respect of which the purchase price or other consideration for the sale has been received by the Crown.

Ecologically sustainable development - an activity or development which "...meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland, 1987)

Estuary – the tidal part of a river where sea water mixes with fresh water.

Foreshore – the area between the high and low water marks where tidal influence exists including salt marshes and rock platforms.

JAMBA and CAMBA – Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) are bilateral agreements relating to the conservation of migratory birds, including terrestrial, water and shorebird (mostly shorebird) species that migrate between the respective countries and Australia.

Public land – land vested in or under the control of council. Public land does not include:

- a road;
- land to which the Crown Lands Act, 1989 applies

- a common; or
- land subject to the Trustees of Schools of Arts Enabling Act 1902;
- a regional park under the National Parks and Wildlife Act, 1974.

Section 149 Certificate – provides information on how a property may be used and the restrictions on its development. The detail which must be contained in the certificate is specified by Section 149 of the Environmental Planning and Assessment Act. A Section 149 is required as part of a contract of sale, you should seek advice from your solicitor whether you need Part 2 of the certificate only or the full certificate parts 2 and 5.

Stormwater runoff - stormwater is water that originates during precipitation events. Stormwater that does not soak into the ground becomes surface runoff. Surface runoff carries various pollutants that enter the sewer system and receiving waterways. Development creates changes to both the quantity and quality of stormwater run-off due to increases in impervious surfaces (roads, curb and guttering, paved areas, swimming pools, buildings). Impervious surfaces increase overland run-off due to reduced infiltration, biomass and evaporation. The results of these changes on water flow are higher peaks during storm events and reduced flows from soil storage during inter storm periods.

Threatened Species – plant or animal species listed under the Threatened Species Conservation Act as either endangered (likely to become extinct unless factors threatening their survival are addressed) or vulnerable (likely to become endangered over the next 25 years unless factors threatening their survival are addressed.)

Wetland – low-lying areas of land occasionally or permanently covered with either fresh or salt water. Wetlands can occur naturally or they can be constructed.

Wildfire – an unplanned fire.