

2 Land and Coastline

The primary land uses within the SHOROC region are residential and commercial with some industrial land use. The geology of the land is predominately Hawkesbury Sandstone, which weathers to produce sandy, low fertility soils. There remains a significant amount of bushland and biodiversity in the upper catchments. Coastline areas including beaches, rocky intertidal platforms, estuaries and lagoons are important features of the SHOROC region and provide habitat and recreational opportunities for the community.



Pressures on our Land and Coastline

Key pressures include:

- urban development
- soil contamination
- land degradation
- vegetation clearing
- invasive species, and
- climate change (e.g storm damage, flooding, sea level rise, bushfire).

Condition of our Land and Coastline

The SHOROC region comprises approximately 82km of coastline which is characterised by headlands and beaches, and is largely accessible to residents and visitors for recreational pursuits. The land and coastline in the SHOROC region is highly developed, in some instances resulting in modification of dune systems and bushland, erosion, cliff instability, and pollution.



Mosman Coastline. Source: Mosman Council

Regional Snapshot

Table 1: Regional Land Condition

Indicator	SHOROC Region				
	06/07	07/08	08/09	09/10	4 Year Trend
Total number of development applications received	3,505	3,818	3,568	4,009	↑
Total number of development applications approved	2,844*	3,732	3,461	3,347	↓
Total trees approved for removal on private land	1,915	1,927	1,763	1,905	↔
Total number of native plants distributed by all councils (including grasses, shrubs and trees)	102,624	66,642	58,406	57,059	↓

*Does not include Mosman Council.



Local Snapshot

Table 2: Development Applications

Indicator	Year	Council			
		Manly	Mosman	Pittwater	Warringah
Number of development applications received	2006/07	711	486	732	1,576 [#]
	2007/08	515	505	747	2,051 [#]
	2008/09	631	369	572	1,996 [#]
	2009/10	603	444	733	2,229 [#]
Number of development applications approved	2006/07	745	384 [*]	678	1,421 [#]
	2007/08	674	405	715	1,938 [#]
	2008/09	788	225	528	1,920 [#]
	2009/10	348	433 ^{**}	578	1,988 [#]

*This figure represents determinations rather than approvals. Determination refers to DA's that have been approved or refused.

**Refers to the total of DA's approved during the year – of the 433 Total DA's approved during 2009/10, 244 DA's were approved straight away, and the remaining 189 DA's were initially rejected, and then approved upon resubmission.

[#]Warringah's figures include development applications for tree removal.

Table 3: Land Clearing and Revegetation

Indicator	Year	Council			
		Manly	Mosman	Pittwater	Warringah
Approvals to remove trees (private land)	2006/07	159	370	196	1190
	2007/08	193	397	221	1275
	2008/09	173	293	237	1060
	2009/10	208	368	258	1071
Total number of local native plants supplied to volunteers, contractors and residents	2006/07	10,679	22,800	33,300	35,845
	2007/08	13,237	7,600	6715	39,090
	2008/09	8,576	7,234	10,166	32,430
	2009/10	7,413	9,724	11,009	31,913

Responding to Land and Coastline Issues

Regional Responses

Shaping Our Future

During the reporting year, Manly, Mosman, Pittwater and Warringah Councils have together developed *Shaping Our Future*, a regional strategy for SHOROC. *Shaping Our Future*, which has been put forward for Council adoption, outlines the most appropriate land use planning for the future of the region as well as the priorities for investment in transport and health infrastructure.

The NSW Government's Metropolitan Strategy has set targets of an additional 22,800 dwellings and 20,800 jobs across our region by 2031. The SHOROC member Councils are strategically planning how to best accommodate this growth in a way that is sustainable, creates jobs close to home and minimises the need for additional public transport and impact on our natural environment and way of life.

Membership of the Sydney Coastal Councils Group

The Sydney Coastal Councils Group (SCCG) represents 15 coastal councils, including Manly, Mosman, Pittwater and Warringah Councils. The SCCG undertake projects to improve the coastal environment. Further information on projects is available at www.sydneycoastalcouncils.com.au



High Tide at Church Point. Source: Pittwater Council

Summer Activities Program

SHOROC member Councils held various activities in January 2010 as part of the SCCG Summer Activities Program. Over 2,000 people enjoyed the 80 events offered. The successful 2010 program involved a number of interesting events including guided coastal walks, sustainable living workshops, snorkelling, wetland tours, and bird watching. For example, Mosman Council partnered with a National Parks Discovery Ranger to undertake a community coastal bushwalk from Taronga Zoo Wharf to Clifton Gardens.

Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises

This project won the 2009 Eureka Prize for Innovative Solutions to Climate Change. The award sponsored by the NSW Department of Environment, Climate Change and Water (DECCW) was presented by the NSW Premier at the Eureka awards dinner on 18 August 2009. The judges stated that the project successfully combined cutting edge science with a practical approach and allowed local governments to identify key factors that will help them respond to climate change and its impacts.

Finalisation of Beach Sand Nourishment Scoping Study

The 'Beach Sand Nourishment Scoping Study - Maintaining Sydney's Beach Amenity Against Climate Change Sea Level Rise' examines information and data on the environmental, physical, social and economic aspects of utilising offshore marine sands to meet immediate and medium term requirements of adopted nourishment strategies at selected beach environments. The project aims to improve protection and augmentation of beach systems under immediate threat from coastal storm activity and sea level rise. During the reporting year, the final report was prepared and is anticipated to be published in late 2010.



SCCG Environment Monitoring Site

The SCCG launched an environmental monitoring website in March 2010.

The site www.monitor2manage.com.au promotes sustainable environmental management through an improved understanding of monitoring and good decision-making. The site aims to assist users in identifying monitoring needs, designing monitoring programs, dealing with data management and analysis as well as reporting. This will improve the likelihood of good decisions leading to improved environmental outcomes.

Manly Lagoon Flood Study

Warringah Council, in partnership with Manly Council, is undertaking the Manly Lagoon Flood Study. The Flood Study will define the nature and extent of flooding in the Manly Lagoon Catchment. The study will include an assessment of the lagoon entrance management, joint probabilities of river and oceanic flooding and the impact of climate change and sea level rise.

The first stage of the Flood Study is to undertake the collection of data. The Councils have engaged AWT Survey to undertake surveys of the stormwater pits and pipes which will allow the Councils to identify and manage severe overland flows.



Manly Lagoon. Source: Manly Council

Delivering Local Responses

Manly Council

Coastal Zone Management

Manly Council has already prepared and adopted six of its eight planned Coastal Zone Management Plans (CZMPs). During 2009/10 Council adopted the North Harbour Coastline Management Plan, finalised the Manly Cove Coastline Management Study and continued to prepare the Manly Cove CZMP.

During the reporting year, Council continued to implement coastal hazard remediation works at Marine Parade, developed a Landscape Masterplan for North Harbour Reserve and Ellery's Punt Reserve, developed a detailed design and obtained permits for maintenance dredging of the Clontarf pool and attempted to gain recognition of Manly-Freshwater as a National Surfing Reserve. Council has contributed and collaborated with DECCW in drafting the *Cabbage Tree Bay Aquatic Reserve: Draft Fisheries (Aquatic Reserve) Regulation 2009 and Implementation Strategy*, the first for an aquatic reserve in NSW. Public exhibition of the draft Regulation has been completed.

Seagrass-Friendly Moorings

Industry & Investment NSW (I&I NSW) in partnership with the Sydney Metropolitan Catchment Management Authority (SMCMA), Manly Council and NSW Maritime initiated a trial of installing Seagrass-Friendly Moorings (SFMs) in Manly Cove. During 2009/10, a total of thirty SFMs were installed replacing traditional moorings. Monitoring of the impact on seagrass bed was also initiated.

Sandy Bay Landscape Masterplan

Development of the Landscape Masterplan for Sandy Bay Reserve was progressed during the reporting year. This involved improvements in areas of community concern including formalisation of a footpath, construction of a landscape retaining wall, provisions for seating, signage, water bubblers, dinghy storage and water access.

Remediation Works

Manly Council is currently project managing the remediation of a Declared Contaminated Site at the former landfill at Addiscombe Road, Manly Vale. During 2009/10 the Site Auditor completed their audit of the Draft Remediation Action Plan (RAP).

Tania Park - Erosion Control (Stage 1)

During the reporting period, Manly Council undertook Stage 1 erosion control and access improvement works at Tania Park utilising grant funding from the NSW Metropolitan Greenspace Program and matching Environment Levy funds. Works included the installation of stairs and native plantings to prevent erosion along the eastern embankment.

Mosman Council

Balmoral Remediation

Remediation of the remaining section of Balmoral Oval and foreshore was undertaken during 2009/10. The foreshore area was capped with virgin excavated natural material (VENM) and turfbed. Grant funding from the State Government Estuary Management Program was utilised to complete restoration works in the south western corner of Balmoral Oval, which had been fenced off to the public as a contaminated site. In March 2010, works began with the removal of five mature coral trees and the treatment of noxious weeds. Earthworks were employed to cap the contaminated soil with crushed sandstone and formalise two existing drainage lines with sandstone and concrete.

To improve the biodiversity outcome several habitat features were incorporated for the local fauna, including frog ponds built into the stormwater channels. The ponds were designed to receive gradual flows of water and were planted with local native aquatic species to provide further shelter and water filtration. Planter boxes were also built into the stormwater design, housing a local creekline species of Water Gum, and the site was scattered with sandstone rock piles and logs that will act as homes for small reptile species. All tree hollows that were observed in the surrounding dead trees were left in situ to continue to provide bird habitat.



Balmoral Remediation and Creekworks.
Source: Mosman Council

With the completion of the remediation work, the area can be enjoyed by the general public. To make the area suitable for passive recreation, Council installed an informal looping walking path, a bridge across the channel and large boulders for informal seating.

Climate Change Risk Assessment and Adaptation Project

From March to May 2010, Council took part in the State Wide Mutual Climate Change Risk Assessment and Adaptation Project. Relevant staff across various Council Departments participated in six workshops to identify risks from hot days, temperature increases, rainfall, sea level rise, wind, and storm surge, which have the potential to impact upon the natural environment (natural resources), health and safety, community recreation, service delivery and administration. Following the identification of risks a climate change adaptation plan was developed for Council for 2030.

Caring for our Coast Program - Working together to keep Mosman's Coasts Clean

Council received a grant of \$14,000 from the Australian Government Caring for our Country Grant Program, for environmental education, focusing on the coastal and marine environments. The program involved the following:

- two field days, one at Balmoral and one at Clifton Gardens, with the support of seven external marine organisations to raise community awareness and knowledge of the coastal environment, and how to protect it
- underwater clean up audits by local dive groups
- a boat drop delivery of marine protection information to 750 boat owners registered in Mosman, undertaken by the volunteer Marine Rescue NSW (Mosman unit)
- delivery of educational material to marina's in Mosman
- interpretive signage and TAngler bins installed on Balmoral and Chowder Bay Wharves, and
- establishment of the Caring for our Coast Volunteer Program.



Pearl Bay Project

The Pearl Bay project was completed during 2009/10, to improve public access to the foreshore, provide a bicycle path for the community, rebuild the seawall to improve its design, and provide habitat for intertidal and aquatic biodiversity. The seawall was partially constructed with sandstone blocks from the Drill Hall and was designed to consider wave action and sea level rise, and has become an ecological habitat for intertidal species and fish. Saltmarsh was also reintroduced along a portion of the seawall to provide habitat. A viewing platform and interpretative signage were installed, a bicycle path was constructed from a percentage of recycled material and bicycle parking facilities were installed in the reserve. A small rockpool and a beach were also created for habitat and recreational purposes respectively, and to improve the amenity of Spit Reserve.

Pittwater Council

Etival Street Foreshore Restoration

Restoration works were carried out along the foreshore off Etival Street, through grant funding received from DECCW. These works will halt foreshore erosion and provide increased protection from storm surges. Actively eroding areas, including those with under cutting behind boulders have been stabilised by planting vegetation between the foreshore and the water. There has also been restoration and planting of foreshore vegetation south of Etival Street (Etival Street to Currawong Reserve) of endemic species to control invasion of grass species into the saltmarsh.

Bushland Restoration and Track Upgrade at Salt Pan Cove

Council upgraded the walking track in Salt Pan Cove Reserve with the view of linking this reserve to Algona Reserve (roadside walk) and Refuge Cove Reserve (foreshore walk at low tide). This project will also contribute to the protection and enhancement of the endangered Pittwater Spotted Gum Forest as well as weed removal and prevention.

McCarrs Creek Foreshore Restoration Project

The McCarrs Creek Foreshore Restoration project aims to restore public reserves along the McCarrs Creek foreshore including; Bothams Beach, Brown's Bay and McCarrs Creek Reserve. Endangered Ecological Communities within areas that have been restored as part of this project include; Pittwater Spotted Gum Forest at Bothams Beach, Littoral Rainforest at Brown's Bay and Freshwater Wetlands and Swamp Oak Floodplain Forest at McCarrs Creek.

Avalon Golf Course Coastal Heath Restoration Project

Council received a Federal Government "Caring for Our Country" grant to eradicate hundreds of African Olive trees at Avalon Golf Course. The site includes Coastal Clay Heath and some rare species including; *Acacia leocalyx*, *Allocasuarina palludosa* and *Jacksonia scoparia*. Areas of intact native plants are being regenerated and woody weeds along the road edge are being replaced with native tubestock planted by community volunteers and contractors.

Pittwater Foreshore Floodplain - Mapping of Sea Level Rise Impacts

In December 2009, Pittwater Council adopted the sea level rise planning benchmarks contained in the NSW Government's Sea Level Rise Policy Statement (2009) i.e. a rise relative to 1990 mean sea levels of 40cm by 2050 and 90cm by 2100. In response to the NSW Sea Level Rise Policy Statement, Pittwater Council is currently undertaking a project to map the potential impacts of sea level rise up until the year 2100 around the foreshore of the Pittwater Estuary. Community engagement and information are key components of this project through Council's Estuary Management Community Working Group. A series of Community Workshops are proposed during the Public Exhibition phase.



High Seas Avalon. Source: Pittwater Council

Warringah Council

Lagoon Entrance Management

Warringah Council has responsibility for managing the entrances of Dee Why and Curl Curl Lagoons, and shares responsibility for management of the Manly Lagoon entrance with Manly Council, and the Narrabeen Lagoon entrance with Pittwater Council. During 2009/10, Warringah Council undertook a number of mechanical 'breakouts' of the entrances of Dee Why, Curl Curl and Narrabeen Lagoons and implemented improved alarm systems to assist staff in managing flood risks and ensuring timely entrance openings. Warringah Council also undertook a review of the management of these entrances to ensure practices are in keeping with best practice flood and environmental management.

Narrabeen Lagoon Multi-Use Trail

The Narrabeen Lagoon Multi-Use Trail Project aims to design and construct 2.5km of trail and pedestrian bridge infrastructure between Deep Creek and South Creek. This project will complete the final links of the existing trail network along the foreshores of Narrabeen Lagoon, which is the northern beaches' largest coastal lagoon.

In the 2009/10 financial year, Council completed the detailed designs and assessment for Stage 1. This will see 850 metres of multi-use trail built between Deep Creek Bridge and Middle Creek Reserve and provide a safe and environmentally responsible access for users away from the busy Wakehurst Parkway. The 2.5 m wide trail was designed to be accessible for a range of users and the majority of the trail has been elevated to prevent inundation, facilitate drainage and enable vegetation growth and fauna movement beneath. The new section of trail is designed to connect with a new bridge at Deep Creek (to be project managed by Pittwater Council), to be completed by early to mid 2011.

Stage 2 of the project involves upgrades to parking and facilities at Middle Creek Reserve and a new multi-use trail and bridge from Middle Creek Reserve to South Creek Reserve adjacent to the Sydney Academy of Sport and Recreation and Cromer Golf Club. Design for Stage 2 of the Narrabeen Lagoon Multi-Use Trail is due to commence in September 2010.

French's Creek Floodplain Risk Management Study

The French's Creek catchment is prone to flash flooding, with hundreds of homes potentially affected. The French's Creek Flood Study has been adopted by Council, and the Floodplain Risk Management Study Report is at draft stage. It is currently being reviewed by Council and DECCW, and is expected to go on public exhibition before the end of 2010. These projects have been two-thirds funded by a grant from DECCW.

FloodSafe Education

Warringah Council partnered with the local State Emergency Service to deliver the FloodSafe Education Campaign in early 2010. This involved educating the business and residential communities affected by flooding of South Creek through the delivery of a FloodSafe Toolkit, doorknock campaign, business breakfast and two information evenings. Research was undertaken into the effectiveness of the program by an independent body and the results showed increased knowledge and behaviour regarding flood preparedness. The FloodSafe education campaign will be replicated in other flood prone areas in Warringah in the future.



Mechanical Lagoon Opening at Curl Curl Lagoon. Source: Warringah Council.



Manly Lagoon Catchment Study

Warringah Council are involved in managing a number of projects investigating the ecological condition of Manly Lagoon. The projects include a review of the benthic fauna within lagoon sediments, bird diversity and abundance surveys, fish diversity and abundance surveys, as well as an investigation of faecal contamination within lagoon waters during dry weather. The study also includes the development of a catchment model that will improve Council's understanding of the influence that different land-use and sub-catchments feeding into Manly Lagoon have on nutrient and sediment loading on the lagoon.

Groundwater Investigations at Curl Curl Lagoon

In 2009/2010 Warringah Council completed a detailed investigation into the quality and movement of groundwater that discharges into Curl Curl Lagoon. This investigation provides Council with important information and will be used in 2010/2011 together with the Curl Curl Lagoon stormwater investigations report to identify overall pollutants entering the lagoon. This information will help guide decisions for the future rehabilitation options for Curl Curl lagoon.

Protection of Waterways and Riparian Lands Policy

Historically many waterways in Warringah were piped as part of the stormwater network, cleared of vegetation, reclaimed with fill and developed. This has had some negative impacts including exacerbated flooding in certain areas, reduction of natural floodplains and bank stability, and a decline in water quality, biodiversity and vegetation corridors. The Natural Environment Unit have prepared the draft Protection of Waterways and Riparian Land Policy which provides clear direction for the management, development and protection of waterways and riparian lands in Warringah.

Warringah Council is committed to managing, protecting and restoring waterways and riparian land in a manner that, allows them to function, where possible, as natural systems. It also considers risks from instability, erosion and flooding, and is consistent with Council's planning controls and guidelines as well as NSW and Australian legislation and guidelines. The draft Protection of Waterways and Riparian Lands Policy has been publicly

exhibited, and is currently awaiting review by Council for potential adoption.

Dee Why Lagoon Benefits from a New Bioretention Swale - Protecting our Waterways!

Council has upgraded the Richmond Avenue carpark, adjacent to Dee Why Lagoon, using a Water Sensitive Urban Design (WSUD) approach which involved building a bioretention swale. Previously the carpark was to be unformed gravel which allowed road runoff to flow overland and into Dee Why Lagoon with no treatment. The bioretention swale system includes planted grass and rock riffles laid over specific layers of sandy loam, coarse sand and coarse gravel. Stormwater runoff is slowed, filtered of hydrocarbons and impurities, before discharging into the sand aquifer and subsoil drain. Small galvanised trash racks assist in capturing large debris and gross pollutants. These systems help to improve the quality of the water flowing into the lagoon, protecting our important environment.

The plant species in the bioretention swale were specifically chosen with consideration of the local endangered ecological community of Swamp Mahogany Forest in mind. These native local plants are important for the uptake of nutrients from the stormwater, they enhance infiltration, and attract local wildlife.



*Dee Why Lagoon Bioretention Swale.
Source: Warringah Council.*