Clontarf / Bantry Bay

Estuary Management Study

FINAL REPORT

November 2007

Completed as part of the Clontarf / Bantry Bay Estuary Management Planning Process

The groups that oversee the planning process of the Clontarf/Bantry Bay Estuary Management Plan

Clontarf/Bantry Bay Estuary Management Working Group

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Government	Dept of Environment & Climate Change	Daniel Wiecek
	Dept of Primary Industries (Fisheries)	Paul Schuetrumpf
	NSW Maritime	Anita Robinson
Scientific Advisory Panel		Jan Ritchie
Neighbouring Councils	North Sydney Council	Peter Massey
	Willoughby City Council	Greg Foster
Council	Manly Council	Rafiqul Islam

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Name	Position
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Vision of the Clontarf/Bantry Bay Estuary Management

"A thriving community, enhanced by heritage and lifestyle, where residents and visitors work together to live in harmony with the unique natural environment, both on land and in the sea."

CONTENTS

i EXECUTIVE SUMMARY

This study sets

10 Goals
&
45 Objectives

to be addressed through

101 Management Options

to manage 10 key issues

This Estuary Management Study is the next step towards formulation of the Estuary Management Plan (EMP). The purpose of this study, according to Estuary Management Manual (NSW 1992), is to define management objectives, options and impacts. This Study was endorsed at the Clontarf / Bantry Bay Estuary Management Working Group meeting held on 29 October 2007. An Estuary Processes Study describing the baseline condition of the various estuarine processes and the interactions between these processes was finalized in August 2007.

Key Issues – Community Perception

In order to assess community perceptions on key issues and their management, extensive consultations were conducted through a variety of mechanisms including display panels, Manly Council's webpage, information through Precinct Newsletters, formal questionnaires and organized Field Days.

These are grouped in 10 broad based headings:

- Water Quality & Pollution,
- Aquatic/Inter-tidal Habitat Conservation & Management,
- Bushland/Terrestrial Habitat Conservation & Management,
- Beach Erosion & Sedimentation,
- Hazards & Risks including Climate Change,
- Estuary Use,
- Access,
- Foreshore Infrastructure & Facilities,
- Heritage Conservation & Management and
- Monitoring.

Community perceptions of managing each of these issues were recorded. Based on these perceptions, the 'Clontarf / Bantry Bay Estuary Management Working Group' established its position in terms of management.

This position paper is the basis for establishing goals, objectives and management options.

Vision, Goals & Management Objectives

Visioning is an important element in any planning process. Setting the future vision ensures strategic long term thinking and is based on the priority areas under the NSW State Plan, targets set by the Natural Resources Commission (NRC) and vision adopted by the Sydney Metropolitan Catchment Management Authority (SMCMA). At local level, the program 'Surfing the Future' provides a direction to aim towards for the year 2025 for Manly Local Government Area.

The following vision was adopted by the Clontarf / Bantry Bay Estuary Management Working Group, to assist in the Estuary Management Planning process. The vision aims to provide a general statement about the future desired state of the study area.

"A thriving community, enhanced by heritage and lifestyle, where residents and visitors work together to live in harmony with the unique natural environment, both on land and in the sea."

This vision statement, from the onset, establishes importance of visitors, heritage and living in harmony with natural environment and influences setting up of management objectives.

For each management issue, a goal has been defined, along with a range of management objectives that were further partitioned into management options. The basis for setting management objectives was Ecologically Sustainable Development (ESD).

The vision statement has been followed by 10 separate issue based goals, further elaborated in 46 management objectives.

In general, set goals and objectives relate to the general goal of the NSW State Rivers and Estuaries Policy, 1992, Estuary Management Policy 1992 and management principles described in relevant regional plans (Sydney Regional Environmental Plan – Sydney Harbour Catchment 2005, Sydney Metropolitan Catchment Management Action Plan 2006, Draft Subregional Strategy: North East Subregion, July 2007) and also Manly Council's Local Environmental Plans and different strategy documents.

Management Options

Forty five management objectives were translated into specific and strategic management options. Many of these options have been proposed by community during consultation meetings. Some of the proposed options, before implementation, will be subjected to further consultations with relevant agencies, Precincts and community.

An initial assessment of all management options has been made against the following factors to determine their overall potential for implementation: cost, effectiveness to achieving objectives and likely acceptance by the community and the implementers.

Finally, a total of 101 management options are adopted (Table below). Each of the management options were elaborated with a description of context, actions, performance target, indicative costs, time frame and responsible agency (ies).

A total of 130 management options were initially proposed. These were then discussed at internal staff working group and in three meetings of the Clontarf/Bantry Bay Estuary Management Working Group.

Further, an attempt was made to prioritise all management options. Members of the Council staff, MSW Management Committee and the Clontarf/Bantry Bay Estuary Management Working Group participated in prioritisation of options. The final overall prioritisation of High, Medium or Low was based on average score and agreed at the Clontarf/Bantry Bay Estuary Management Working Group meeting dated 29 October 2007. A total of 25 management options were grouped as high priority while 65 as medium priority and 11 as low priority options.

Key Issues, Goals, Objectives & Management Options

Goal /Objectives (Issue related)	Strategic Management Options	Priority
Water Quality & Pollution *Ensure that the water quality of the estuary is suitable for maintaining healthy natural aquatic ecosystems, and for recreational pursuits*		
1.1 Reduce the level of catchment sourced pollutants sufficiently.	1.1.1. Formulate comprehensive Stormwater Management Plan for Manly LGA encompassing the study area.	High
	1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf catchment.	High
	1.1.3. Investigate feasibility of installing new Stormwater Quality improvement Devices (SQIDs) at priority locations taking into account current best practice technologies.	Medium
	1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.	High
1.2 Reduce sewage discharges from sewerage overflows within the catchment	1.2.1. Confirm, with Sydney Water, the presence of all sewerage overflow points within the Clontarf / Bantry Bay study area including the five known ones.	High
1.3 Reduce litter loads entering the estuary from urban catchment runoff	1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from surrounding catchments and identify litter hotspots.	Medium
	1.3.2. Install pit inserts in litter hotspots throughout the study area.	Medium

Goal /Objectives (Issue related)	Strategic Management Options	Priority
1.4 Ensure that faecal *coliform* and *enterococci* levels at designated public swimming enclosures comply with standard recommendations.	1.4.1. Work with relevant agencies to manage, *faecal coliform* and *enterococci* levels at all three public swimming enclosures.	High
	1.4.2. Investigate possible sources of high faecal coliforms and enterococci levels in Sangrado swimming enclosure.	High
1.5 Reduce volume of storm water through re-use, detention and retention.	1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced storm water generation.	Medium
1.6 Ensure sustainable use of groundwater.	1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.	Medium
	1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.	Medium
1.7 Manage storm water outflows to minimize beach erosion and scour.	1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.	Low
1.8 Continue water quality and waste management education program	1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable stormwater management	Medium
	1.8.2 Work with residents to implement best practices in storm water management at residential scale.	Medium
Aquatic / Inter-tidal Habitat Conservation & Management *Restore and maintain a healthy and diverse mix of aquatic and intertidal habitats that will maintain and improve biodiversity and ecological functions of the estuary*		
2.1 Preserve existing seagrass beds and encourage the colonisation of suitable areas by improving water quality and reducing sedimentation.	2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.	Medium
	2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water quality and a potential boat exclusion zone	Medium
	2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.	High
2.2 Eradicate where possible or bring under control all aquatic weed	2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.	Medium

Goal /Objectives (Issue related)	Strategic Management Options	Priority
species (including *Caulerpa taxifolia*) from within and around the Middle Harbour.	2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.	Medium
2.3 Maintain existing mangrove population and investigate possibility of its expansion.	2.3.1. Undertake mangrove maintenance and regeneration activities at existing sites.	Medium
	2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.	Medium
2.4 Ensure all areas of ecological significance are properly protected and conserved.	2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of legal to voluntary measures.	Medium
	2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings	Low
	2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).	Medium
2.5 Define factors affecting areas of high ecological value and develop and implement measures to address them.	2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.	Low
	2.5.2 Initiate studies and surveys to fill data gaps through collaboration MEC and/or Universities.	Low
	2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.	Low
	2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat	Low
2.6 Improve general awareness of the ecological values of the estuary	2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.	Medium
Bushland / Terrestrial Habitat Conservation & Management *Protect and enhance urban bush land and native vegetation areas*		
3.1 Continue to manage Council's bushland management program.	3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.	Medium
	3.1.2. Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.	Medium

Goal /Objectives (Issue related)	Strategic Management Options	Priority
	3.1.3. Identify ad hoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified standard.	Medium
	3.1.4. Council to continue to be an active participant in the Die-Back Working Group	Medium
3.2 Manage bushlands against degradation caused by stormwater outlets.	3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.	Low
	3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources.	Medium
3.3 Establish native vegetation corridors linking natural bushland areas.	3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.	Medium
3.4 Rationalise tree plantation programme based on a recommended list of appropriate plant species.	3.4.1. Continue and Reassess Council's Street Tree Planting Programme within the study area.	Low
3.5 Encourage and establish community participation in bush regeneration program and in native plants on public and private lands	3.5.1. Continue Community Bush Care Volunteers programme in the study area.	Medium
	3.5.2. Continue publication of 'Bushland News' and circulate widely in the community	Medium
	3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.	Medium
3.6 Maintain and preserve natural views for residents.	3.6.1. Involve the Precinct to discuss the issue of view maintenance with property owners.	Medium
Sedimentation & Beach Erosion Manage erosion and sedimentation to reduce their impact on the natural environment and recreational amenity		
4.1 Generate comprehensive understanding on estuarine sediment transport patterns of the area	4.1.1. Carry out a comprehensive study on estuarine sediment transport patterns	High
4.2 Mitigate foreshore accretion/erosion	4.2.1. Define and implement mitigation measures for erosion prone sites.	High

Goal /Objectives (Issue related)	Strategic Management Options	Priority
processes at priority areas.	4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.	High
	4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.	Medium
Hazards & Risks including Climate Change *Assess, minimize and mitigate risks from natural hazards including climate change*		
5.1 Identify existing and potential hazards and establish mitigation measures	5.1.1. Commission a geotechnical study for specific sections of foreshore areas to identify and prioritise risks, and establish risk based management options.	Medium
	5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.	Medium
	5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco-friendly sea walls.	Medium
	5.1.4. Work with SES and other agencies to continuously update Emergency Action Plan including evacuation procedures in the event of storm surges and tsunami.	Medium
5.2 Consider the potential implications of sea level rise on the estuary and its surrounds as a result of climate change.	5.2.1. Assess impact of climate change on areas of ecological significance and devise adaptive measures	Medium
	5.2.2. Work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.	Medium
	5.2.3. Collaborate with the Sydney Coastal Councils Group/ Macquarie Uni /CSIRO project investigating climate change adaptations in Manly.	Medium
5.3 Ensure that potential climate change impacts for Manly are incorporated in Council's strategic planning and management plans.	5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and national projections	High
Estuary Use *Improve and meet the environmental, socio-economic and recreational needs of estuary use*		
6.1 Create safe, sustainable and enjoyable public	6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.	High

Goal /Objectives (Issue related)	Strategic Management Options	Priority
areas for diverse user groups.		
	6.1.2. Install adequate garbage and waste recycling stations in public places.	High
	6.1.3. Liaise with relevant state authorities regarding the consolidation of existing signage with signage more sympathetic to the area.	Medium
	6.1.4. Promote natural features of 'Clontarf - Sandy Bay- Fisher Bay – Ellery's Punt Reserve' of the study area.	Medium
6.2 Encourage boating use including kayaking within the estuary that minimises its social and environmental impact, whilst not compromising the amenity or safety.	6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.	Medium
	6.2.2. Encourage NSW Maritime to enforce current speed limits and mooring restrictions by increased patrolling.	Medium
	6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.	Medium
	6.2.4. Maintain jetski (PWC) ban.	High
	6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment.	Medium
6.3 Support sustainable recreational fishing in the estuary	6.3.1. Support continuation of ban on commercial fishing.	High
	6.3.2. Encourage DPI (Fisheries) & NSW Health to monitor Dioxin levels in Sydney Harbour waters.	Medium
	6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag limits, size limits and species types) through NSW Fishcare Program	Medium
6.4 Minimise user conflict of the estuary by using education programmes	6.4.1. Promote community events and education program to achieve sustainable use of the estuary.	Medium
Access *Ensure safe public accessibility of waterways, foreshores and other areas of the estuary.*		
7.1 Maintain and improve safe public access to all foreshore areas and where possible, create new access.	7.1.1. Assess and improve safety condition and maintain natural vegetation along existing access paths.	Medium

Goal /Objectives (Issue related)	Strategic Management Options	Priority
7.2 Maintain Manly Scenic Walkway regularly and continuously improve its use value	7.2.1. Enhance maintenance schedule and retain and enhance the native vegetation along the Manly Scenic Walkway.	Medium
	7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.	High
	7.2.3. Assess ways to improve use value of the MSW and implement.	Medium
7.3 Increase disabled access (where practically possible) to parks and bays in the study area	7.3.1. Audit disability access of all parks and bays within the study area.	Medium
7.4 Facilitate dog-walking including possibility of establishing off-leash dog areas.	7.4.1. Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flats as off-leash dog area.	Low
	7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.	High
Foreshore infrastructure & facilities *Improve social amenity through rationalisation of foreshore structures which are sympathetic to social and ecological needs and manage public risks.*		
8.1 Rationalise mooring places to minimise the impact on ecologically important seagrass beds.	8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.	Medium
	8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings	Medium
	8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.	Medium
8.2 Asses construction of public boat landing facilities at suitable sites within the study area	8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area & specify alternative locations.	Medium
8.3 Establish dinghy and kayak storage facilities at suitable locations within the study area	8.3.1. Install horizontal dinghy and kayak storage racks at Sandy Bay in consultation with nearby residents and dinghy owners.	High
	8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore	High
8.4 Maintain and improve usability of public swimming enclosures of the study area	8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.	High

Goal /Objectives (Issue related)	Strategic Management Options	Priority
8.5 Better general amenities, traffic and safety at foreshore areas, public reserves and beaches	8.5.1 Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations	High
	8.5.2 Improve and facilitate traffic management around public reserves and beaches	Medium
	8.5.3 Ensure safety and crime prevention in public areas	High
Heritage Conservation *Ensure that all Aboriginal and European (cultural and natural) heritage areas in the estuary are preserved and protected in consultation with appropriate bodies.*		
9.1 Ensure that all 22 sites of Aboriginal heritage significance are properly identified, recorded and protected under the applicable State and Federal legislation.	9.1.1. Review Aboriginal Site Management Report for Manly Council (2006) and associated reports to prioritize management needs and develop a plan of implementation.	Medium
	9.1.2. Prevent further damage to Aboriginal middens in critical condition.	High
	9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.	Medium
	9.1.4. Develop management guidelines for sites that are located within private properties.	Medium
9.2 Ensure that all sites of non-indigenous heritage are identified and registered under the relevant legislation and in Council planning instruments.	9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.	Medium
	9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.	Low
	9.2.3. Ensure physical protection and maintenance of all heritage listed items.	High
	9.2.4. Explore feasibility of restoring a small part of old tram line near the Spit Bridge to signify historical past.	Low
9.3 Increase community awareness of the significance of Aboriginal occupation and European settlements through adequate signage.	9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children	Medium
	9.3.2. Place appropriate interpretative signage on key Aboriginal heritage sites.	Medium
Monitoring *Measure the condition and usage of the estuary to gauge the effectiveness of the Estuary Management Plan in achieving its goal and management objectives*		
10.1 Develop and implement a Monitoring Program	10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.	Medium

Goal /Objectives (Issue related)	Strategic Management Options	Priority
(including key indicators) to assess improved management of the estuary		
	10.1.2. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.	High
10.2 Monitor the public usage of Clontarf/Bantry Bay estuary and its surrounds.	10.2.1. Monitor use of the Manly Scenic Walkway.	Medium
	10.2.2. Monitor the use of waterways at different points of the estuary.	Medium
	10.2.3. Monitor the use of public reserves and dog exercise areas.	Medium
10.3 Assess possibility of establishing participatory monitoring by the community	10.3.1. Establish participatory monitoring and encourage community participation	Medium
10.4 Evaluate monitoring results to update, refine and revise the Estuary Management Plan.	10.4.1. Review monitoring results and revise/update management options.	Medium

While it would be ideal to implement all high priority options, funding limitations means that some options will need to be allocated as part of future financial budgets. For each of these management options, an indicative time frame for implementation has been shown.

The Estuary Management Study, among others, also contains appendices on 'Land Tenure, Use & Management' and 'Statutory Framework'.

ii ABBREVIATIONS

ANZECC	Australian and New Zealand Environment Conservation Council
CBD	Central Business District
CSIRO	Australia's Commonwealth Scientific and Industrial Research Organisation
DCP	Development Control Plan
DDT	Dichloro-Diphenyl-Trichloroethane
DEC	The former NSW Department of Environment and Conservation (now DECC)
DECC	NSW Department of Environment and Climate Change
DIPNR	The former NSW Department of Infrastructure Planning and Natural Resources
DNR	The former NSW Department of Natural Resources
DoP	NSW Department of Planning
DPI	NSW Department of Primary Industries
DWE	NSW Department of Water and Energy
EIS	Environmental Impact Statement
EMP	Estuary Management Plan
EMS	Estuary Management Study
EPI	Environmental Planning Instrument (includes LEP, REP and SEPP)
EPS	Estuary Processes Study
ESD	Ecologically Sustainable Development
GIS	Geographic Information System
GSE	Graduate School of Environment, Macquarie University
IPA	Intertidal Protected Area
IPCC	Inter-Governmental Panel for Climate Change
LEP	Local Environmental Plan
LGA	Local Government Area
MC	Manly Council
MEC	Manly Environment Centre
MSW	Manly Scenic Walkway
MLALC	Metropolitan Local Aboriginal Lands Council
NHT	National Heritage Trust
NRM	Natural Resources Management
NSW	New South Wales
RAN	Royal Australian Navy
REP	Regional Environmental Plan
RTA	NSW Road Transport Authority
SAP	Scientific Advisory Panel (of the Manly Council)
SEPP	State Environmental Planning Policy
SREP	Sydney Regional Environmental Plan
SREPP	Sydney Regional Environmental Planning Policy
UWS	University of Western Sydney
WPA	Wetlands Protection Area

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1. INTRODUCTION

1.1 ESTUARY MANAGEMENT IN NSW

NSW has over 130 estuaries that vary in size from small coastal creeks and lagoons to large lakes and rivers. The estuaries of NSW provide priceless natural resources. Collectively, they are immensely valuable from ecological, social and economic perspectives. These estuaries contribute $400 million to the State's economy per annum (NSW DNR 2006). Estuaries contain diverse ecosystems that form the foundation of the coastal food chain. They provide important habitats for a variety of marine and terrestrial plants and animals.

Estuaries have a special place in the lives of most Australians. In NSW, over 75% of the population live and work in towns and cities near estuaries. A high proportion of the State's commercial activity occurs near estuaries as they provide an important focus for industry, tourism and recreational activities. This high level of development pressure means that estuaries are subject to direct and indirect impacts due to land use in the catchment, changes in hydrology and tidal processes and the use of the estuary waterway.

Altered hydrology of estuaries may lead to increased sedimentation, altered freshwater flows and changes in tidal flushing. Estuaries have been used as dumping areas for solid wastes and sewage effluent discharges. They have been dredged, filled in, had their entrances trained with break-walls, and wetlands associated with them have often been destroyed. These changes have profound impacts on estuarine and coastal ecosystems.

To support the growing need for the sustainable management of the estuary, the State Government co-ordinates a number of key strategic initiatives. DECC (formerly DNR) provides financial and technical assistance to councils to help develop and implement sustainable estuary management plans through the Estuary Management Program. The Program was commenced in 1992 to assist local government to better manage estuaries through a strategic process outlined in the NSW Estuary Management Manual[1]. It targets a broad range of issues and engages local communities in the process. The program focuses on improving or maintaining the overall health and functionality of an estuary, and maintaining the integrity of the whole system - its chemical, physical, and biological properties, as well as its economic, recreational, and aesthetic values.

The Estuary Management Program encourages local communities to take responsibility for managing their own estuaries. An Estuary Management Committee is established by the local Council and is made up of representatives from local government and state agencies responsible for managing the estuary's resources, as well as members of the community - local residents, industry representatives, environmental interest groups and researchers. These stakeholders work together to identify problems in the estuary, evaluate various management options, develop specific actions to address those problems, and create and implement a formal Estuary Management Plan to restore and protect the estuary.

The State Government provides annual funding to assist councils to prepare and implement the plans. The DECC administers the Estuary Management Program, but program decisions and activities are carried out by the committees of local government.

1 A new Coastal Zone Management Manual is being prepared to combine and revise the existing Coastline and Estuary Management Manuals. The manual is being drafted in two volumes. Volume 1 deals with the generic process of developing coastal zone management plans and the inter-relationships with other land use and NRM plans and policies. Volume 2 provides the technical appendices to support the coastal zone management planning process and is being developed as an electronic, web-based document to enable regular updates of new information. During 2006 an initial draft of Volume 1 of the manual was circulated for agency comment. Comments are being incorporated in a revised draft which will be released for public comment (NSW DNR 2006).

1.2 COASTAL ZONE MANAGEMENT IN MANLY

Manly is known distinctively for its beaches and foreshore areas. The majority of the Manly Local Government Area is bordered by water. Hence, it is important that the waters and natural features around these beaches and foreshores are nurtured and protected.

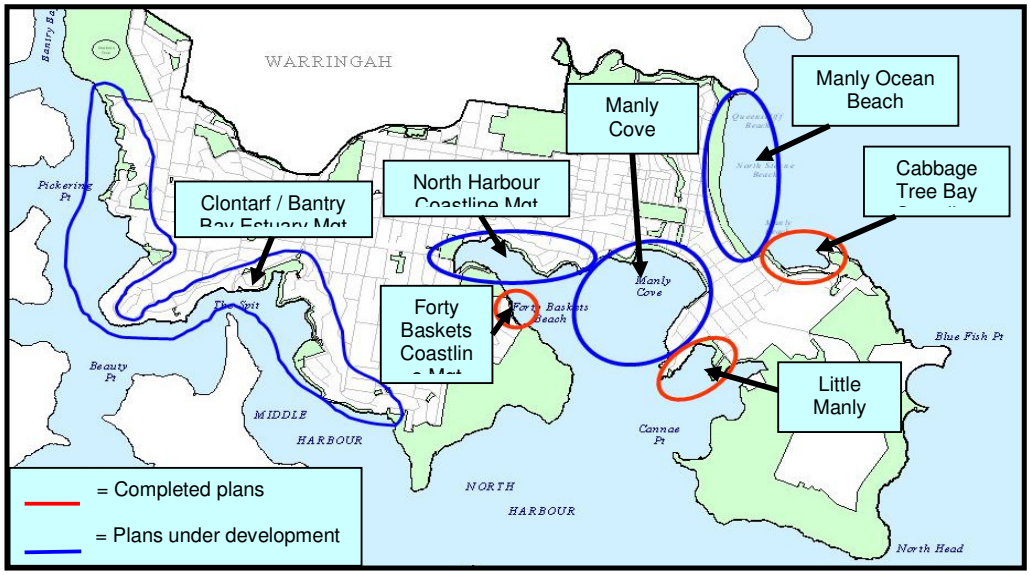
In line with efforts of NSW State Government, Manly Council has embarked on planning and management of coastal and estuarine areas. The importance of coastal and estuarine management has been highlighted in all key policy, vision & strategy documents adopted by the Manly Council. One of the key theme areas of the Manly Sustainability Strategy (MC 2006) is 'A Natural, Sustainable Manly'. The theme adopts the principle '*Recognise the intrinsic value of Manly's geodiversity, biodiversity and natural ecosystems, and protect and restore them*' and include the 'Coastline and Estuary Management Program'.

Manly Council has adopted a staged approach to cover the entire Manly lagoons & foreshores (Figure 1.2 & Table 1.2).

Table 1.2: Formulation status of Coastline & Estuary Management Plans

Plans	Status	Remarks
Manly Lagoon Estuary Management Plan	Completed, August 1988	Being implemented
Cabbage Tree Bay Management Plan	Completed, October 2000	Being implemented
Forty Baskets Coastline Management Plan	Completed, May 2004	Being implemented
Little Manly Coastline Management Plan	Completed, May 2004	Being implemented
Manly Ocean Beach Coastline Management Plan	On-going	Public Exhibition of the Plan completed in October 2007
Manly Cove Coastline Management Plan	On-going	Coastline Management Study being reviewed
Clontarf/Bantry Bay Estuary Management Plan	On-going	Processes Study completed in August 2007
North Harbour Coastline Management Plan	-	To be initiated in 2008

Figure 1.2 – Coastline & Estuary Management Planning in the Manly LGA

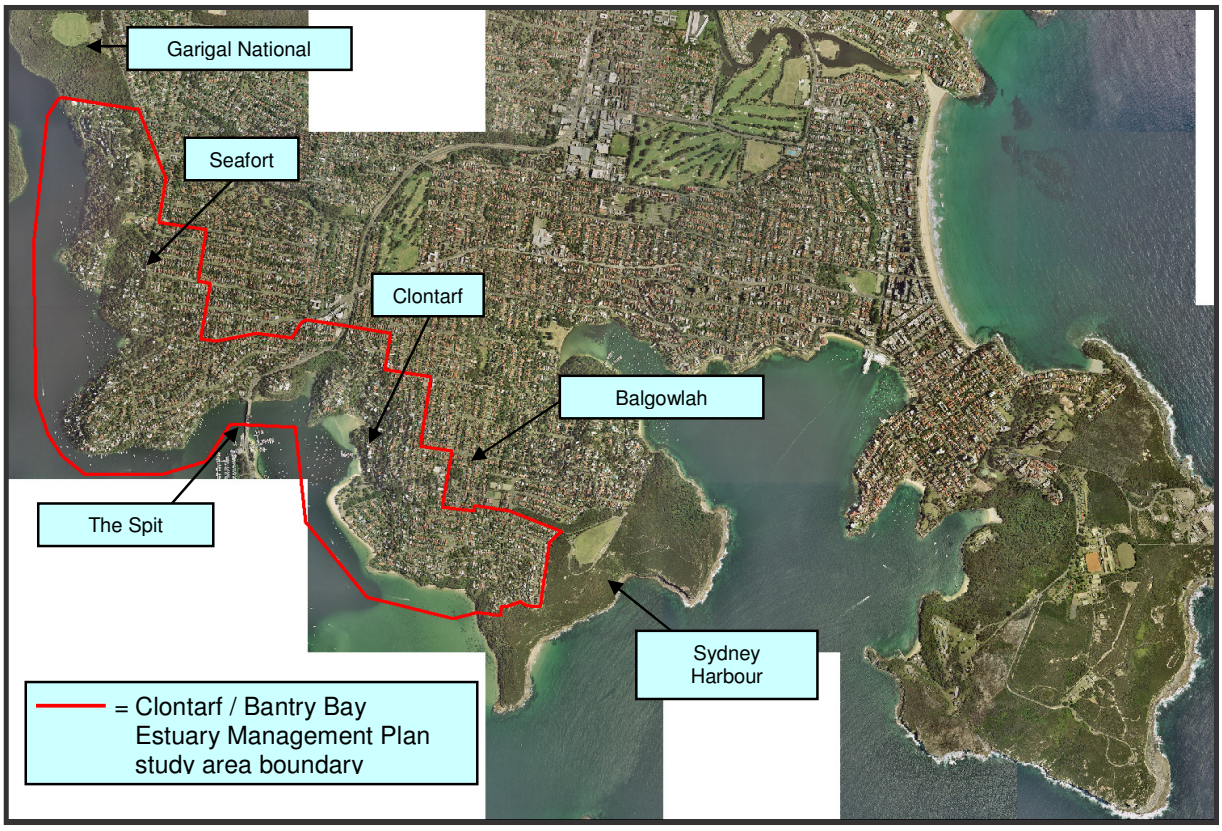


Areas specified above are indicative management plan boundaries

1.3 CLOTARF-BANTRY BAY ESTUARY - STUDY AREA

This study addresses the portion of the Middle Harbour (part of the greater Port Jackson / Sydney Harbour) estuary and foreshore that corresponds with the Manly Local Government Area border. The boundaries of the study area (Figure 1.3) are Sydney Harbour National Park at the south-eastern extremity and Garigal National Park at the north-western extremity. The study area boundary on the terrestrial side is the ridgeline, to focus total catchment management, which incorporates relevant sub-catchments that drain to the foreshore. On the aquatic side the boundary extends to approximately the middle of the waterway.

Figure 1.3 – Aerial view of the Clontarf / Bantry Bay study area



The study area covers an area of approximately 350 hectares, with a perimeter of approximately 11.5km, and takes in parts of the suburbs of Balgowlah Heights, Clontarf and Seaforth, and also the local Precinct Community Forum areas of Balgowlah Heights, Clontarf and Seaforth. The Spit Bridge, a landmark connecting northern beaches with Sydney and a state heritage, is located halfway along the foreshores of the study area.

The entire study area is covered within the Sydney Harbour Foreshores and Waterways Area. The study area is located in five of the nine zones under Sydney harbour: W1 (Maritime Waters), W2 (Environment Protection), W5 (Water Recreation), W6 (Scenic Waters – Active Use) and W8 (Scenic Waters – Passive Use).

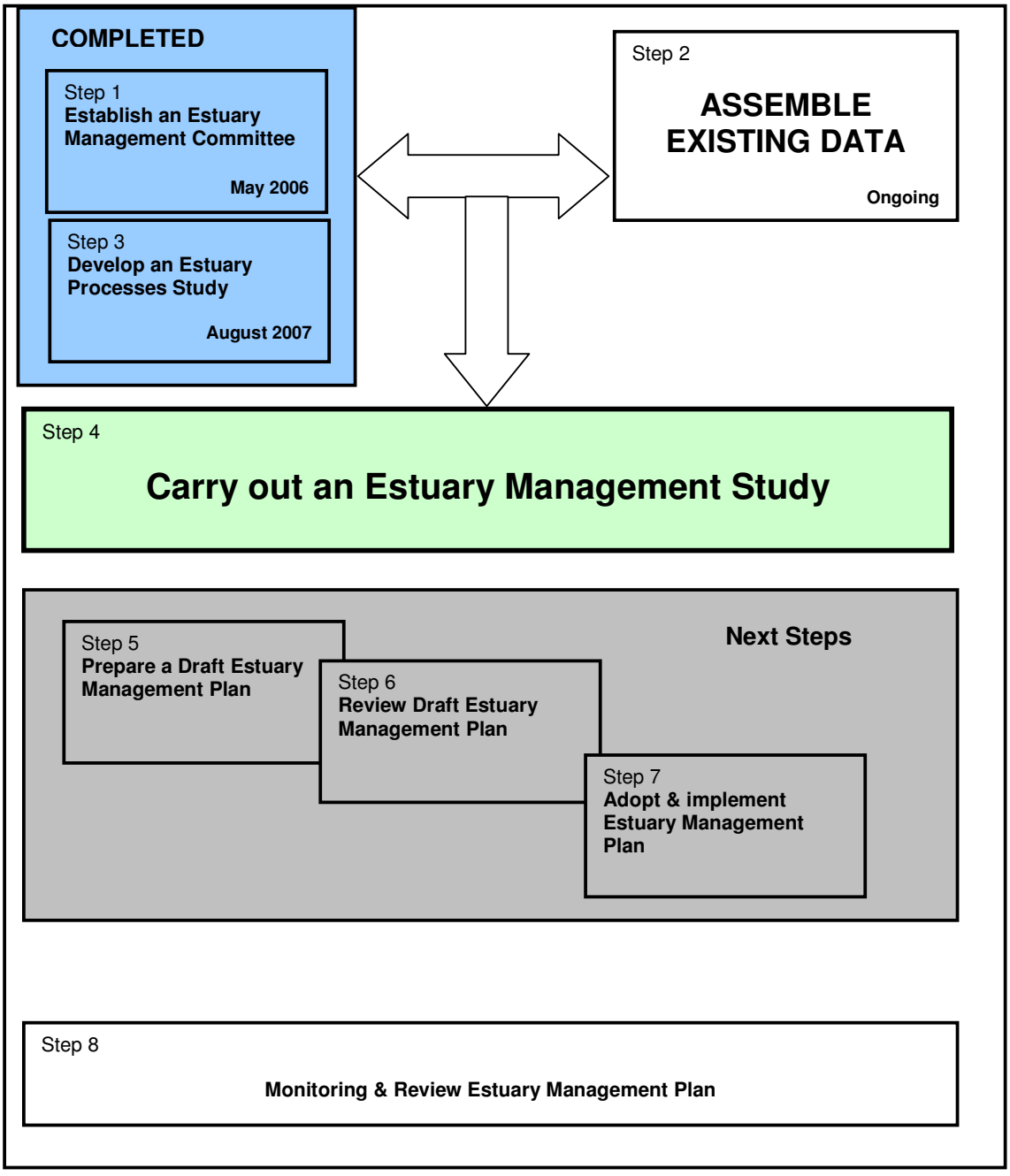
The entire study area is also covered within the Sydney Metropolitan Catchment Management Area. The catchment has an area of 1860 sq.km. and involves 39 LGAs including Manly.

1.4 ESTUARY MANAGEMENT PLANNING PROCESS

As indicated in section 1.1, DECC provides a strategic process for the development of Estuary Management Plans in NSW, through its 'Estuary Management Manual'. The fourth step is to develop an Estuary

Management Study based on completed Estuary Processes Study and available additional data and study results. The present status in the planning process is presented in Figure 1.4.

Figure 1.4 – Present Status in the Estuary Management Process



1.5 ESTUARY MANAGEMENT STUDY

The purpose of an estuary management study, according to Estuary Management Manual (NSW 1992), is to define management objectives, options and impacts.

The objectives of the Estuary Management Study have been defined as follows:

- to identify the planning framework relevant to management of the estuary;
- to develop and evaluate management goals and objectives;
- to develop and evaluate management options that will achieve the objectives.

The outcomes of this report will lead to the development of a formal Estuary Management Plan for the Clontarf/Bantry Bay estuary.

This study has been done in house with contribution from the 'Internal Working Group' under the guidance of the 'Clontarf / Bantry Bay Estuary Management Working Group'

The study report has gone through an extensive peer review.

Review of Preliminary Discussion Paper
A preliminary discussion paper describing management objectives and strategic management options was prepared and discussed twice with Council staff. A revised discussion paper was circulated to members of the 'Clontarf / Bantry Bay Estuary Management Working Group' and discussed at the Working Group meeting on August 13, 2007.

Review of the First Draft
The first draft is prepared and circulated to members of the 'Clontarf / Bantry Bay Estuary Management Working Group'. The draft was technically reviewed by various State and Local Government bodies including Department of Lands, NSW Maritime, DPI Fisheries and Aboriginal Heritage Office. The report was discussed at the Working Group meeting on 17 September 2007. Daniel Wiecek at the DECC contributed written comments on the draft.

Selected management options were presented at the Manly Scenic Walkway Committee meeting on 9 October 2007.

Review of the Final Draft
A final draft was prepared accommodating comments and suggestions made by members of the 'Clontarf / Bantry Bay Estuary Management Working Group' and distributed for review, comments and contribution. The 'Clontarf / Bantry Bay Estuary Management Working Group', at its meeting on 29 October 2007, discussed each of the management options and sought proposals for modifications, elaborations to achieve final endorsement. A total of 98 management options were endorsed unanimously and without revisions, 10 were endorsed with revisions and only one option (Sandy Bay as off-leash dog area) was endorsed with expressed disagreement. The Working Group also participated in prioritisation of management options

The Working Group further endorsed the final draft pending incorporation of further comments.

This Final Report accommodates all comments and suggestions received since and priorities assigned to management objectives.

2. OVERVIEW OF ESTUARY FEATURES & FUTURE USAGE

2.1 GENERAL

This study area relates to the northern portion of the Middle Harbour (part of the greater Port Jackson / Sydney Harbour) estuary and foreshore that corresponds with the Manly Local Government Area boundary. Population of the study area, according to 2001 census, is 5,873. Key characteristics generic for the Middle Harbour estuary system and specific to the Clontarf / Bantry Bay study area are presented in Table 2.1 a and b, respectively.

Table 2.1a – Key Characteristics of the Middle Harbour Estuary System

Characteristic	Detail
Longitude	151.283ºE
Latitude	33.828ºS
Estuary Classification	Tide Dominated (OzEstuaries, 2006) Wave Dominated (Ryan et al, 2003)
Interim Biogeographic Region	Sydney Basin
Interim Marine & Coastal Region	Hawkesbury Shelf
Estuary Length	12 kilometres (Willing & Partners, 1999)
Entrance Width (of Middle Harbour estuary)	720 metres (Manly Council GIS)
Mean Maximum Wave Height at Clontarf Beach	<0.5 m
Mean Wave Period	6.96 seconds
Maximum Wave Period	13.50 seconds
Tidal Range (Sydney Harbour)	1.82 metres (Lawson and Treloar, 2003)
Tidal Classification	Microtidal
Tidal Period	Semi Diurnal

Source: OzEstuaries, 2006 (unless stated otherwise)

Table 2.1b – Key Characteristics of the Clontarf / Bantry Bay Study Area

Characteristic	Detail
Area	349 hectares (Manly Council GIS)
Estuary Length	5.2 kilometres (Manly Council GIS)
Perimeter	11.5 kilometres
Intertidal Flats Area	Approximately 2.4 hectares (Manly Council GIS)
Saltmarsh / Saltflat Area	0 (NSW Government Department of Planning, 2005)
Mangrove Area	Approximately 0.05 hectares (Manly Council GIS)
Seagrass Area	1.8 hectares
Maximum Depth	33 metres (Willing & Partners, 1999)

Source: OzEstuaries, 2006 (unless stated otherwise)

The current land use remains predominantly residential development (65.5%), followed by road surfaces (22.0%) and open spaces and parks (10.2%). Pockets of bushland remain scattered throughout the area (which total 18.5 hectares in size), occurring mostly around the immediate estuary foreshore. Manly Scenic Walkway and Harbour to Hawkesbury Walking Tracks run through the study area. The estuary is used actively for walking, swimming, boating, sailing and passive recreation (e.g. - reading, meditation, picnicking). In addition, the estuary is also popular for kayaking, recreational fishing, sunbathing and dog walking.

The study area is zoned under both the *Manly Local Environment Plan* 1988 and the *Sydney Regional Environmental Plan - Sydney Harbour Catchments 2005* or simply the Harbour REP. The Manly LEP establishes land use zones within the study area as zone 2 – Residential, 3 – Business Zone, 5 – Special Uses Zone, 6 - Open Space and Zone 8 – National Parks. The foreshores and waterways of the study area are located in five of the nine zones under Sydney Harbour REP: W1 (Maritime Waters), W2 (Environment Protection), W5 (Water Recreation), W6 (Scenic Waters – Active Use) and W8 (Scenic Waters – Passive Use). Land tenure, use and management including zoning are presented in detail in **Appendix A**.

The study area has a rich history, beginning with extensive Aboriginal occupation, which is evidenced through the many middens that are still present. The area was used extensively by the Aboriginals, known locally as the Gayemal clan of the Guringai tribe. The oldest Aboriginal site known in the Manly LGA is dated to about 4100 years before present. There are 22 recorded Aboriginal sites within the study area. Following European settlement in Sydney, the study area was slowly developed, until improved access made the area more desirable. In 1850 a punt began running from the Spit giving easier access to the north side. Access was further enhanced in 1924 with the opening of the first Spit Bridge. By the 1970s the area was already extensively developed.

2.2 NATURAL ENVIRONMENT – PHYSICAL PROCESSES

The estuary exhibits semidiurnal tidal characteristics, with two high and two low tides each day. The area is not fed by any permanent creeks; however various water courses provide freshwater inflows during and after rain. In periods of wet weather, the estuary becomes stratified with more buoyant fresh water sitting as a thin layer on the surface of the salt water.

Groundwater is an integral part of the “water cycle” and maintains the dynamics of estuarine and near-shore marine water bodies. The major aquifer class, in the study area, is consolidated porous rocks containing limited quantities of groundwater. However, along the foreshores there occurs the aquifer termed ‘unconsolidated sediments’. This aquifer contains significant groundwater resources with well defined water table that is responsive to recharge events, and even tidal influences in some cases.

Wind waves generated in Middle Harbour are generally less than 0.1m in height. Ocean swell waves penetrate lower Middle Harbour through the heads of Sydney Harbour, and undergo severe refraction and diffraction. The only place in the study area that is subject to waves from a consistent direction is the lower half (Castle Rock Beach to Sandy Bay), where ocean swell waves run along the shore. Sediment has been observed to move along the shore in the same direction, providing possible evidence of a longshore current.

Significant storm events affecting the Middle Harbour area are known to have occurred in April 1893, June 1923 and May-June 1974. The study area experienced the impact of a tsunami on May 22, 1960 when a strip 90 by 55 meters wide was swept away from Clontarf Reserve Point Park. The 1974 storm reported wall collapse near Middle Harbour Yacht Club and minor beach erosion at the Spit and Clontarf. The study area experienced waves and high winds from a recent storm on June 9-10, 2007 which resulted in a cruiser washing ashore at Clontarf but no serious erosion.

From the Spit Bridge to the north western extremity of the study area, the foreshore is predominantly stable rock, with estuarine mud on the sea floor. This area is beyond the normal limit of ocean waves, and is reasonably deep, therefore creating a relatively stable sedimentary environment. However, the lower reaches, from Castle Rock Beach to the Spit Bridge, consists largely of unstable sandy shores, with a mixture of marine sand and estuarine mud on the sea floor. The estuary in this section consists of both a shallow sand bar and a deep channel. The marina at Clontarf lies directly in the path of the sand transport corridor between the tidal delta and Sandy Bay. However, the beach profile appears to have been modified from its natural state, due to the irregular shape of the shoreline between Clontarf Reserve and Sandy Bay. The large sand flat of Sandy Bay transforms into a narrow beach with a steep drop-off on either side of Clontarf Marina, and then back into a sand flat to the south of the marina. There are many forces impacting on this part of the estuary, creating a complex system.

2.3 NATURAL ENVIRONMENT – ECOLOGICAL PROCESSES

The ecosystems within the study area are highly fragmented and have signs of the many pressures placed on them through development and high usage.

The marine environment within the study area has a diverse range of habitats. There are significant seagrass beds within the study area: the largest bed is adjacent to Castle Rock Beach and reasonably large meadows exist at Clontarf and Sandy Bay. Compared to the past, large losses of seagrass have been reported. Over 570 species of fish have been recorded in greater Sydney Harbour, and it is likely that a large proportion of these are also present within the study area. The list includes 3 endangered, 5 vulnerable and 18 protected species.

The intertidal area within the study area has a range of habitats including rocky reefs and platforms, sandy beaches and mudflats, a few remaining mangroves and artificial habitat including seawalls, jetties and pontoons. The entire foreshore of the study area is protected as Intertidal Protected Area (IPA). Many types of algae (e.g. - red, green, brown) inhabit the intertidal zone, providing a food source for the many grazing invertebrates. Numerous types of invertebrates, such as worms, crabs and molluscs, can be found in the sediment. There is only one small pocket and few individual mangroves remaining within the study area. However, no salt marsh has been identified. The majority of these species are invertebrates. The Little Penguin is often sighted within the study area but no information is available on its nesting place. It feeds in the estuary during the day and nests on land during the night.

The terrestrial environment within the study area has seen the largest change. Bushland reserves occur in a total 18.5 hectares and are scattered throughout the study area. Six reserves have SEPP 19 status under EP&A Act. Smaller patches of bushland on both public and private land do exist throughout, and in some places provide corridors between the reserves. A total of 3 amphibian, 49 birds, 6 mammal and 13 reptile species have been recorded. Grey-headed Flying Fox (*Pteropus poliocephalus*) is the only threatened species recorded.

2.4 HUMAN INTERVENTIONS & USAGE

Human activities have altered and modified the natural system of the study area. Foreshore development has been extensive. The first and major foreshore development in the study area happened with the construction of the Spit Bridge in 1924 (which was replaced by the existing bridge in 1958) and other prior developments: first punt operation in 1849, ferry operation in 1880 and tram services in 1900. Seawalls, both public and private, exist throughout the study area. Total length of seawalls is 2.4km, which is approximately 46% of the foreshore length. Swimming baths/enclosures, Clontarf Marina and walkways including Manly Scenic Walkway are some other developments on the shore. Public access to foreshore is available at several points. There is no public pontoon/jetty in the study area. There are sailing and yacht clubs providing boating facilities and contributing to estuary use. Groundwater is being extracted near Clontarf Reserve area by Manly Council as well as private properties. Stormwater flows through 16.0 km artificial drainage networks. The estuary is used actively for walking, swimming, boating & sailing and passive recreation (e.g. - reading, meditation, picnicking) with reasonable degree of use for kayaking, recreational fishing, sunbathing and walking dogs. Dogs are allowed on a leash in the Clontarf Reserve.

There exist conflicts between different user groups and the impacts that competing users have on the environment. Examples of some of these conflicts identified include:

- Seawalls for protection of properties versus its damaging impact on natural ecosystem
- Groundwater abstraction and possible saline water intrusion in aquifer
- Beach raking for safety versus its impact on invertebrates
- Dog walking off leash and impact on shore birds
- Powered and sailing boats and their wake impacting on seawalls and beach erosion
- Access to mooring versus their impact on seagrass beds, ability to spread *caulerpa taxifolia*
- Powered boats and the safety aspects for swimmers and kayakers
- Ad hoc boat storage and its impact on amenity and habitat:
- Ad hoc access ways to foreshore for convenience versus destruction of habitat.

2.5 PROCESSES & IMPACTS

With most parts of the study area being highly urbanised, there is significant pressure placed on water quality health. Pollution is indeed still evident, particularly in times of rain when stormwater transports terrestrial pollutants into the estuary. Loads of pollutants in the estuary from the study area have been estimated at 2250 kg/year of total nitrogen; 260 kg/year of total phosphorus; 180 kg/year of copper, 230 kg/year of lead, 490 kg/year of zinc, and 128,000 kg/year of sediment. Four Gross Pollutant Traps (GPTs) are currently installed in the Clontarf / Bantry Bay Catchments. The Department of Primary Industries has placed a ban on all commercial fishing within Sydney Harbour including the study area, because of the presence of elevated levels of dioxins in fish and crustaceans. Of the three swimming pool/baths, Sangrado bath is the worst in terms of bacterial contamination. There are 5 known sewer overflow locations within the study area.

The study area is used extensively by a variety of vessels, particularly between Castle Rock Beach and Seaforth Bluff. This section of the waterway is the only access between greater Sydney Harbour and upper Middle Harbour, so all vessels wishing to travel between the two must pass through. Boat generated waves over time can cause foreshore erosion and weaken sea walls. They can impact on habitat. Boating can, in addition, impact on water quality via spills, anti-foul paints, littering from boats and from marinas where boats are washed and fixed etc. A No Wash Zone is in place between Clontarf Point and Seaforth Bluff. An 8 knot speed limit zone is also in place, between Clontarf Point and d'Albora Marina (Mosman side of Spit Bridge).

Erosion in the study area occurs along beaches, in front of stormwater outlets, along ad hoc access tracks, and where foreshore protection structures such as seawalls are collapsing. Beach erosion has been experienced at four sections of Clontarf Beach and Sandy Bay with varying degrees of severity. Accelerated erosion occurs as a result of the concentration of stormwater flows through artificial drainage networks. The study area, specially the Clontarf Swimming area, also regularly experience siltation. The study area is susceptible to slope and cliff instability, with a large landslip having occurred at Seaforth Crescent in 1956.

An ecosystem health card has also been developed for the study area.

The study area will experience many of the impacts of climate change, with the low lying areas close to the foreshore likely to be subject to more of the impacts than the elevated areas. These impacts are likely to include: sea level rise; increases in extreme weather events; temperature increases; reductions in water availability; altered hydrology and increased flash flooding; and more frequent and more severe droughts (Hennessy et al, 2006).

2.6 FUTURE USAGE

The Sydney Metropolitan Strategy is the key NSW State Government urban land use policy to guide future growth for the next 25 years. The Strategy predicts a population increase of 1.1 million people over this period, with 640,000 new dwellings, which are to be concentrated in existing areas. The Sydney Metropolitan Strategy is translated into 10 sub-regional strategies. Local Government Areas of Manly, Warringah and Pittwater are included in the North-East Subregion.

The North-East Subregion has a planning target of 17,300 new dwellings and 19500 new employments over the 25 year period (NSW DoP, 2007). Increasing population will continue to accelerate urbanisation. Within Manly LGA, there is target for 2400 additional dwellings and 1000 additional employment. These will put increased pressure on environmental assets of the study area such as beaches, waterways, seagrass beds, mangroves, rich heritage etc.

The North-East Subregional Strategy (NSW DoP 2007) has indicated types of increased pressure on environmental assets and includes:

- Urban Development leading to
  - Clearing of Bushland
  - Threats to endangered fauna & flora

  - Pollution of waterways
  - Stormwater runoff and erosion
  - Reduced recharge of groundwater
- Damage to aquatic ecosystem and coastal environment
- The impacts of climate change, including sea level rise

However, the study area is already extensively developed with few opportunities for expansion, so new dwellings will be accommodated in other parts of the subregion. Initial assessments have revealed that the targets for the study area can be accommodated within existing density controls, so the nature of development within the study area is not likely to change significantly. Small pockets of state government owned land still exist in the north-western end of the study area at Seaforth, and these will be released over the coming years. Manly Council is currently updating its Local Environment Plan to bring it into line with new State Government requirements, and this could result in minor changes to land uses and zonings within the study area.

Recreational and leisure activities are expected to continue to be popular throughout the study area, and maintenance of existing infrastructure and facilities will be necessary to ensure they can take place. With a forecast increase in population for the north-east subregion, it is likely that there will be increased demand for recreational and leisure infrastructure and facilities, so investments may need to be made to accommodate this demand.

3. MANAGING KEY ISSUES - COMMUNITY PERCEPTION

A vital part in the estuary management planning process is community involvement and action. Hence, an extensive awareness campaign and consultation was undertaken in the formulation process of the Clontarf / Bantry Bay Estuary Management Plan.

3.1 COMMUNITY CONSULTATION

Mechanisms of community consultations are summarized below.

Display Panels: A series of A3 Display Panels were created to assist in marketing the EMP development. They were designed and used for various events and displays. A4 laminated posters were displayed on the door of all the four Freebie Hop, Skip & Jump buses to reach as many people as possible.

Webpage: A webpage is created on Manly Council's website (www.manly.nsw.gov.au) to allow easy access to information relevant to the plan.

Precinct Newsletters: Articles were regularly sent to the Precincts for inclusion in monthly newsletter.

Survey: Two survey forms were produced to assist people in providing input into the development of the EMP – a comprehensive survey and a brief survey. The survey forms were distributed through various means, and were emailed or posted to people upon request. A total of 120 filled in survey forms were returned.

Field Days: Two community consultation field days were held within the study area –Clontarf Reserve (October 21, 2006) and Seaforth (November 12, 2006). The Seaforth field day was held as part of the Seaforth Centennial Event.

Detailed outcome from these community consultations is presented in Chapter 9 of the Estuary Processes Study (MC 2007). However, information regarding community perception on managing key issues is presented in this chapter.

3.2 MANAGEMENT ISSUES

A long list of management issues was identified mainly from filled in survey forms. Further, specific local issues were derived during two community consultation field days. These issues are summarised and presented in the middle column of **Appendix B**. These have been presented under 9 key broad based management issues, as given below, and have been followed throughout this report.

- Water Quality & Pollution
- Aquatic/Inter-tidal Habitat Conservation & Management
- Bushland/Terrestrial Habitat Conservation & Management
- Beach Erosion & Sedimentation
- Hazards& risk including climate change
- Estuary Use
- Access
- Foreshore infrastructure & facilities
- Heritage Conservation & Management

3.3 MANAGING KEY ISSUES

Community perceptions of managing key issues were discussed in detail at the 'Clontarf / Bantry Bay Estuary Management Working Group' meetings held on 30 October, 27 November and 11 December 2006. The Working Group established its position in terms of management on each issue (presented in boxes). These are also presented in **Appendix B**.

Water Quality & Pollution

Stormwater in Clontarf / Sandy Bay area has been cited as a major problem. Stormwater pipe draining into Clontarf Pool is not only risky health wise but pollutes Middle Harbour generally. Hence, stormwater pollution (inc. dog faeces) needs to be managed for now and future generations. There is need for more stormwater traps / filters and also regular inspection of existing Gross Pollutant Traps.

- Undertake further investigation to determine the possibility of removing the stormwater pipe draining into Clontarf Pool
- Continue to work with Sydney Water to identify and remediate sewer issues
- Continue to work with Clontarf Marina through the SR&G program
- Continue to undertake various stormwater education initiatives through Council
- Continue to investigate and implement water recycling initiatives through Council's Water Cycle Management Program

Maritime rubbish boat, seen in the estuary recently by residents, is important to reduce pollution. This should visit the area more frequently. Ice cream boat should have rubbish bin on board to manage litter

Main issues with the increasing marine traffic are rubbish, pollution and noise. There should not be any further expansion of the boat moorings, marine or wharf facilities.

Aquatic/Inter-tidal Habitat Conservation & Management

Conservation of seagrass is an important issue. It has been observed that marine growth and seahorses are linked. Threats are due to beach & sand movement. Emergence of *Caulerpa taxifolia*, a weed, is also another threat. There is inadequate knowledge on the weed.

It has been established that beach raking, though important for safety reasons, damage fauna in the sand/sediment.

Dolphins, sea turtles and seals have been sighted in study area. More sightings of little penguins in the area occurred.

Retain and conserve, at least, existing, mangrove areas.

- Work with DPI (Fisheries) to investigate seagrass issue at Castle Rock, and a potential boat exclusion zone
- Use the existing Starboard Right & Green (SR&G) education program to educate boat owners about seagrass protection and *Caulerpa taxifolia*
- Encourage community input to keep beach clean
- Monitor best practice beach raking in other areas, for possible implementation at Clontarf
- Using outcomes of DECC surveys, investigate if south-east corner of Clontarf Beach may benefit from hand raking
- Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour
- Work with DPI (Fisheries) to undertake a study of mangroves within the study area. Formulate management options to maintain, and investigate possibility of enhancing, existing populations

Bushland/Terrestrial Habitat Conservation & Management

There is wider support to maintain as much bush lands as possible in the study area. Views are as important as bush for residents, a balance must be made to stop poisoning trees for views. Keep foreshore under control

with respect to vegetation height. Manly residents pay high rates because of high valuation of homes by the Harbour with views. Hence, include residents in landscape decisions regarding maintenance of views.

Bush regeneration at Pickering Point should be started as soon as possible. Community should be encouraged to a community service day in bush care per year - per rate payer. Residents should be encouraged also to replant natives.

Weed infestation is a general problem. Phytophthora along the waterfront at Castle Rock is more visible.

Council has replanted the hillside on south side of Edgecliffe Esp with grass however, only progressed along halfway of the total area covered in noxious weeds. Completing the whole strip would be appropriate for the entire strip as the part not 'grassed' is the part most noticeable

Create Wetland facilities which is good for family and environmental combined.

- Council to continue to be an active participant in the die-back working group
- Council to co-ordinate managed (limited) pruning in bushland reserves to retain views and discourage illegal pruning
- Council's Bushland Management Officer to provide advice on bushland management issues and options

Beach Erosion & Sedimentation

Beach erosion causes risk to property and beach users. However, sedimentation is occurring around marinas. Dredging of marina area into Sandy Bay is required.

- DECC to undertake photogrammetry, and possible hydro-surveys, to determine sediment processes.
- Use results to formulate holistic management options.

Hazards& risk including climate change

Seawall maintenance is critical as it protects properties. For this, maintenance of beach sand is important. Similarly, seacliff instability is also a major concern.

Climate change is of concern, but should not be the subject of Council expenditure unless part of a national initiative. As this phenomenon is long term, large scale measures are needed. Responsibility to combat climate change rests with the Federal Government. Rising sea levels create risk to beach properties.

- Commission a geotechnical study of foreshore to identify and prioritise risks, and provide management options
- Take advice from DECC surveys, and formulate management options to maintain seawalls / beaches, to protect property and safety of beach users
- Model sea level rise predictions for the study area and investigate necessary management options
- Link with the Macquarie Uni / Sydney Coastal Councils Group project investigating Climate Change in Manly

Estuary Use

The estuary is a family orientated area and being currently used by many groups: bushwalker groups, harbourside restaurants, kayak users, boat and line fishermen, sailboards, water skiers, skiff club children, enclosure swimming, children's playgrounds, navy Balmoral divers, Harbourside residents, dog exercise owners, Mosman Rowing club, recreational picnics, Northbridge Sailing Club, school groups, seniors bus picnics, charter ferries.

Middle Harbour Yacht Club, the Northbridge Sailing Club/Seaforth Moth Sailing Club and the 16 foot Skiff benefit greatly from the area

As Manly is visitor's destination, the study area receives many visitors who come to area for many different recreational uses and/or for brief stopovers.

There should be facilities to cater for all users. Activities for children (playgrounds, natural areas, sailing clubs etc) are important. A local grocery shop would be an advantage in the local area - i.e. Bantry Bay near Seaforth Oval. Area is of huge economic value to Manly residents. Clonnies, restaurant located within Clontarf Park, should be a la carte instead of function focused. Lease arrangements for Clonnies should be enforced to meet the terms of the lease.

- Continue to support and enhance activities for children and families

Fishing: The community supports continuation of commercial fishing closure. However, more help is needed from Fisheries to combat illegal fishing practices. Recreational fishing should be allowed from seawalls.

People have been sighted removing fauna from foreshore of the study area despite it is an Intertidal Protected Area.

- Retain commercial fishing ban
- Continue to encourage DPI (Fisheries) to enforce illegal fishing practices
- Council Rangers and SR&G Program to assist with education and enforcement of illegal fishing practices

Boating: There is overall support of the community to boating and other recreational activities but safety issue is very important. Clontarf Beach is used by swimmers and recreational boating in a largely harmonious manner. There are no major issues that need to be addressed. A 'swimming only' enclosure would restrict use of kayaks, windsurfers and small boats – this is not necessary. There was a proposal to close off Clontarf Beach to kayaks and boats some time ago, for alleged safety reasons but it failed for lack of resident support. Current safety standards seem ok.

Boats are not supposed to anchor within a certain number of metres from shore (particularly on a swimming beach). Boats clearly trespass within this limit on a regular basis and smaller boats even anchor on the shoreline posing a very serious safety concern for small children and adults alike. Boats mooring close to shore and landing at Castle Rock Beach are a safety hazard for children. Restriction of boats, mooring at eastern end of Clontarf Beach (50 – 70m from point), can be enforced for safety of children.

This part of the waterway is used by all types of water craft but there are a great many non motor type boats. Number of kayaks is increasing, not only private but hire kayakers love to paddle up to Bantry Bay from the Spit or Clontarf. Kayak hire should be permitted on the foreshore. However, there are water jet skis going really fast and behaving in an unpredictable manner, creating a lot of noise and making it much less enjoyable for other water craft - perhaps this can be prohibited or at least curtailed in some way. Rowers without lights in upper Middle Harbour are a hazard. There is need for education about waterway etiquette.

There were concerns about speed limits, some were asking for low speed limits while others are maintaining the present 8 knot limit at Clontarf. However, limit wash from Spit to Bantry Bay to reduce erosion of shore

- Work with NSW Maritime to investigate the need for a no wash zone
- Work with NSW Maritime to investigate possibility of a small exclusion zone (marked with buoys) for swimming, while still maintaining access to part of the beach for recreational activities
- Allow kayak hire, but limit the number of operators, and investigate whether it can be done at the Marina complex
- Maintain jetski (PWC) ban
- NSW Maritime & SR&G program to educate boat owners about waterway etiquette and boat ballast

Access

Walking has been identified as the No. 1 use of the estuary. Hence, access is an important management issue. The study area already has well established walkways – Manly Scenic Walkway and Harbour to Hawkesbury Walkway. However, access to foreshores, especially along Seaforth Crescent, is being debated. While, there is support for unhindered access and thoroughfare along whole of foreshores, it has been established that there is no practicality of reclaiming Seaforth Crescent for public access. The issue needs to be balanced with rights of waterfront land owners and definitely access is not achievable in all areas. A compromise is called to feel that those who have purchased and maintained their waterfront properties in the same form should not be adversely affected by a sudden change of circumstances. No blanket ruling should apply in such places as Powder Hulk Bay. Instead each stretch of the foreshores should be considered on its own merits and exemption to the legislation should be supported when for instance it is equally easy or sometimes much easier to walk along the road for a short length rather than scrambling over steep rocks. All moorings and boatsheds in the area have added to the beauty of the foreshore and look brilliant. However, there is another dimension for a proper waterfront / shoreline walkway to give access with the Davey pumps to water from the Harbour in fire emergencies. This would not require the destruction or harm to anyone's jetty, just the 'permissive' use of the right to cross individuals land.

Sangrado Reserve is wonderful and should be maintained in its natural state. It is very much used by walkers and dog owners. It would be great to extend it around to the Spit, so more people can enjoy our beautiful bay.

Clontarf Reserve is a long established beach bathing/picnicking and boating area which is and has been much frequented by larger numbers of residents and visitors both by road and by water for many years now. The present format of the of the reserve with the extremely popular children's playground, picnic areas, pool, boat launching, the kiosk and Clonnies restaurant and that section of the spit to Manly walk which sees a lot of walkers, seeming to meet a broad spectrum of users' needs. It also has easy car and kayaking access with good parking available. These facilities need to be continually well managed as they have been in the past.

Some people objected to the use of valuable bore water to irrigate grassed areas at Clontarf Reserve, Ellery's Punt Reserve etc. They suggest seeing more use of short native grasses with paths of bark and leafing mulch that wander through the grasses. Larger areas of leaf mulch could be used in picnic table areas etc.

There are limited facilities for the aged / disabled. There is need for improved access facilities: bike paths in Clontarf Reserve, access for parents with prams / bicycles, beach access for disabled as in Manly.

- Maintain and (where possible) improve access to all existing public foreshore areas, but retain existing private structures.
- Use Clontarf Landscape Master plan to increase disabled parking and access to the Reserve
- Investigate options to increase disabled access to all bays / pools in the study area
- Investigate the possibility of purchasing a beach freewheeler (to allow disabled access onto sand) for use at Clontarf

The issue of companion animals' access is very important. Community is divided both for and against. Dogs should not be allowed on walkways or beaches at all and specially on Manly to Spit walk. Dogs are always seen on Castle Rock Beach, and they pose a safety risk to children. They are threat to wildlife also. On the other hand, there is strong support for maintaining current on leashed dogs. Dogs are important companions and should be able to roam more. Sandy Bay should be retained as an off-leash area. More bins needed for doggy bags

Owners should be more responsible. Pet owners should be supported / educated so they are more responsible

- Increase Ranger patrols and regulation in the study area, including early, late, weekends and public holidays. Ensure Castle Rock Beach is included.
- Formalise Sandy Bay as an off-leash dog area, with clear signage that includes:
  - Map of off-leash area
  - Education messages
  - Phone numbers for emergencies
- Increase number of dog poo bag dispensers

In relation to access, extension of the Manly Scenic Walkway and its improvement is an important issue. Healthy debate exists for and against a possible extension. While, some suggested that the Council should have a plan and program to construct a walkway from the Spit to Bantry Bay, others are in favour of preserving the last untouched harbour areas. The Bantry Bay environment should be kept as it is and should not be developed in a commercial sense - it must retain its natural National Parks environment.

There is suggestion to modify the existing Harbour to Hawkesbury Track closer to the foreshore between Sangrado Reserve and lower Castle Circuit. It is possible for an alternative route could be devised at Seaforth through quieter streets and reserves closer to Pickering Pt, away from busy streets (i.e. present route uses Dalwood Ave, Acacia Rd and upper Castle Circuit, before returning to Wakehurst Parkway thence Seaforth Oval)

Walkers like to see tracks as natural as possible with low interventions with regular maintenance and weeding.

- Investigate opportunities for a formal track to link the Manly Scenic Walkway with Bantry Bay, incorporating as much foreshore and bushland as possible without disturbing existing structures.
- (Council's Bushland Management Officer to provide advice on MSW issues and management options)

Foreshore infrastructure & facilities

Council should have strong relationship with NSW Maritime in respect of controlling mooring numbers and types (e.g. swing, trot, finger wharves / jetties, marina) as these have related impact on adjoining water and land.

- Encourage Council Rangers to work with and contact NSW Maritime for water-based issues

Moorings: While there is concern to restrict moorings to present numbers, there is demand for more moorings for Clontarf beach area. Residents believe that the moorings do three positive things: it adds to the visual environment – pretty, interesting, colourful; brings more people to use the area and adds a simple buffer to the beach. People are opposed to remove boat moorings from the area

In reality, moorings are being gradually removed from Clontarf Bay to minimise damage to seafloor. But, boats then come in and anchor and potentially damage a larger area (anchors dropped wherever boat stops rather than a fixed mooring location). Perhaps fixed moorings for temporary use could solve this issue.

- Re-align moorings at Clontarf lengthwise along beach to form a buffer & decrease beach erosion, and discourage boats from landing on beach
- Install some permanent public moorings at Clontarf Beach (request seagrass friendly moorings)
- Ensure any extra moorings are aligned to maintain the width of the channel

Boat Ramp/Pontoon: At present, boat access from shore is difficult. There was a request to re-visit the old proposal for a pontoon to be attached to Clontarf pool or explore the possibility of a landing pontoon at the Spit during the bridge widening works. There is shortage of boat ramp in Clontarf area. A wharf is needed for boat owners to more easily access Powder Hulk Bay from Sangrado reserve, and for general recreational use

- No boat ramp possible in study area
- Investigate possibility of installing a public pontoon at Clontarf Pool or Clontarf Marina.

Dinghy Storage: There is general opposition of hazardous storage of dinghies on Sandy Bay shore. Uncontrolled foreshore storage of moored craft – owners' access dinghies happen in most areas. These should be off grassed and sand areas. However, some see that current haphazard storage of dinghies is completely appropriate as that adds to the feature of the area. There should be places for storage of small tenders / kayaks on beach at Castle Circuit, as it is difficult to carry up and down slope to road. There is suggestion of registration of dinghies with small annual fee.

- Install horizontal dinghy racks (preferably no higher than current situation) at Sandy Bay, with small annual fee
- Discuss with Seaforth Moth Sailing Club re opportunities for a formal dinghy storage system at Sangrado
- Leave Gurney Crescent & Castle Circuit dinghy storage as is, but educate owners to ensure protection of trees & middens, and decrease erosion of foreshore

Swimming Enclosures: These are important for families. However, all these structures require maintenance, especially replacement of nets. Sangrado pool is unusable because of oysters and pollution. Clontarf pool needs dredging.

- Clontarf pool needs dredging to make it usable, however:
  - Wait for results of DNR surveys before any dredging takes place
  - Ensure dredging is sympathetic to children
- Nets of all pools need to be cleaned for safety reasons, with the appropriate DPI (Fisheries) approvals

Conservation of Heritage

Aboriginal Heritage conservation is important but has been totally ignored to date. However, there is dilemma if this heritage is kept secret in order to protect it - then how would people appreciate it? Anyhow, aboriginal heritage signage should be increased. Similarly European Heritage should also be conserved.

The main threats to Aboriginal heritage within this area can be summarised as follows:

- Lack of knowledge, appreciation and recognition of Aboriginal heritage.

- Lack of consultation and recognition of Aboriginal people as the principals in sites interpretation, conservation and management processes.
- Lack of consultation in developing Landscape Management Plans.
- Erosion or damage to sites through wind or water erosion.
- Human foot traffic.
- Inappropriate clearing of established trees and shrubs.
- Land subsidence from stormwater erosion in storm events.
- Stormwater works and excavations by statutory authorities.
- Multi occupancy and multi-storey developments.
- Developments that intrude upon the foreshore.
- Inappropriately sited signage leading to:
    - Aerosol and other graffiti.
    - Deliberate and malicious destruction of identified sites.

- Work with Aboriginal Heritage Officers to formulate management options
- Heritage sign on amenities block in Clontarf reserve

4. VISION, GOALS AND MANAGEMENT OBJECTIVES

This section presents vision (Section 4.1), a set of goals for each key issues and overarching management objectives for the estuary relating to each of the issues (Section 4.2).

4.1 VISION FRAMEWORK

Visioning is an important element in any planning process. Setting the future vision ensures strategic long term thinking and avoids focus on daily issues.

State & Regional Levels

NSW Government released the State Plan on 14 November 2006. It is tipped as 'A New Direction for NSW'. The Plan reflects the hopes and goals of people across NSW and the priorities for the public sector. The Plan sets out clear targets for improved outcomes and service delivery. The Plan contains 14 long term social, economic and environmental goals and 34 priority areas for action for NSW. The Priority E4 of the State Plan is

"Better outcomes for native vegetation, biodiversity, land, rivers and coastal waterways".

This has been translated into state-wide targets (Box 1) by the Natural Resources Commission (NRC) and adopted by the Government in the State Plan.

At regional level, the Sydney Metropolitan Catchment Management Authority (SMCMA), responsible for the coordination and management of Sydney's natural resources, adopted the following vision:

"The Sydney community has the knowledge and skill to achieve healthy waterways and bushland that all Sydneysiders can enjoy, now and in the future."

The SMCMA has completed its draft Catchment Action Plan (CAP). The draft CAP will guide the activities of the SMCMA while forming the basis for partnerships with the community, business, industry and government. The draft CAP will assist the SMCMA in ensuring that natural resource management projects are undertaken in priority areas within the catchment, and that these projects lead to the best outcomes for the environment and the community. There are five themes: biodiversity, land use, water, community and coastal. Under each of these, there are the Catchment Targets and Management Targets (Coastal targets in Box 2).

Local level

Wider community participation is not only important but crucial. Manly Council has routinely, for the last two decades, involved community in setting vision through programs like myManly, Futures Forum and Surfing the Future. Surfing the Future provides a direction to aim towards for the year 2025 for Manly Local Government Area. It establishes a 'road map' and identifies major themes. The Social Plan (MC 2004) and Manly Sustainability Strategy (MC 2006), short-term strategy documents, are developed based on themes established under Surfing the Future. The following vision statement has been adopted for 'Surfing the Future':

"A thriving community where residents and visitors enjoy a clean, safe and unique natural environment enhanced by heritage and lifestyle"

Following this, a vision for the study area was prepared by the Clontarf / Bantry Bay Estuary Management Working Group, to assist in the Estuary Management Planning process. The vision aims to provide a general statement about the future desired state of the study area:

"A thriving community, enhanced by heritage and lifestyle, where residents and visitors work together to live in harmony with the unique natural environment, both on land and in the sea."

This vision statement, from the onset, establishes importance of visitors, heritage and living in harmony with natural environment and influences setting up of management objectives.

NRC targets adopted in the State Plan 2006

Biodiversity

Macro-environmental

1. By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition
2. By 2015 there is an increase in the number of sustainable populations of a range of native fauna species

Specific priorities

3. By 2015 there is an increase in the recovery of threatened species, populations and ecological communities
4. By 2015 there is a reduction in the impact of invasive species

Water

Macro-environmental

5. By 2015 there is an improvement in the condition of riverine ecosystems
6. By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent ecosystems and designated beneficial uses
7. By 2015 there is no decline in the condition of marine waters and ecosystems

Specific priorities

8. By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained
9. By 2015 there is an improvement in the condition of estuaries and coastal lake ecosystems

Land

Macro-environmental

10. By 2015 there is an improvement in soil condition

Specific priorities

11. By 2015 there is an increase in the area of land that is managed within its capability

Community

Macro-environmental

12. Natural resource decisions contribute to improving or maintaining economic sustainability and social well-being

Specific priorities

13. There is an increase in the capacity of natural resource managers to contribute to regionally relevant natural resource management

4.2 MANAGEMENT GOALS & OBJECTIVES

The Estuary Management Plan is a tool for integrating the needs and values of the environment within the development-based planning framework of local and state government. Therefore, the focus of the plan should be on addressing environmental concerns through a series of management options that are both effective and easy to implement.

The basis for the Estuary Management Plan needs to be Ecologically Sustainable Development (ESD). ESD is development that aims to meet the needs of the present, while conserving our ecosystems for the benefit of future generations. By following the principles of ESD, we should be able to reduce the likelihood of serious environmental impacts arising from our present day economic activities.

SMCMA Catchment & Management Targets, August 2007 - COASTAL

CATCHMENT TARGET ECM1 – ESTUARIES AND LAKES CATCHMENT

By 2016, there is an improvement in the condition of estuaries and coastal lake ecosystems.

Management Target ECM1.1 – Marine Pests
- By 2008, a risk assessment for key pest species and vectors has been undertaken

Management Target ECM1.7 – Estuarine Vegetation Management, Sydney Harbour
- By 2008, mapping of all estuarine vegetation in Sydney Harbour is completed.

Management Target ECM1.8 -Estuarine Vegetation Management, Estuaries and Lakes
- By 2010, mapping of all estuarine vegetation in Port Hacking, Botany Bay, Manly Lagoon, Dee Why Lagoon, Curl Curl Lagoon, and Narrabeen Lagoon is completed.

Management Target ECM1.9 -Estuarine Vegetation Management, Setting Priorities
- By 2010 for Sydney Harbour and 2012 for Port Hacking, Botany Bay and Narrabeen Lagoon, key sites of estuarine vegetation are prioritised for protection and/or rehabilitation in terms of ecological value and level of risk.

Management Target ECM1.10 -Estuarine Vegetation Rehabilitation
- By 2016, the extent, condition and connectivity of estuarine vegetation is maintained and/or improved by facilitating the protection and rehabilitation of estuarine vegetation at all high priority sites.

Management Target ECM1.3 – Best Management Practice in Marine-based Industries
- By 2014, Best Practice Guidelines and/or Environmental Management Systems have been developed and adopted by all marine based industries.

Management Target ECM1.4 – In-stream & Marine Structures
- By 2010, guidelines for the ecologically sensitive design and installation of in-stream and marine structures, including jetties, seawalls, moorings, and marinas have been developed.

Management Target ECM1.5 – Estuary Management Plans
- By 2016, Estuary Management Plans have been implemented, facilitated by the Sydney Metropolitan Catchment Management Authority.

CATCHMENT TARGET ECM2 – COAST AND ECOSYSTEMS

By 2016, there is improvement in the condition of coastal landforms and ecosystems.

Management Target ECM2.1 – Invasive Species
- By 2016, all vegetation in dune areas on public land is rehabilitated to reduce weed cover by 20% from the June 2007 baseline.

Management Target ECM2.2 – Beach Area
- By 2016, institutional and technical processes are in place to achieve maintenance of the mean beach area as at 2006.

Management Target ECM2.3 – Inter-tidal Rock Platforms, Intertidal Protected Areas & Aquatic Reserves
- By 2012, council rangers have the capacity and resources to enforce the NSW Fisheries Management Act, 1994 in Inter-tidal Protected Areas and Aquatic Reserves.

Management Target ECM2.4 -Marine Protected Areas
- By 2016, there is an increase in the extent of Marine Protected Areas.

Management Target ECM2.5 – Coastline Management
- By 2016, the Sydney coastline is covered by a Coastline Management Plan.

CATCHMENT TARGET ECM3 – MARINE WATERS

By 2016, there is an improvement in the condition of marine waters and ecosystems.

Management Target ECM3.1 – Sewerage Management
- By 2016, five major sewage recycling projects, each with a minimum 20% reduction in the 2007 discharge have been implemented.

4.2.1 Principles of ESD

There are four basic principles of Ecologically Sustainable Development (ESD):

1. Conservation of biological diversity and ecological integrity;
2. Social equity, including inter-generational equity;
3. Improved valuation, pricing and incentive mechanisms; and
4. The precautionary principle.

These principles form the basis in deciding whether projects are consistent with ecologically sustainable objectives. Detailed descriptions of each of the ESD principles are provided in **Appendix C**.

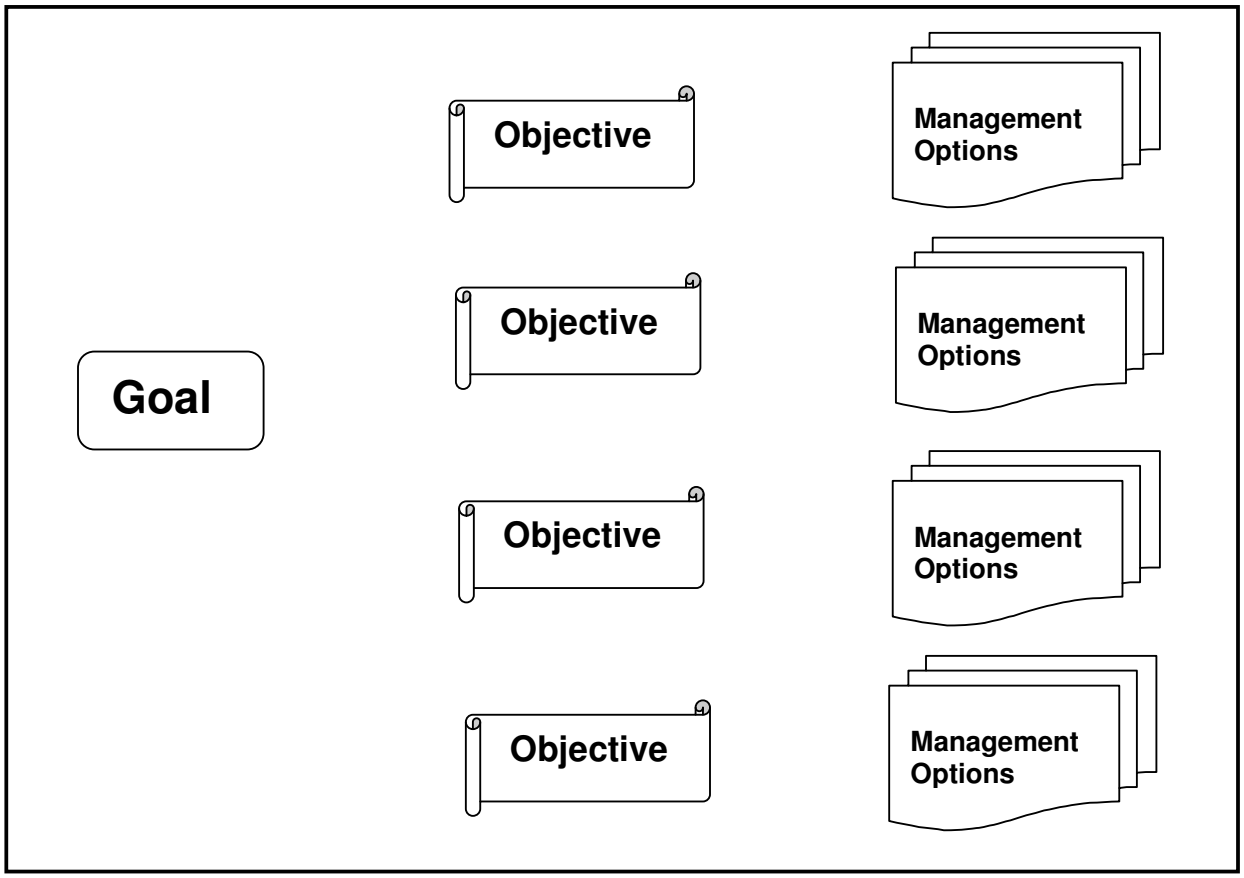
4.2.2 Formulation of Goals and Management Objectives

A series of goals and objectives for the future management of the Clontarf/Bantry Bay Estuary were developed on the basis of information received through the community and stakeholder consultation, input from the the Estuary Management Working Group and a sound appreciation of estuarine processes and human interactions.

Management Objectives provide the 'goal posts' towards which future management of the Clontarf/Bantry Bay Estuary should be directed. In short, the objectives aim to rectify the problems or issues facing the estuary, whilst preserving and enhancing its inherent values.

Goals and objectives have been defined under a series of key management issues, as described in Section 3.2. Monitoring, as a management issues, has been added to the list. For each management issue a goal has been defined, along with a range of management objectives that will be further partitioned into management options in later chapters (Figure 4.2.2).

Figure 4.2.2 – Management Framework



Goals define the aspirations of the community and future direction for management with respect to the environmental, social recreational and economic sustainability and viability of the estuary. For each goal, a series of specific objectives have been defined, which describe the requirements for specific aspects of the estuary, necessary to achieve the goals. Linkages to existing policies, plan documents have been made. Estuary Management statutory framework is detailed in **Appendix D**.

The goals and their related objectives for the Clontarf/Bantry Bay Estuary are presented below. These have been discussed, scrutinized and agreed at the Clontarf/Bantry Bay Estuary Management Working Group meeting dated August 13, 2007.

In general, set goals and objectives relate to the general goal of the NSW State Rivers and Estuaries Policy, 1992, Estuary Management Policy 1992 and management principles described in relevant regional plans (Sydney Regional Environmental Plan – Sydney Harbour Catchment 2005, Sydney Metropolitan Catchment Management Action Plan 2006, Draft Subregional Strategy: North East Subregion, July 2007) and also Manly Local Environmental Plans and different strategy documents (details in Appendix D).

Water Quality & Pollution

1.0	*Goal* **Ensure that the water quality of the estuary is suitable for maintaining healthy natural aquatic ecosystems, and for recreational pursuits**
	Objectives
1.1	Reduce the level of catchment sourced pollutants sufficiently.
1.2	Reduce sewage discharges from sewerage overflows within the catchment
1.3	Reduce litter loads entering the estuary from urban catchment runoff
1.4	Ensure that faecal coliform and enterococci levels at designated bathing areas comply with standard recommendations.
1.5	Reduce volume of storm water through re-use, detention and retention.
1.6	Ensure sustainable use of groundwater.
1.7	Manage storm water outflows to minimize beach erosion and scour.
1.8	Continue water quality and waste management education program

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006), which aims to protect and improve water quality for both natural ecosystem and human use. On a regional scale, these are complementing primary goals of the 'Northern Beaches Stormwater Management Plan' 2003, planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and targets of the Sydney Metro Catchment Management Action Plan 2006. On state level, these objectives complement NSW State Rivers and Estuary Policy 1992.

Aquatic / Inter-tidal Habitat Conservation & Management

2.0	*Goal* **Restore and maintain a healthy and diverse mix of aquatic and intertidal habitats that will maintain and improve biodiversity and ecological functions of the estuary.**

	Objectives
2.1	Preserve existing seagrass beds and encourage the colonisation of suitable areas by improving water quality and reducing sedimentation.
2.2	Eradicate where possible or bring under control all aquatic weed species (including *Caulerpa taxifolia*) from within and around the Middle Harbour.
2.3	Maintain existing mangrove population and investigate possibility of its expansion.
2.4	Ensure all areas of ecological significance are properly protected and conserved.
2.5	Define factors affecting areas of high ecological value and develop and implement measures to address them.
2.6	Improve general awareness of the ecological values of the estuary

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006), which seek to have a positive impact on biodiversity within the study area. On a regional scale, these are complementing planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and targets of the Sydney Metro Catchment Management Action Plan 2006. On state level, these objectives complement NSW State Rivers and Estuary Policy 1992, Estuary Management Policy 1992 and Fisheries Policy & Guidelines: Aquatic Management & Fish Conservation 1998/99.

Bushland / Terrestrial Habitat Conservation & Management

	Goal
3.0	**Protect and enhance urban bush land and native vegetation areas**
	Objectives
3.1	Continue to manage Council's bushland management program.
3.2	Manage bushlands against degradation caused by stormwater outlets.
3.3	Establish native vegetation corridors linking natural bushland areas.
3.4	Rationalise tree plantation programme based on a recommended list of appropriate plant species.
3.5	Encourage and establish community participation in bush regeneration program and in native plants on public and private lands
3.6	Maintain and preserve natural views for residents.

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006), which seeks to have a positive impact on biodiversity within the study area. On a regional scale, these are complementing planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and targets of the Sydney Metro Catchment Management Action Plan 2006. On state level, these objectives complement SEPP19 of EP & A Act 1979 and NSW State Rivers and Estuary Policy 1992.

Sedimentation & Beach Erosion

4.0	*Goal* **Manage erosion and sedimentation to reduce their impact on the natural environment and recreational amenity**
4.1	*Objectives* Generate comprehensive understanding on estuarine sediment transport patterns of the area
4.2	Mitigate foreshore accretion/erosion processes at priority areas.

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006), which target the sustainable management of land within the catchment, and minimising / preventing erosion and associated sedimentation within the study area. On a regional scale, these are complementing planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and targets of the Sydney Metro Catchment Management Action Plan 2006.

Hazards & Risks including Climate Change

5.0	*Goal* **Assess, minimize and mitigate risks from natural hazards including climate change**
5.1	*Objectives* Identify existing and potential hazards and establish mitigation measures
5.2	Consider the potential implications of sea level rise on the estuary and its surrounds as a result of climate change.
5.3	Ensure that potential climate change impacts for Manly are incorporated in Council's strategic planning and management plans.

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006), which seeks to have a positive impact on hazard management within the study area. On state level, these objectives complement NSW Greenhouse Plan (2005) and on Commonwealth level, *Plan for Collaborative Action on Climate Change* (2006).

Estuary Use

6.0	*Goal* **Improve and meet the environmental, socio-economic and recreational needs of estuary use**
6.1	*Objectives* Create safe, sustainable and enjoyable public areas for diverse user groups.
6.2	Encourage boating use including kayaking within the estuary that minimises its social and environmental impact, whilst not compromising the amenity or safety.
6.3	Support sustainable recreational fishing in the estuary
6.4	Minimise user conflict of the estuary by using education programmes

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006). On a regional scale, these are complementing planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. On state level, these objectives complement NSW Estuary Management Policy 1992, Fisheries Policy & Guidelines: Aquatic Management & Fish Conservation 1998/99 and Sydney Metropolitan Strategy 2005.

Access

7.0	*Goal* **Ensure safe public accessibility of waterways, foreshores and other areas of the estuary.**
7.1	*Objectives* Maintain and improve safe public access to all foreshore areas and where possible, create new access.
7.2	Maintain Manly Scenic Walkway regularly and continuously improve its use value
7.3	Increase disabled access (where practically possible) to parks and bays in the study area
7.4	Facilitate dog-walking including possibility of establishing dog off-leash areas.

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988), Social Plan (2004) and Sustainability Strategy (2006). On a regional level, these are complementing visions of the 'Sharing Sydney Harbour Access Plan 2003' and Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

Foreshore infrastructure & facilities

8.0	*Goal* **Improve social amenity through rationalisation of foreshore structures which are sympathetic to social and ecological needs and manage public risks**
8.1	*Objectives* Rationalise mooring places to minimise the impact on ecologically important seagrass beds.
8.2	Assess construction of public boat landing facilities at suitable sites within the study area
8.3	Establish dinghy and kayak storage facilities at suitable locations within the study area
8.4	Maintain and improve usability of public swimming enclosures of the study area
8.5	Better general amenities, traffic and safety at foreshore areas, public reserves and beaches

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006), which target improvement of social amenity through addition and maintenance of foreshore structures within the study area. On a regional scale, these are complementing planning principles of the Boat Storage Policy of Sydney Harbour 2004, Sydney Metropolitan Strategy 2005, and Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

Heritage Conservation

9.0	*Goal* **Ensure that all Aboriginal and European (cultural and natural) heritage areas in the estuary are preserved and protected in consultation with appropriate bodies.**
	Objectives
9.1	Ensure that all 22 sites of Aboriginal heritage significance are properly identified, recorded and protected under the applicable State and Federal legislation.
9.2	Ensure that all sites of non-indigenous heritage are identified and registered under the relevant legislation and in Council planning instruments.
9.3	Increase community awareness of the significance of Aboriginal occupation and European settlements through adequate signage.

These objectives are consistent with aims and objectives of the Council's Local Environmental Plan (1988), Social Plan (2004) and Sustainability Strategy (2006), which target conservation of environmental heritage within the study area. These are also consistent with Aboriginal Heritage Office's Manly Aboriginal Site Plan (2006), Foreshores Aboriginal Heritage Promotion, Sydney Northern Region, Site Conservation: Aboriginal Sites Works Program 2007 and Aboriginal Site Signage Report 2007. On regional scale, these complement planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. On state level, these objectives complement National Parks and Wildlife Act 1974 and NSW Heritage Act 1997.

Monitoring

10.0	*Goal* **Measure the condition and usage of the estuary to gauge the effectiveness of the Estuary Management Plan in achieving its goal and management objectives**
	Objectives
10.1	Develop and implement a Monitoring Program (including key indicators) to assess improved management of the estuary
10.2	Monitor the public usage of Clontarf/Bantry Bay estuary and its surrounds.
10.3	Assess possibility of establishing participatory monitoring by the community
10.4	Evaluate monitoring results to update, refine and revise the Estuary Management Plan.

These objectives are consistent with a number of aims and objectives of the Council's Local Environmental Plan (1988) and Sustainability Strategy (2006) to provide a measure of how well the environmental goals are being achieved through the actions of Council On a regional scale, these are complementing planning principles of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and targets of the Sydney Metro Catchment Management Action Plan 2006.

5. STRATEGIC MANAGEMENT OPTIONS

In chapter 4, issue based goals and objectives have been established. In this chapter, objectives have been translated into specific and strategic management options. Many of these options have been proposed by community during consultation meetings. Some of the proposed options, before implementation, are subject to further consultations with relevant agencies, Precincts and community.

5.1 BASIS FOR DEVELOPMENT OF MANAGEMENT OPTIONS

Management Options have been developed for the Clontarf/Bantry Bay estuary based on a number of principles, which focus on:

- options that require little or no additional out-of-pocket expenditure, with works/actions being done by Council staff, or in-kind contributions from other organisations, volunteers etc;
- innovative ideas and non-standard approaches to natural resource management;
- easy to implement on-ground works;
- options those are scientifically defensible.

5.2 MANAGEMENT OPTIONS

The management options are presented under each of management objectives categorized under key management issues. Brief titles of the options are provided in this Chapter. Detailed descriptions of each of the options are presented in Chapter 6.

1. WATER QUALITY & POLLUTION

Ensure that the water quality of the estuary is suitable for maintaining healthy natural aquatic ecosystems, and for recreational pursuits

With most parts of the Clontarf/Bantry Bay EMP study area being highly urbanised, there is significant pressure placed on water quality health. It is important to note that the Middle Harbour catchment is one large interconnected system. Tidal fluctuations and freshwater flows ensure that water is mixed throughout the estuary, and the pressures placed on the health of the estuary may originate from any part of the greater Sydney Harbour catchment. Conversely though, these flows that mix the water are also extremely effective in flushing the estuary of contaminants after periods of rainfall. Groundwater is also part of the interconnected system and has the risk of salinisation if over extracted.

Anecdotal reports suggest that water quality within Middle Harbour has improved in recent times. However, there is limited data available that supports this anecdotal evidence of improvements in water quality. Pollution is indeed still evident, particularly in times of rain when stormwater transports terrestrial pollutants into the estuary. Stormwater in Clontarf / Sandy Bay area has been cited, during community consultations, as a major problem.

1.1 Reduce the level of catchment sourced pollutants sufficiently.

Six urban sub-catchments exist within the study area. Stormwater from these sub-catchments is a primary source of pollution inflows into the Middle Harbour Estuary. Stormwater directly flows into Middle Harbour, via both artificial stormwater drainage structures and natural creek channels. Installation of GPTs in one of the sub-catchments has resulted in improved water quality. As GPTs are costly, they should be installed based on appropriate management plan, through establishing priorities and combined with other measures.

Management Options:

1.1.1. Formulate comprehensive Stormwater Management Plan for Manly LGA encompassing the study area.
1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf catchment.
1.1.3 Install new Stormwater Quality improvement Devices (SQIDs) at priority locations taking into account current best practice technologies.
1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.

1.2 Reduce sewage discharges from sewerage overflows within the catchment

There are five known designed sewage overflow points in the Clontarf / Bantry Bay catchments currently registered in Manly Council's GIS system. They are often located at intensive human use areas and pose direct health risks. Total number of these point sources within the study area is not known which should be checked with Sydney Water. At the same time, it should be studied if relocations are feasible

Management Options:

1.2.1. Confirm, with Sydney Water, the presence of all sewage overflow points within the Clontarf / Bantry Bay study area including the five known ones.

1.3 Reduce litter loads entering the estuary from urban catchment runoff

High loads of litter and rubbish are usually swept from gutters. However, extent of these loads is unknown. Both litter and rubbish accumulations are highly sporadic, site-specific, and dependent on conditions found locally and on stormwater and sewage network engineering. Pit inserts are a very effective method of capturing gross pollutants

Management Options:

1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from surrounding catchments and identify litter hotspots.
1.3.2. Install pit inserts in litter hotspots throughout the study area.

1.4 Ensure that faecal coliform and enterococci levels at designated bathing areas comply with standard recommendations.

Random grab sampling undertaken for the Spit Bridge Widening Statement of Environment Effects indicated that water quality generally fell within the ANZECC Guidelines recommended for estuarine and marine habitats (GHD, 2003). However, the most comprehensive measured water quality data identified was through the Harbour Watch program. In this program, the two major indicators of bacterial contamination, *faecal coliform* and *enterococci,* are measured at various harbour swimming locations.

Sangrado Bath was registered as the second worst of eight Middle Harbour monitoring locations reported in the 2005-06 Harbour Watch Report, with only 84% compliance with guideline levels of *enterococci*, and 97% compliance with guideline levels of *faecal coliform*, amongst samples taken at the location over the 2005-06 year. Although the exact source of pollution is unknown, this may be due to the designed sewer overflow in the catchment, but requires further monitoring.

Management Options:

1.4. Work with relevant agencies to manage *faecal coliforms* and *enterococci* levels at all three public swimming enclosures.

1.4.2. Investigate possible sources of faecal coliforms and enterococci levels in Sangrado swimming enclosure.

1.5 Reduce volume of storm water through re-use, detention and retention.

Increased community installation of rainwater tanks at an individual residential scale, would greatly reduce the volume of stormwater entering Middle Harbour. This would decrease the proportion of stormwater swept off-site from residential properties, and the capacity of stormwater to transport pollution from residential land-uses into the Middle Harbour estuary. Residential land-uses were estimated to be the greatest source of nutrients and the second-greatest source of heavy metals and sediment in Middle Harbour.

Manly Council would encourage residents to consider installation of residential rainwater tanks as a means to reduce stormwater flows into Middle Harbour, and establish an alternate water source for their gardens and/or properties. Local precincts should be encouraged to facilitate campaign regarding rainwater harvesting. Manly Council has already developed Guidelines on the Installation of Rainwater Tanks.

Management Options:

1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced storm water generation.

1.6 Ensure sustainable use of groundwater.

Recently, groundwater has become an attractive and viable alternate water source for irrigation of public and private land. Manly Council is extracting groundwater for irrigation of Clontarf Reserve. Many properties along the immediate beachfront at Clontarf display signs indicating that they are extracting groundwater for residential irrigation purposes. Due to the close proximity of these bores to the Manly Council bore, it is assumed that they are both accessing water from the same aquifer. Groundwater abstraction, from bores so close to the estuary, can lead to seawater intruding into the freshwater aquifer. This could render the use of the groundwater unsuitable if contaminated by higher salinity. Further research needs to be undertaken on these issues.

Management Options:

1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.

1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.

1.7 Manage storm water outflows to minimize beach erosion and scour.

In the study area, the relatively narrow and steep catchment means that nearly all of the major stormwater pipes extend right to estuary, and discharge either onto the foreshore or directly into the water. The pipes that discharge directly into the water or onto the foreshore, generally pose erosion problems. Some of the pipes direct flows over rock, which provides a stable surface that is not easily eroded, but many of the pipes direct flows over the sandy beaches, which result in erosion. Large volumes of sand are removed from the beach, and often the base of the seawall is also exposed, potentially compromising the integrity of the seawall.

Management Options:

1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.

1.8 Continue water quality and waste management education program

Education campaigns to target behaviour in individual residences have been conducted in the past in many precincts in Manly Council. In particular the Sea Change education program has targeted residents in the major central business district precincts. This is important because the greatest source of TN and TP in many urban areas, including the Clontarf / Bantry Bay Catchments is estimated to be residential land-uses. Residents in the Clontarf / Bantry Bay Catchments play a crucial role in preventing these pollutants from entering the stormwater system, and achieving real improvements in water quality. The Bricks and Water stormwater education program for construction sites has taken place throughout the Manly LGA, including the Clontarf / Bantry Bay study area. This program targets sediment and nutrient runoff from construction sites, which have both been determined as significant pollutants within the study area.

Extension of community stormwater education programs (e.g. - Sea Change) to areas of the Clontarf / Bantry Bay Catchment in the immediate future is relatively simple (compared with more structural engineering treatment solutions.

Management Options:

1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable waste management

1.8.2 Work with residents to implement best practice in storm water management at residential scale.

2. AQUATIC / INTER-TIDAL HABITAT CONSERVATION AND MANAGEMENT

Restore and maintain a healthy and diverse mix of aquatic and intertidal habitats that will maintain and improve biodiversity and ecological functions of the estuary

The key habitat management priority for the study area is to protect habitats of high ecological and estuarine value. It is more cost effective to protect these areas now than to rehabilitate them in the future if habitats are allowed to deteriorate.

2.1 Preserve existing seagrass beds and encourage the colonisation of suitable areas by improving water quality and reducing sedimentation.

The largest seagrass bed is found adjacent to Castle Rock Beach. Clontarf and Sandy Bay also have reasonably large meadows of seagrass. Seagrass is also found in various isolated patches around the shallow foreshores of the upper half of the study area. Anecdotal evidence suggests that Clontarf and Castle Rock have experienced large losses in seagrass. West et al (2004) confirms this and states that large losses of seagrass have occurred inside Middle Harbour adjacent to Grotto Point (the tidal delta) and also at Clontarf. Good water quality is known to enhance growth of seagrass beds.

Under the Fisheries Management Act, 1994, all seagrass is protected, and must not be damaged or collected (DPI, 2007).

Management Options:

2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.

2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water quality and a potential boat exclusion zone

2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.

2.2 Eradicate where possible or bring under control all aquatic weed species (including Caulerpa taxifolia) from within and around the Middle Harbour.

There are weed species (including *Caulerpa taxifolia*) within and around the Clontarf/Bantry Bay estuary, as listed in the Estuary Process Study. *Caulerpa* continues to pose a serious threat to the marine environment within the study area (DPI, 2006).

Caulerpa taxifolia has been declared a Class 1 noxious species in all NSW waters under the Fisheries Management Act 1994. The NSW Government has developed a comprehensive control program for *Caulerpa taxifolia* (NSW Fisheries 2004).

The program includes removing the weed from sale in the aquarium trade, controlling infestations in priority areas and eradicating them where possible, educating the public and restricting the use of fishing gear to help stop the weed spreading.

Management Options:

2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.

2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.

2.3 Maintain existing mangrove population and investigate possibility of its expansion.

The study area has a total of 0.05 ha. of mangroves. The study area used to have much larger mangrove area. Mangroves are extremely important to intertidal ecosystems, as they provide habitat, shelter and a source of food (Lynch & Burchmore, 2006). It is therefore important that not only the remaining population is preserved but also options for any possible expansion investigated. One of the likely possible mangrove expansion sites could be Fisher Bay.

Management Options:

2.3.1. Undertake mangrove maintenance and regeneration activities at existing sites.

2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.

2.4 Ensure all areas of ecological significance are properly protected and conserved

The Clontarf / Bantry Bay estuary supports habitats of regional, state and national conservation value including species and communities listed under different acts. These include: mixed rocky intertidal with sand; sandy beaches; seagrass beds; mangroves and wetlands. Many of these ecologically important habitats are being threatened due to urban development and other external pressures. Moreover, climate change impacts are going to exert additional pressure on these habitats. Already many habitats have been declared as protected areas but enforcement still remains a concern.

Management Options:

2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of legal to voluntary measures.

2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings

2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).

2.5 Define factors affecting areas of high ecological value and develop and implement measures to address them.

Many factors, some less understood, affect habitats of regional, state and national conservation value. Fishing, littering and boating and more importantly introduction of exotic species affect marine habitats. Urban development has probably had the greatest impact on the intertidal and terrestrial environment within the study area.

Losses of habitat from seawall and foreshore modification such as marinas etc have a big impact on intertidal ecology in the study area. Seawalls differ from natural rocky shores in important ways. First, around Sydney, they tend to be steep, often vertical. Second, seawalls have fewer cracks, crevices and overhangs compared to rocky shores and some habitats (e.g. rock pools) are completely missing. The University of Sydney is now testing modified seawalls to restore habitat.

Beach raking is also known to affect habitats of some organisms.

Management Options:

2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.

2.5.2 Initiate studies and surveys to fill data gaps through collaboration MEC and/or Universities.

2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.

2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat

2.6 Improve general awareness of the ecological values of the estuary

People are more inclined to protect ecological areas if they are informed of values and the significance of an area. Educational programs have been conducted previously to improve public awareness.

Management Options:

2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.

3. BUSH LAND / TERRESTRIAL HABITAT CONSERVATION & MANAGEMENT

Protect and enhance urban bush land and native vegetation areas

Bushland reserves occur in a total 18.49 hectares and are scattered throughout the study area. Smaller patches of bushland on both public and private land do exist throughout, and in some places provide corridors between the reserves. Die back is an issue in parts of the study area and results from several factors. Inappropriate fire frequency has also impacted on the terrestrial environment. Fire is important in many aspects of ecosystem functioning, such as seed germination, nutrient cycling and control of species diversity.

Some of the impacts and causes of degradation in urban bushland are:

- increased levels of high nutrient stormwater runoff entering bushland, creating ideal conditions for weed growth
- dumped garden refuse and rubbish.
- altered fire regimes - some native plants rely on fire for regeneration
- urban encroachment on reserves
- the impact of domestic pets on flora and fauna
- poisoning trees for views

The fragmentation of natural bushland areas in Manly has reduced the viability of habitat in many bushland reserves to support populations of native fauna.

3.1 Continue to manage Council's bushland management program.

The State Environmental Planning Policy (SEPP) No. 19 - Bushland in Urban Areas is targeted to protect and preserve bushland within the Greater Sydney area. It also provides for the preparation of management plans for SEPP 19 Bushlands. Reserves within the study area that have been declared under the State Environmental Planning Policy No.19 (SEPP 19) are:

Bushlands with SEPP 19 status

- Castle Circuit Foreshore (4.04ha)
- Pickering Point – partly (0.73 ha)
- Castle Rock to Clontarf Point (1.20 ha)
- Ogilvy Road Reserve (2.47 ha)
- Gurney Reserve (2.52 ha)
- Sangrado Reserve (1.69ha)

Recommended for SEPP 19 status (Skelton 2004)

- Sandy Bay to Ellery's Punt (4.83ha)
- Alder Street Reserve (0.10 ha)
- Cutler Road Lot 5 (0.18ha)
- Weekes Road (0.18ha)
- Rignold Street (0.74ha)

Management Options:

3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.

3.1.2 Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.

3.1.3. Identify adhoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified standard.

3.1.4. Council to continue to be an active participant in the Die-Back Working Group

3.2 Manage bush lands against degradation caused by stormwater outlets.

Impact of high nutrient stormwater on Manly Bushland Reserves was investigated (Skelton et al. 2002). High nutrient loads were found to occur at 14 of 22 sites located all over the study area. It is felt that recommendations of this study are further reviewed based on the present condition.

Management Options:

3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.

3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources

3.3 Establish native vegetation corridors linking natural bushland areas.

Smaller patches of bushland on both public and private land do exist throughout, and in some places provide corridors between the reserves. Skelton et al (2004) noted important corridors between the Castle Circuit foreshore and Pickering Point reserves, and also the Castle Rock to Clontarf Point and Weekes Road reserves. These corridors are extremely important habitat features, and allow for fauna to move throughout the study area and maintain populations.

Management Options:

3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.

3.4 Rationalise tree plantation programme based on a recommended list of appropriate plant species.

Manly Council's policy is to maintain the attractiveness, appeal and amenity of the area by preserving healthy trees in recognition of the value and importance of trees held by the community. Trees play an important part in maintaining the health of our environment, they help to protect soil and water supplies, provide habitat, food, shelter and protection for wildlife. Trees in urban areas act links between core bushland, also known as bushland corridors. Council has a street tree planting program that runs between April to September each year and/or following the street tree maintenance contract works.

Management Options:

3.4.1. Continue and reassess Council's Street Tree Planting Programme within the study area.

3.5 Encourage and establish community participation in bush regeneration program and in native plants on public and private lands

Bush regeneration is the rehabilitation of bushland from a weed infested or otherwise degraded plant community to a healthy community comprised of indigenous plants. Council has an active bush regeneration programme, working to protect and restore Manly's valuable urban bushland assisted by community bushcare volunteers. This unique program is designed to allow residents greater involvement in the care of local bushland through either volunteer work or voluntary financial contribution.

There is *Bush Friendly Neighbour* programme where community are encouraged to participate in creating right environment in private garden by following some simple tips:

- choose native plants that provide food and habitat for native animals
- conserve water by mulching garden and choosing drought tolerant plants
- responsible pet care - keep dogs on a leash and cats indoors at night
- use friendly pesticides and fertilisers - natural deterrents like the native Blue Tongue lizard eliminate pests like snails, slugs and bugs.
- remove weeds from garden or other plants that invade bushland.

Manly Council also publishes a quarterly 'Bushland News'.

Poisoning of trees has often been reported to maintain harbour & estuary view. This can be avoided by undertaking consultations with harbour side residents during bush regeneration.

Management Options:

3.5.1. Continue Community Bush Care Volunteers programme in the study area.

3.5.2. Continue publication of 'Bushland News' and circulate widely in the community.

3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.

3.6 Maintain and preserve natural views for residents.

Views are important for all residents, particularly for harbour side properties. Residents do not like tall trees to obstruct their views of the bay. Cutting, even poisoning of trees have often been reported to maintain harbour & estuary view. This can be avoided by undertaking consultations with harbour side residents during bush regeneration.

Management Options:

3.6.1. Involve Precincts to discuss the issue of view maintenance with property owners.

4. SEDIMENTATION & BEACH EROSION

Manage erosion and sedimentation to reduce their impact on the natural environment and recreational amenity

Sediment processes are extremely complex, with many different factors influencing the sediment budget and movement for any given system. Natural beach systems are not static, and beach erosion and accretion occurs constantly over time. It is mainly the lower reaches of the study area, from Castle Rock Beach to the Spit Bridge, consists largely of unstable sandy shores, with a mixture of marine sand and estuarine mud on the sea floor. The estuary in this section consists of both a shallow sand bar and a deep channel, and is influenced by ocean waves, which, when combined with human pressures, creates a dynamic and ever-changing estuary system.

Only limited information is currently available about sediment processes within the study area, and the major information source (GSE, 1990) is relatively old.

4.1 Generate comprehensive understanding on estuarine sediment transport patterns of the area

The broad issues of sedimentation, sediment movement, beach accretion and erosion in the Castle Rock Beach to Spit Bridge section of the study area are significant issue according to the results of community consultation and findings of the Estuary Process Study (Manly Council 2007). According to some limited research that was undertaken in the early 1980s for Clontarf Marina, it is likely that sediment processes throughout this area are linked.

Hence, a comprehensive study of the entire system needs to take place, to understand the sediment budget and movement throughout the lower reaches of the Middle Harbour estuary. DECC is already undertaking a photogrammetric survey of the study area.

A thorough understanding has implications on several aspects of estuary management.

Management Options:

4.1.1. Carry out a comprehensive study on estuarine sediment transport patterns
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4.2 Mitigate foreshore accretion/ erosion processes at priority areas.

Beach accretion and erosion have been experienced in sections of Clontarf Beach and Sandy Bay with varying degrees of severity, and fluctuations over time. Obvious erosion prone areas have already been identified at 4 different sites. Implement mitigation measures, as appropriate for individual sites.

However, the swimming enclosure at Clontarf Beach is continuously accreting and making the pool virtually unusable. The pool lies directly in the path of the sand transport corridor between the tidal delta and Sandy Bay, and disrupting this natural flow of sand may have undesirable consequences further down the corridor. Similarly, Clontarf Marina also looses navigable depth due to siltation. As the supply of sand is continuous, the enclosure simply fills back up, and the dredging would need to be done regularly to maintain depths. Dredging has been undertaken in the swimming enclosure and also near the Clontarf Marina in the past, and sand returned to the pool in a month (GSE, 1990).

Management Options:

4.2.1. Define and implement mitigation measures for erosion prone sites.

4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.

4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.

5. HAZARDS & RISKS INCLUDING CLIMATE CHANGE

Assess, minimize and mitigate risks from natural hazards including climate change

General hazards affecting the study area include beach erosion, shoreline recession, storms, coastal inundation, slope and cliff instability, water quality. Of these, beach erosion and water quality are being addressed in separate sections. On longer term, risks from tsunami and climate change impacts are also hazards affecting the study area.

In February 2006, the Council of Australian Governments (COAG) announced its *Plan for Collaborative Action on Climate Change* and is now preparing 'National Climate Change Adaptation Framework'. Prior to these, NSW Greenhouse Plan was also released.

Management strategy may include both structural and non-structural measures.

5.1 Identify existing and potential hazards and establish mitigation measures

Although information about general hazards affecting the study area is known, extent of risks is yet to be defined. There are knowledge gaps to fully conceptualize potential hazards and that also prevent to establish possible mitigation measures. However, it is possible to assume certain risk level against each of these hazards and formulate a comprehensive risk management strategy.

These hazards are likely to be exacerbated by the effects of climate change including increases in the frequency and intensity of storms and storm surges.

One of the structural measures against a number of hazards is seawalls. Seawalls are designed to protect properties against storm waves and surge and can act against continual sea level rise as a consequence of climate change. It is important that they are sufficiently stable (Piorewicz, 2007). Total length of seawalls, within the study area, is 2.4km., approximately 46% of the foreshore length. Majority of remaining foreshores are rocky foreshores. This again creates the risk of slope and cliff instability.

Management Options:

5.1.1. Commission a geotechnical study for specific foreshore areas to identify and prioritise risks, and establish risk based management options.

5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.

5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco-friendly sea walls.

5.1.4. Work with SES and other agencies to continuously update Emergency Action Plan including evacuation procedures in the event of storm surges and tsunami.

5.2 Consider the potential implications of sea level rise on the estuary and its surrounds as a result of climate change.

Though impact of sea level rise on the estuary and its surrounds, in general, are well accepted but possible impacts at specific locations are not known. Increased sea level rise will mean that some intertidal areas may be permanently inundated. This is likely to have some flow on effects to existing vegetative communities, estuarine morphology and on a variety of human based infrastructure situated around the estuary. It will also allow for tides to propagate up estuaries to a larger extent and thereby affect existing salinity regimes, which will have impacts on existing vegetative communities. During flood events the ocean surge levels may also be heightened, potentially increasing flood levels and extent.

Potential impacts can, at present, be addressed through appropriate forward planning. Hence, future development and redevelopment at estuary foreshores need to accommodate potential risks. This is particularly pertinent to foreshore structures such as seawalls, boat ramps, swimming enclosures.

Management Options:

5.2.1. Assess impact of climate change on areas of ecological significance and devise adaptive measures.

5.2.2. Work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.

5.2.3. Collaborate with the Sydney Coastal Councils Group/ Macquarie Uni /CSIRO project investigating climate change adaptations in Manly.

5.3 Ensure that potential climate change impacts for Manly are incorporated in Council's strategic planning and management plans.

Concerns for climate change impacts are already acknowledged in many of Manly Council's strategic documents including Manly Sustainability Strategy (2006). However, these concerns are yet to be translated into implementable actions and mainstreamed into Management Plans. Manly LEP and DCPs are yet to accommodate some doable.

Manly Council is in the process of initiating a full review and risk assessment of climate change impacts conducted through a workshop process and review panel. Based on their recommendations, further actions will be undertaken.

Management Options:

5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and national projections

6. ESTUARY USAGE

Improve and meet the environmental, socio-economic and recreational needs of estuary use

The public spaces and waterway within the study area are used extensively for various types of passive and active recreation, with the more easily accessible areas in the lower half of the study area being the most popular. Boating (power and sail), kayaking, rowing, walking, swimming, picnicking, and fishing are all popular activities that are regularly undertaken. Facilities and environment of the estuary and foreshores should be improved in such a way that will encourage enhanced water and land-based use of the estuary.

The estuary use can also be improved by promoting tourism, especially eco-tourism. Nature and heritage of the study area, especially 'Clontarf Reserve – Sandy Bay – Fisher Bay – Ellerys Punt Reserve' has all the elements to develop as 'Eco Corner' of Manly.

6.1 Create safe, sustainable and enjoyable public areas for diverse user groups.

There are number of public reserves, open spaces, play grounds, swimming areas presently being used by different user groups. These areas support passive recreation. Clontarf Reserve is a popular family picnic area. Facilities established in these areas, among others, include toilettes, rubbish bins, BBQ facilities, access paths, parking.

Management Options:

6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.

6.1.2. Install adequate garbage and waste recycling stations in public places.

6.1.3. Liaise with relevant state authorities regarding the consolidation of existing signage with signage more sympathetic to the area.

6.1.4. Promote natural features of 'Clontarf – Sandy Bay – Fisher Bay – Ellery's Punt Reserve' of the study area.

6.2 Encourage boating use including kayaking within the estuary that minimises its social and environmental impacts, whilst not compromising the amenity or safety.

There is overall support of the community to boating and other recreational activities but safety issue is very important. Although Clontarf Beach is used by swimmers and recreational boating in a largely harmonious manner but the community has noted there were a number of usage conflicts and impacts. Boat usage impacts include boat wash impacts on bank stability, impacts of propellers on seagrasses and boat noise impacts on urban areas. All waters at the Spit from Clontarf Point to the Beauty Point are already a no-wash zone.

Boats are not supposed to anchor within a certain number of metres from shore (particularly on a swimming beach). Boats clearly trespass within this limit on a regular basis and smaller boats even anchor on the shoreline posing a very serious safety concern for small children and adults alike. There are also concerns regarding the lack of dedicated passive recreational areas.

Management Options:

6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.

6.2.2. Encourage NSW Maritime to enforce current speed limits and mooring restrictions by increased patrolling.

6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.

6.2.4. Maintain jetski (PWC) ban.

6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment

6.3 Support sustainable recreational fishing in the estuary

Commercial fishing used to be arguably the largest commercial activity undertaken in the study area. However, fishing was banned throughout all of Sydney Harbour for five years, from 10 February 2006 to 9 February 2011, unless sooner amended or revoked (NSW Department of Primary Industries, 2006). The ban was based on the existence of dioxins found in Sydney Harbour fish, due to contaminated sediments at various locations within the harbour. However, recreational fisheries are allowed with restricted dietary implications.

Management Options:

6.3.1. Support continuation of ban on commercial fishing.

6.3.2. Encourage DPI (Fisheries) NSW Health to monitor Dioxin levels in Sydney Harbour waters.

6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag limits, size limits and species types) through NSW Fishcare Program.

6.4 Minimise user conflict of the estuary by using education programmes.

The estuary is being currently used by many groups: bushwalker groups, harbour side restaurants, kayak users, boat and line fishermen, sailboards, water skiers, skiff club children, enclosure swimming, children's playgrounds, harbour side residents, dog owners, recreational picnickers, Northbridge Sailing Club, school groups, seniors, charter ferries. Middle Harbour Yacht Club, the Northbridge Sailing Club/Seaforth Moth Sailing Club and the 16 foot Skiff benefit greatly from the area

Hence, there exist conflicts between different user groups and the impacts that competing user groups have on the environment. The social acceptability and community ownership of this estuary could be improved by promoting harmony among different users. This can be achieved by providing holistic picture of the estuary as well as enhancing knowledge base of each user groups.

Management Options:

6.4.1. Promote community events and education program to achieve sustainable use of the estuary.

7. ACCESS

Ensure safe public accessibility of waterways, foreshores and other areas of the estuary

Access is an important management issue both for people and companion animal. The study area already has well established walkways – Manly Scenic Walkway and Harbour to Hawkesbury Walkway. However, there is limited access to foreshores, especially along foreshores between the Spit Bridge and Castle Crescent. While, there is desire and public support for unhindered access and thoroughfare along whole of foreshores, it is also accepted that there is no practicality in reclaiming sections of foreshores from private owners. Emphasis should be on establishing new access paths including provision of disability access.

7.1 Maintain and improve safe public access to all foreshore areas and where possible, create new access.

People desire unhindered access and thoroughfare along whole of foreshore. However, it is recognised that this is not possible at present due to private residential development. In general, there is adequate public access to foreshores all along from castle rock to the Spit Bridge but there is only three along western part of the Spit Bridge. Many of these existing access paths are narrow, steep and often only staircases but often condition is poor. These are required to be maintained regularly to allow smooth and safe walking.

In addition, there is need to establish new access paths, where possible. One such possibility exists along Battle Boulevard at Seaforth.

Management Options:

7.1.1. Assess and improve safety condition and maintain natural vegetation along existing access paths.

7.2 Maintain Manly Scenic Walkway (MSW) regularly and continuously improve its use value

Manly Scenic Walkway is one of the key attractions of the study area. It is also one of the popular destinations of visitors. This walkway is regularly maintained jointly by the Manly Council and National Parks and Wildlife Services. However, there are often complaints of low maintenance and weeding. Further, in order to keep continuous interest of the walkway, the use value of the walkway needs to be improved. This can be done by

increased signage, creating variations on tracks etc. Signage has recently been upgraded along the Walkway. Where MSW bisects any Aboriginal midden, there is need also to realign MSW or take alternative measures.

Management Options:

7.2.1. Enhance maintenance schedule and retain and enhance the native vegetation along the Manly Scenic Walkway.

7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.

7.2.3. Assess ways to improve use value of the MSW and implement.

7.3 Increase disabled access (where practically possible) to parks and bays in the study area

People (residents) with a disability raised the need for better access ways in the Manly local government area, specially increased disabled access to parks and bays. Disabled access has recently been upgraded in Clontarf reserve, a popular family picnic area.

Management Options:

7.3.1. Audit disability access of all parks and bays within the study area.

7.4 Facilitate dog-walking including possibility of establishing dog off-leash areas.

The issue of companion animals' access is very important. Community is divided both for and against off-leash dog areas on beaches. Dogs are not permitted on any beaches or swimming enclosures within Manly LGA. However, there is demand for declaring at least one of the beach areas as off-leash dog area. Sandy Bay is at present being used, though illegally, as off-leash dog area.

Management Options:

7.4.1. Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flats as dog off-leash area.

7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.

8. FORESHORE INFRASTRUCTURE & FACILITIES

Improve social amenity through rationalisation of foreshore structures which are sympathetic to social and ecological needs and manage public risks

Development of the foreshore has been extensive in the study area. These have gradually changed the natural processes within the area. These alterations have impacted the natural environment, and often with consequences to both humans and the environment.

8.1 Rationalise mooring places to minimize the impact on ecologically important sea grass beds.

The study area is popular and has a number of mooring locations, offering convenient locations in relatively calm and secure conditions. All moorings are licensed by the NSW Maritimes. Moored boats are usually accessed by dinghies that are stored in the area. Moorings in Clontarf encourage boats across shallow areas where there is a reasonable stand of seagrass. Boat propellers act like harvesters on seagrass resulting in

significant damage and dislodgment of seagrass plants and other aquatic flora. Boat anchorage can have a similar effect on aquatic flora.

The NSW Maritimes is currently trialling seagrass friendly moorings in an attempt to minimise the impact of boating on seagrass beds and the aquatic environment. DPI Fisheries is also undertaking an inventory of seagrass in NSW which, once completed, will be included in Waterways' boating maps to assist boats in the avoidance of areas where significant seagrass beds exist and to identify ideal areas for mooring.

Management Options:

8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.

8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings

8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.

8.2 Assess construction of public boat landing facilities at suitable sites within the study area

At present, there is no public pontoon facility within the study area. However, Manly Council has received matching grant from NSW Maritime to construct a floating pontoon at Powder Hulk Bay. In addition, there is community demand for a public pontoon near Clontarf pool because of the increasing popularity of Clontarf as boating area. Besides, there is possibility to develop a boat landing facility at the remnant site of 'Laura Street Wharf' dated 1906 at Seaforth.

Management Options:

8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area.

8.3 Establish dinghy and Kayak storage facilities at suitable locations within the study area

Dinghy storage was identified as a key issue. Historically dinghies have been stored along the foreshore of Sandy Bay, Sangrado and Pickering Point. Many are of the opinion that dinghies should be removed from the foreshore, stored and the area to which they occupy restricted. The extensive number and random storage of dinghies and other boats along the foreshore of the study area impact on the aesthetic and environmental nature of the area. Many of the dinghies are disused, chained to trees in bushland areas and scattered along the study area's foreshore causing erosion as boat owner's access these areas and this is also a safety concern.

Council does not provide alternate dinghy storage facilities anywhere within the study area. However, Council has established formal dinghy storage facilities at Little Manly and Forty Basket.

Currently, it is against Council regulations to store dinghies on the beach and those found to be stored on the beach will be impounded by Council rangers. If a dinghy or other type of watercraft is found to be stored in prohibited areas it is classified as an 'abandoned article'. If the 'abandoned article' is not removed within 21 days of marking, Council will impound it. These regulations are enforced annually. The presence of dinghies along the foreshore has been found to damage tree bark and numerous informal tracks have been formed due to inappropriate dinghy storage and access. It was recommended that alternate dinghy storage be designed such as chain loops or copper posts in designated areas. It was also recommended that chaining boats to trees and dragging them through the bush should be prohibited.

It is recommended that dinghy storage for a maximum number of dinghies (to be determined at a later date) be provided where prior 'written permission' has been obtained by the boat owner from Council (as owner and/or

manager of the land). Written permission would be subject to an agreement between Council and the boat owner. The agreement would state that storage is subject to a 'boat storage fee' charged per annum, that only the designated boat storage areas may be used, and that Council accepts no liability or responsibility for what happens to stored boats and therefore the boat owners would be required to sign a release form.

It is proposed that a maximum number of dinghies be agreed to and that storage and written permission be provided for that number. Craft larger than dinghies such as small yachts and catamarans should not be granted boat storage permission. A waiting list may be required. Should the boat storage area be located on Council owned community land and a boat storage fee proposed, Council's Finance Department would need to be notified in advance in order to include the boat storage fee in the Corporate Management Plan under section 404 of the *Local Government Act 1993*. Should the boat storage area be located on lands subject to the *Crown Land Act 1989*, this proposal would need to be signed off by the Minister responsible for that Act. A separate fund for the boat storage fees may be required.

In determining dinghy storage arrangements in the area, Council should also consult with Clontarf Marina and Seaforth Moth sailing Club for their possible involvement in maintaining and administering dinghy storage facilities for use by those using moorings licensed directly from Waterways. This option should be explored in light of the space limitations within the reserve areas.

Management Options:

8.3.1. Install horizontal dinghy and kayak storage racks at Sandy Bay in consultation with nearby residents and dinghy owners.

8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore

8.4 Maintain and improve usability of public swimming enclosures of the study area

There are three swimming enclosures within the study area and all are important for family recreation. All these structures require maintenance, especially cleaning and/or replacement of nets. Sangrado pool is unusable because of oysters and pollution. Clontarf pool needs dredging or even relocation. However, any upgrading is restricted or prohibited as these are heritage listed. On the other hand, if nothing is done, these swimming enclosures will not be used.

Management Options:

8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.

8.5 Better general amenities, traffic and safety at foreshore areas, public reserves and beaches

Public reserves and beaches in the study area including Clontarf Reserve are used extensively year round for many purposes. It is important that taps, bubblers, shade, rain shelters, rails on steps, telephones, toilets, accessible toilets / showers / seating / pathways / parking / ramps / rails are maintained routinely. Graffiti on sewer structure and public toilets is a problem. Though crime is not a significant issue, vandalism to facilities is problem. Traffic management of the area needs a further review.

Management Options:

8.5.1. Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations

8.5.2 Improve and facilitate traffic management around public reserves and beaches

8.5.3 Ensure safety and crime prevention in public areas

9. HERITAGE CONSERVATION

Ensure that all Aboriginal and European (cultural and natural) heritage areas in the estuary are preserved and protected in consultation with appropriate bodies.

The entire Clontarf / Bantry Bay study area was used extensively by the Aboriginals, known locally as the Gayemal clan of the Guringai tribe, who spent much of their time on the foreshores of Sydney Harbour (Aboriginal Heritage Office, 2007). The oldest Aboriginal site known in the Manly LGA is dated to about 4100 years before present' although it is expected that older sites will be discovered. There are 22 known Aboriginal sites in the study area and it is considered to have high potential for further unrecorded sites. Therefore, seemingly unused shelters and vantage points will actually contain archaeological evidence of past Aboriginal occupation. These and other landscapes have cultural significance for generations of Aboriginal people and make up an important part of Australia's heritage.

However, the entire study area has been populated by Europeans immediately after European settlement in 1788. Areas such as Clontarf became popular destinations for day trips by boat, and people would arrive from throughout Sydney to enjoy the Harbour front venue. Hence, area around the Spit Bridge bears a number of European heritages: reserved track for trams, former bridge, vehicular ferry ramp, tram terminus and wharf for tram punt, monument etc. Lists are presented in Tables 2.8.2 and 2.8.3 of the Estuary Process Study (Manly Council 2007).

9.1 Ensure that all 22 sites of Aboriginal heritage significance are properly identified, recorded and protected under the applicable State and Federal legislation.

There are a significant number of Aboriginal heritage items and areas within the bounds of the estuary. These sites need to be protected. Aboriginal people are the cultural owners and managers of information relating to their heritage. Information relating to Aboriginal history and heritage provided by members of any Aboriginal community must be treated with respect for the informant, and any agreement regarding access and/or confidentiality should be honoured.

The Aboriginal Heritage office has recorded 11 shelters with middens and five open middens within the study area (AHO 2006). Many middens are situated in rock shelters, reflective of relative abundance of cavernous overhangs to the shoreline. Middens are observed to be of varying size and length. Most midden sites are within 200 meters of a water supply. Within the study area, middens are located in Castle circuit, Pickering point, Sangrado and in Fisher Bay.

Many midden sites have been destroyed by European land uses, with substantial destruction in the early years of colonisation when middens were exploited as a source of lime (NSW Fisheries 2001).

The involvement of the local Aboriginal community and Metropolitan Local Aboriginal Lands Council is important for Aboriginal heritage management. Aboriginal people are the rightful owners of Aboriginal heritage and the DECC who enforce the National Parks and Wildlife Authority (DECC) Act 1973, its regulations and guidelines recognise that Aboriginal people should be consulted in matters relating to management plans and interpretation of places, sites and landscapes.

Manly Council, as joint initiative among seven councils, has established the 'Aboriginal Heritage Office (AHO)' in a progressive move to protect Aboriginal Heritage in these areas. The office has prepared three volumes Aboriginal Site Management Report for Manly Council (2006). As information about some places is restricted by cultural protocols and relevant legislative regulations (*NSW Heritage Office* guidelines, *NPWS Act* and Aboriginal Heritage Information Management System database: *AHIMS*), the information offered must not be made public.

Aboriginal Heritage Management

The most succinct recommendation attached to *ad hoc* Aboriginal heritage management is "When in doubt, don't!"

Any Aboriginal conservation works must be undertaken with the full co-operation and consent of the Metropolitan Local Aboriginal Lands Council. Bush regeneration works must be undertaken only after advice from Council's Aboriginal Heritage Officer who is available to conduct a field assessment.

Where there are grassed surfaces adjacent then the management practice should include periodic slashing in favour of mowing, tilling or planting of large shrubs or trees. This method means that sites are not interfered with and that sufficient flora exists to retain stormwater and prevent erosion and movement of material down slope.

Retention of sufficient vegetation over a deposit site is a prerequisite for preventing stormwater erosion or movement of deposit down slope. Many sites have only several centimetres of soil or vegetation protection and the retention of five to ten metres of cartilage protects sites from the majority of stormwater events.

Management Options:

9.1.1 Review Aboriginal Site Management Report for Manly Council (2006) and associated reports and associated reports to prioritize management needs and develop a plan of implementation.

9.1.2. Prevent further damage to Aboriginal middens in critical condition.

9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.

9.1.4. Develop management guidelines for sites that are located within private properties.

9.2 Ensure that all sites of non-indigenous heritage are identified, registered and protected under the relevant legislation and in Council planning instruments.

There are a significant number of European cultural heritage items and areas within the bounds of the estuary. These sites should be protected according to their level of significance. Many sites are already listed in Manly Council's LEP, NSW State Heritage Inventory and Register and other heritage registers. However, sites and items of significance are increasing as new studies are completed and time goes on. It is important that due care is taken to avoid damage to known cultural sites and sites that may be culturally significant.

There is one site 'Laura Street Wharf' that dates back to 1906 but has not been individually listed as heritage item. This site deserves a review for listed as heritage item.

Management Options:

9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.

9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.

9.2.3. Ensure physical protection and maintenance of all heritage listed items.

9.2.4. Explore feasibility of restoring a small part of old tram line near the Spit Bridge to signify historical past.

9.3 Increase community awareness of the significance of Aboriginal occupation and European settlements through adequate signage.

The Sydney Basin is one of the richest areas in Australia in terms of Aboriginal & European archaeological sites (Sullivan 1982). These sites are living history. Because of lack of knowledge/information, people are not aware of the value of historical past. There is also great scientific value in these sites. By studying the shells, stones and bones, one can learn a great deal about past environments, plants and animals, tools used and their survival strategy. An informed population will be more careful in preserving its heritage. Signage of a site is one of the approaches followed in creating community awareness.

Management Options:

9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children

9.3.2. Place appropriate interpretative signage on key Aboriginal heritage sites.

10. MONITORING

Measure the condition and usage of the estuary to gauge the effectiveness of the Estuary Management Plan in achieving its goal and management objectives

Monitoring is a critical component of estuary management. When used for management purposes, monitoring provides an on-going picture of the health and response of the estuary, e.g. water quality levels, species and numbers of fauna, area and productivity of seagrass beds etc. Estuarine monitoring programs can be involved and quite expensive. Hence to obtain the best value from monitoring program, monitoring objectives have to be carefully defined. Further, monitoring results need to be continuously reviewed during the program to facilitate program modification, if needed. Data compiled in the Estuary Processes Study provides the baseline for subsequent monitoring.

10.1 Develop and implement a Monitoring Program (including key indicators) to assess improved management of the estuary

An Ecosystem Health Assessment Report Card has been presented in the Estuary Process Study providing qualitative information. For many of the indicators, there exists no data. A structured monitoring program is important for any management programme.

Management Options:

10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.

10.1.2. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.

10.2 Monitor the public usage of Clontarf/Bantry Bay estuary and its surrounds.

The public spaces and waterway within the study area are used extensively for various types of passive and active recreation, with the more easily accessible areas in the lower half of the study area being the most popular. Boating (power and sail), kayaking, rowing, walking, swimming, picnicking, and fishing are all popular activities that are regularly undertaken.

From a community survey, a qualitative assessment of usage of the estuary is available. User monitoring should be initiated to understand the extent, trend, frequency and period of use, public usage of the estuary should be monitored.

Management Options:
10.2.1. Monitor use of the Manly Scenic Walkway.
10.2.2. Monitor use of waterways at different points of the estuary.
10.2.3. Monitor use of public reserves and dog exercise areas.

10.3 Assess possibility of establishing participatory monitoring by the community

Residents within the catchment of Clontarf/Bantry Bay estuary are environmentally conscious and have knowledge of the importance of the environmental values of the study nature. They participate in many nature conservation activities. Some may be interested in physical and ecological monitoring of the estuary and wish to participate in a monitoring program established under this management plan. This sort of participatory monitoring will enable residents also to protect, maintain and enhance the environment. Manly Environment Centre can facilitate community participation in monitoring.

Management Options:
10.3.1. Establish participatory monitoring and encourage community participation

10.4 Evaluate monitoring results to update, refine and revise the Estuary Management Plan.

Management Options:
10.4.1. Review monitoring results and revise/update management options.

5.3 INITIAL ASSESSMENT OF MANAGEMENT OPTIONS

An initial assessment of all management options has been made against the following factors to determine their overall potential for implementation:

- Cost;
- Effectiveness to achieving objectives; and
- Likely acceptance by the community and the implementers.

For this preliminary assessment, the factors were simplified into High, Medium and Low categories.

With regard to **cost**, high costs are typically more than $50,000, medium costs are between $10,000 and $50,000, while low costs are less than $10,000. Many low cost options actually have minimal expenditure, as these options would be implemented by existing staff as part of normal duties.

The **effectiveness** of each option was assessed based on how well the option addresses the objectives and issues associated with Clontarf/Bantry Bay estuary. Options that addressed only one or two objectives were considered to have low overall effectiveness, options that addressed only three or four objectives were considered to have medium overall effectiveness, while options that addressed > four objectives were considered to have high effectiveness. The relationship between management objectives and management options is presented in **Appendix E**.

The **acceptance** of the options by the community and the implementers was made subjectively by the study team. Of importance to this factor is the relative difference in acceptable between the various management options. If considered necessary, the acceptance grading can be changed prior to finalisation of this document based on comments received on the draft report.

The assessment of individual factors was then combined to give an overall score as the suitability for implementation. For ease of interpretation, a star rating has been used, ranging from 1 star for low overall value to 6 stars for high overall value.

Table 5.3 presents a summary of the assessment of all management options against these factors.

Table 5.3: Initial assessment of management options

Management Options	Indicative Cost	Effective-ness	Accept-ability	Overall
Water Quality & Pollution				
1.1.1. Formulate comprehensive Stormwater Management Plan for Manly LGA encompassing the study area.	M	H	H	*** **
1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf catchment.	L	M	H	*** **
1.1.3. Install new Stormwater Quality improvement Devices (SQIDs) at priority locations taking into account current best practice technologies.	H	M	H	***
1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.	L	M	H	*** ***
1.2.1. Confirm, with Sydney Water, the presence of all sewerage overflow points within the Clontarf / Bantry Bay study area including the five known ones.	L	H	H	*** **
1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from the Clontarf / Bantry Bay catchments and identify litter hotspots.	L	M	M	*** *
1.3.2. Install pit inserts in litter hotspots throughout the study area.	M	L	M	***
1.4.1. Work with relevant agencies to manage *faecal coliforms* and *enterococci* levels at all three public swimming enclosures.	L	H	H	*** ***
1.4.2. Investigate possible sources of high faecal coliforms and enterococci levels in Sangrado swimming enclosure.	L	M	M	*** *
1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced storm water generation.	M	M	H	*** *
1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.	M	L	M	**
1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.	L	L	M	***
1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.	L	M	M	*** *
1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable waste management	L	L	M	***
1.8.2 Work with residents to implement best practices in storm water management at residential scale.	L	M	H	*** **
Aquatic / Inter-tidal Habitat Conservation & Management				
2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.	M	M	M	***

Management Options	Indicative Cost	Effective-ness	Accept-ability	Overall
2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water quality and a potential boat exclusion zone	L	H	M	*** **
2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.	L	M	M	*** *
2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.	L	L	L	**
2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.	M	L	H	***
2.3.1. Undertake mangrove maintenance and regeneration activities at existing sites.	L	M	M	*** *
2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.	M	L	H	***
2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of legal to voluntary measures.	L	H	M	*** **
2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings	L	L	M	***
2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).	L	M	M	*** *
2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.	L	L	L	**
2.5.2 Initiate studies and surveys to fill data gaps through collaboration MEC and/or Universities.	M	L	M	**
2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.	L	L	M	***
2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat	L	L	L	**
2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.	M	M	M	***
Bushland / Terrestrial Habitat Conservation & Management				
3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.	M	H	L	***
3.1.2. Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.	M	L	L	*
3.1.3. Identify adhoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified standard.	L	M	H	*** **
3.1.4. Council to continue to be an active participant in the Die-Back Working Group	L	L	L	**
3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.	L	L	L	**
3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources.	M	L	M	**

Management Options	Indicative Cost	Effective-ness	Accept-ability	Overall
3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.	L	L	M	***
3.4.1. Continue and reassess Council's Street Tree Planting Programme within the study area.	L	L	M	***
3.5.1. Continue Community Bush Care Volunteers programme in the study area.	L	M	M	*** *
3.5.2. Continue publication of 'Bushland News' and circulate widely in the community	L	L	M	***
3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.	M	L	M	***
3.6.1. Involve Precincts to discuss the issue of view maintenance with property owners.	L	L	H	*** *
Sedimentation & Beach Erosion				
4.1.1. Carry out a comprehensive study on estuarine sediment transport patterns	M	L	L	*
4.2.1. Define and implement mitigation measures for erosion prone sites.	H	L	H	**
4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.	H	M	H	***
4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.	H	M	M	**
Hazards & Risks including Climate Change				
5.1.1. Commission a geotechnical study for specific sections of foreshore areas to identify and prioritise risks, and establish risk based management options.	H	M	M	**
5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.	L	M	L	***
5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco-friendly sea walls.	H	M	M	**
5.1.4. Work with SES and other agencies to continuously update Emergency Action Plan including evacuation procedures in the event of storm surges and tsunami.	L	M	H	*** **
5.2.1. Assess impact of climate change on areas of ecological significance and devise adaptive measures	L	H	M	*** **
5.2.2. Work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.	H	L	M	*
5.2.3. Collaborate with the Sydney Coastal Councils Group/ Macquarie Uni /CSIRO project investigating climate change adaptations in Manly.	M	L	H	***
5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and national projections	L	L	H	*** *
Estuary Use				
6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.	L	M	H	*** **
6.1.2. Install adequate garbage and waste recycling stations in public places.	M	M	H	*** *
6.1.3. Liaise with relevant state authorities regarding the consolidation of existing signage with signage more sympathetic to the area.	M	H	L	***

Management Options	Indicative Cost	Effective-ness	Accept-ability	Overall
6.1.4. Promote natural features of 'Clontarf – Sandy Bay – Fisher Bay – Ellery's Punt Reserve' of the study area.	L	M	M	*** *
6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.	L	L	H	*** *
6.2.2. Encourage NSW Maritime to enforce current speed limits and mooring restrictions by increased patrolling.	L	L	H	*** *
6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.	L	L	H	*** *
6.2.4. Maintain jetski (PWC) ban.	L	L	H	*** *
6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment.	L	L	M	***
6.3.1. Support continuation of ban on commercial fishing.	L	M	M	*** *
6.3.2. Encourage DPI (Fisheries) & NSW Health to monitor Dioxin levels in Sydney waters.	L	M	M	*** *
6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag limits, size limits and species types) through NSW Fishcare Program	M	M	H	*** *
6.4.1. Promote community events and education program to achieve sustainable use of the estuary.	L	H	M	*** **
Access				
7.1.1. Assess and improve safety condition and maintain natural vegetation along existing access paths.	L	M	H	*** **
7.2.1. Enhance maintenance schedule and retain and enhance the native vegetation along the Manly Scenic Walkway.	L	M	M	*** *
7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.	M	L	H	***
7.2.3. Assess ways to improve use value of the MSW and implement.	L	M	M	*** *
7.3.1. Audit disability access of all parks and bays within the study area.	L	L	M	***
7.4.1. Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flat as off-leash dog area.	L	M	M	*** *
7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.	M	M	H	*** *
Foreshore Infrastructure & facilities				
8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.	L	H	M	*** **
8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings	M	L	H	***
8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.	L	L	H	*** *
8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area & specify alternative locations.	M	M	H	*** *
8.3.1. Install horizontal dinghy and kayak storage racks at Sandy Bay in consultation with nearby residents and dinghy owners.	H	L	H	**
8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore	L	L	H	*** *
8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.	H	L	H	**

Management Options	Indicative Cost	Effective-ness	Accept-ability	Overall
8.5.1 Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations	H	M	H	***
8.5.2 Improve and facilitate traffic management around public reserves and beaches	M	M	H	*** *
8.5.3 Ensure safety and crime prevention in public areas	M	M	H	*** *
Heritage Conservation				
9.1.1 Review Aboriginal Site Management Report for Manly Council (2006) and associated reports to prioritize management needs and develop a plan of implementation.	L	L	M	***
9.1.2. Prevent further damage to Aboriginal middens in critical condition.	M	L	H	***
9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.	L	M	M	*** *
9.1.4. Develop management guidelines for sites that are located within private properties.	L	L	M	***
9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.	L	L	H	*** *
9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.	L	L	M	***
9.2.3. Ensure physical protection and maintenance of all heritage listed items.	M	L	H	***
9.2.4. Explore feasibility of restoring a small part of old tram line near the Spit Bridge to signify historical past.	H	M	L	*
9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children	L	L	M	***
9.3.2. Place appropriate interpretative signage on key Aboriginal sites.	L	L	M	***
Monitoring				
10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.	L	M	M	*** *
10.1.2. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.	H	H	H	*** *
10.2.1. Monitor use of Manly Scenic Walkway.	L	L	M	***
10.2.2. Monitor use of waterways at different points of the estuary.	L	H	L	*** *
10.2.3. Monitor use of public reserves and dog exercise areas.	L	M	L	***
10.3.1. Establish participatory monitoring and encourage community participation	L	H	H	*** ***
10.4.1. Review monitoring results and revise/update management options.	M	M	M	***

6. DESCRIPTION OF STRATEGIC MANAGEMENT OPTIONS

Each of the management options are elaborated in this chapter with a description of context, actions, performance target, indicative costs, time frame and responsible agency (ies).

With regard to **indicative cost**, high costs are typically more than $50,000, medium costs are between $10,000 and $50,000, while low costs are less than $10,000. Many low cost options actually have minimal expenditure, as these options would be implemented by existing staff as part of normal duties.

Timeframe for Implementation: The Estuary Management Plan (once completed and adopted) will be reviewed regularly (in the course of preparing Council's Management Plan) and updated periodically. Therefore, it has been tentatively described as:

Continued - to be implemented as part of on-going program
Immediate - to be implemented shortly after adoption of the EMP
Short term – to be implemented within 2 years of adoption of the EMP
Medium term – to be implemented within 3-4 years after adoption of the EMP
Long term - to be implemented within year 5 and beyond after adoption of the EMP

Responsibilities: Agencies and respective branches with Manly Council responsible for implementing the option have been indicated. A brief description of Agencies and their mandates has been presented in **Appendix E.**

Attributes such as performance targets, indicative costs, time frame and responsible agencies for each of the management options have also been summarised in Table 6.11.

6.1 OPTIONS ADDRESSING WATER QUALITY & POLLUTION

1.1.1. Formulate comprehensive Stormwater Management Plan for Manly LGA encompassing the study area.

Context: *This option involves formulation of a comprehensive Stormwater Management Plan for the study area. The Plan should contain detailed information on existing catchment conditions, stormwater management objectives, existing stormwater management, potential stormwater management options, evaluation of management options, adopted management plan and implementation. Community consultation is an important requirement in developing this plan.*

Recommendations from Middle Harbour Catchment Stormwater Management Plan (Willing & Partners 1999) and Northern Beaches Stormwater Management Plan (Patterson Britton & Partners 1999) will be reviewed. However, Manly Council has conducted a stormwater quality desktop study (MC 2006) including a modeling considering six sub-catchments within the study area. This report has been appended in the Clontarf/Bantry Bay Estuary Processes Study. These reports provide basic information in formulation of the Management Plan.

Actions:

- *Review earlier Management Plans & recent modelling study*
- *Carry out a community consultation program*
- *Rerun the model with latest available data*
- *Liaise with the Sydney Water*
- *Formulation of the Report*

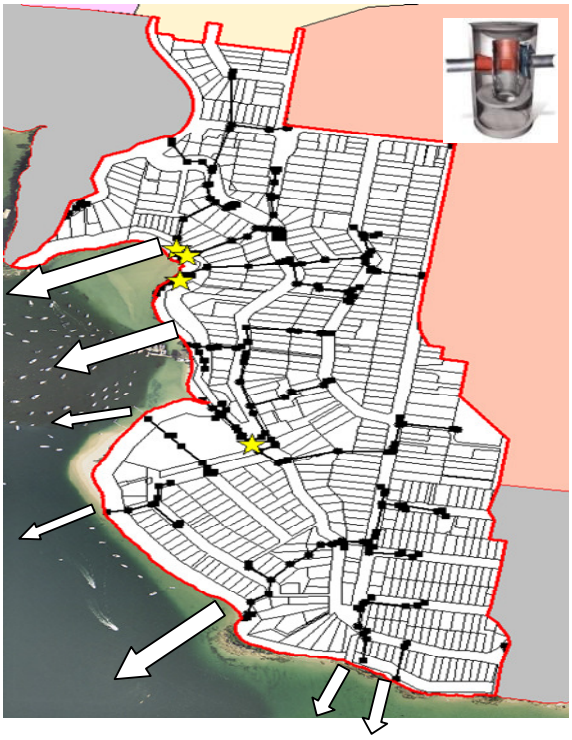
Advantages: *Provides a holistic approach to stormwater management of the area. The report will provide more structured and prioritized actions considering all options. The Plan contributes in cost savings for piecemeal efforts.*

Disadvantages: *Plan preparation is time consuming, costly. Value of the Plan is lost if not implemented readily.*

Objectives addressed: 1.1 , *1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 3.2, 6.1, 10.2, 10.4*
Performance Target: *Management plan completed*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Natural Resources*

1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf sub-catchment.

Context: *Four Gross Pollutant Traps (GPTs) are currently installed in the Clontarf sub-catchments. These capture gross pollution and litter, sediment, and a limited percentage of nutrients and metals present in stormwater, improving the quality of catchment-generated stormwater entering Middle Harbour. All four GPTs are located near the popular swimming and recreation area.*



GPTs are currently inspected immediately after heavy rainfall (following 20 mm or greater) and routinely once every 8 weeks. This routine has proved to be efficient and is carried out to remove pollutants re-captured from stormwater, minimising pollutant decomposition, and minimising re-suspension of pollutants into Middle Harbour. Scientific research has demonstrated GPTs to be capable of capturing on average 23% of nutrients and metals, and 56% of sediment in stormwater generated in the catchments.

Actions: *The option involves continuation of present maintenance schedule*

Advantages: This option would result in a reduction of pollutants (including nutrients, sediment and bacteria) entering the estuary from catchment sources. This would improve the overall water quality of the estuary, particularly in the Clontarf sub-catchment and would provide a more healthy aquatic habitat and recreational amenity.
Disadvantages: *Higher cost*

Objectives addressed: 1.1, *1.3, 6.1*
Performance Target: *Efficient GPT maintenance*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Natural Resources*

1.1.3. Install new Stormwater Quality Improvement Devices (SQIDs) at priority sub-catchments taking into account current best practice technologies.

Context: *All six sub-catchments within the study area drain directly into the waters of Middle Harbour. Manly Council is committed to contribute to improving stormwater quality to protect the health of harbour waterways. Council has already installed 4 GPTs at one of the sub-catchments, Clontarf.*

At present, there is community demand to install Stormwater Quality Improvement Devices (SQIDs) also at other sub-catchments. It is desired that decision of new SQIDs is based on current best practice technologies.

Two sub-catchments, Sangrado and/or the Spit, are proposed as priority sub-catchments for installations of new SQIDs though no funding is available at this stage.

Actions:

- *Assess current best practice technologies*
- *Assess locations at proposed priority sub-catchments*
- *Install SQIDs based on available funding resource.*
- *Liaise with Sydney Water.*

Advantages: *Installing new SQIDs within the catchment would significantly reduce the catchment-based pollutant loads to the estuary. As the water quality of the estuary is largely dependent on the quality of the catchment runoff, significant improvements to the estuary water quality could be expected. This would in turn improve the aquatic habitat, possibly resulting in more abundant or diverse aquatic fauna. Improved water quality would also increase the recreational amenity of the estuary.*
Disadvantages: *Increased cost; cannot be implemented if funding is not secured.*

Objectives addressed: 1.1 , *3.2, 6.1*
Performance Target: *SQIDs installed*
Indicative Cost: *High*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Natural Resources & Urban Services*

1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.

Context: *Street sweeping is currently conducted in the six Clontarf / Bantry Bay catchments at a frequency of at least once of every twelve weeks, in each catchment. Street sweeping has been shown through scientific research to capture large loads of sediment, gross pollution, nutrient and metal loads throughout the Manly LGA. Scientific research in other areas of the Manly LGA has also demonstrated street sweeping to be capable of capturing on average 27% of sediment and 14% of nutrients and heavy metals in stormwater.*

It is suggested that this routine sweeping practice is dispensed for target oriented approach, i.e. higher frequency of sweeping in areas that generate larger loads of sediments and pollutants, for example near shops.

Actions:

- *Assess loads of sediment and pollutant generation per unit area by sub-catchments*
- *Identify priority rankings of sub-catchments*
- *Reschedule sweeping frequency between sub-catchments targeting priority areas*
- *Review schedule and frequency of street sweeping periodically*

Objectives addressed: 1.1, *1.3, 6.1*
Performance Target: *Sweeping rescheduled targeting priority areas*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Civic Services & Natural Resources*

1.2.1. Confirm, with Sydney Water, the presence of all sewerage overflow points within the Clontarf / Bantry Bay study area including the five known ones.

Context: *There are five known designed sewage overflow points in the Clontarf / Bantry Bay Catchments currently registered in Manly Council's GIS system. It is not known whether there are other sewage overflow points. No survey has been undertaken to detect all sewage overflow points within the study area. It is also not known what extent these overflows contribute to bacterial load in water within the estuary. High bacterial loads to the estuary, particularly during rainfall events, are currently causing pollution. Water quality near Sangrado enclosure is affected by bacterial contamination from sewage overflows.*

Overflow No.	*Catchment*	*Address*	*Location*	*Suburb*
SN436OF01	*Bligh Crescent*	*Bligh Cr.*	*In-road*	*Seaforth*
SMSE1OF02	*Sangrado Street*	*Sangrado St.*	*Bush-NP*	*Seaforth*
SMSE1OF01	*The Spit*	*Battle Bvd*	*Private*	*Seaforth*
SMCL5OF01	*Clontarf*	*Amiens Rd/Holmes Ave*	*In-road*	*Clontarf*
SMCL5OF02	*Castle Rock Reserve*	*Ogilvy/Weekes Rd*		*Clontarf*

Actions:

- *Liaise with Sydney Water to identify all designed sewage overflow points.*
- *Check out other overflow hot spots such as leaks*
- *Map additional points, if any, on Manly Council's GIS system.*

Advantages: Although this option, which involves discussions with Sydney Water, would not have any direct impacts on the existing conditions, it could initiate works by Sydney Water that would result in a reduction of pollutant loads to the estuary.
Disadvantages: -

Objectives addressed: *1.1,* ***1.2,*** *1.4, 3.2, 8.4*
Performance Target: *All overflow points known and mapped*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Sydney Water, Manly Council – Natural Resources*

1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from surrounding catchments and identify litter hotspots.

Context: *Stormwater from the Clontarf / Bantry Bay Catchments is also likely to transport high loads of litter and rubbish swept from gutters. However, both litter and rubbish accumulation; are highly sporadic, site-specific, and dependent on conditions found locally and on stormwater and sewage network engineering. This requires direct on-site monitoring in particular locations.*

Actions: *The option involves a litter survey to identify litter hotspots.*

Advantages: *Identification of hotspots will facilitate targeted measures to contain litter load reaching the estuary*
Disadvantages: *Value of the survey is lost if not implemented readily.*

Objectives addressed: *1.1,* ***1.3,*** *1.8, 6.1*
Performance Target: *Survey completed*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – CEP & Natural Resources*

1.3.2. Install pit inserts in litter hotspots throughout the study area.

Context: *Pit inserts are a very effective method of capturing gross pollutants before they enter the stormwater system and receiving waterways. Consisting of a fine mesh, they can be installed inside stormwater pits throughout each catchment to filter gross pollutants before they enter the stormwater system, where they will become more difficult and costly to treat. The captured pollutants are stored in the mesh in a dry state, and their location at street level means that pollutants are easily removed.*

Actions:

- *Install pit inserts into selected stormwater pits.*
- *Monitor their performance and analyse cost and ease of maintenance*
- *If successful, install pit inserts in litter hotspots*

Advantages: *Pit inserts are also relatively cheap to install compared to other engineering methods of stormwater treatment, although the limited storage of each unit means that they need to be installed at many locations throughout each catchment.*
Disadvantages: *Pit inserts require regular ongoing maintenance, as their effectiveness means that they can fill quickly during a storm event and contribute to the chance of localised flooding.*

Objectives addressed: *1.1,* ***1.3***
Performance Target: *Pit inserts tried & installed in hotspots*
Indicative Cost: *Medium*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Urban Services*

1.4.1. Work with relevant agencies to manage *faecal coliforms* and *enterococci* levels at all three public swimming enclosures.

Context: *The Harbourwatch Program was established in November 1994 to monitor and report on water quality in the harbour, bay and estuarine swimming areas of Sydney. The Harbourwatch Program monitors and reports on water quality at 59 swimming sites including all three public swimming enclosures within the study area. Beachwatch staff collects water samples at all sites every sixth day in accordance with NHMRC (1990) guidelines for recreational use of water. All samples are transported to one laboratory for microbiological analysis.*

There is designed sewage overflows located near the three public swimming enclosures within the study area. It is desired that these overflows are redirected elsewhere to contribute to improved water quality in swimming enclosures.

Actions:

- *Collaborate with Harbourwatch Program to obtain regular water quality data.*
- *Inform the community about trends in water pollution at these swimming enclosure sites.*
- *Install cautionary signage, if needed*
- *Liaise, through Sydney Water-Manly Council Partnership, to discuss possible redirection of designed overflow points away from public swimming enclosures*
- *Investigate the possibility of removing stormwater pipe draining into Clontarf pool*

Advantages: *This option would provide valuable information on the water quality of the estuary in general and around public swimming pools in particular. This option is essential to measure any changes in water quality that could be the result of the implementation of other management options.*
Disadvantages:-

Objectives addressed: 1.4 , *6.1, 8.4, 10.1, 10.2, 10.3*
Performance Target: *Bacterial contamination managed & water quality improved*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Harbour Watch, Sydney Water, Manly Council – Natural Resources*

1.4.2. Investigate possible sources of high faecal coliforms and enterococci levels in Sangrado Swimming Enclosure.

Context: *Sangrado Baths is clearly the worst polluted swimming enclosure of the three within the study area and has a history of bacterial contamination. It did have 100% compliance with faecal coliform guidelines for two years between 1999 and 2007, but in all of the other years its compliance was lower than the other sites. Compliance with enterococci guidelines was much worse, with only three years between 1999 and 2007 above 80% compliance, and one year below 30% compliance.*

Sangrado Baths lies downstream of Gurney Crescent, and should theoretically be expected to similar or better water quality than Gurney Crescent. The fact that it doesn't may indicate a localised point source of pollution, most likely a sewage leak or overflow.

In fact, one of the five known designed sewer overflow point is just located near the bath.

Action: *The option involves preparing a report finding the source of high faecal coliforms and enterococci levels and suggesting remedial measures.*

The issue was raised at the Sydney Water-Manly Council Partnership meeting on 27 September 2007. Sydney Water has committed to look into the matter and submit a report shortly.

Advantages: *Identification of possible source facilitates correct mitigation measures*
Disadvantages: -

Objectives addressed: 1.4 , *6.1, 8.4*
Performance Target: *Investigation Report*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Sydney Water, Manly Council – Natural Resources*

1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced storm water generation.

Context: *Increased community installation of rainwater tanks at an individual residential scale, would greatly reduce the volume of stormwater entering Middle Harbour, through disconnecting the large roof areas of residential properties' from the stormwater network. This would decrease the proportion of stormwater swept off-site from residential properties, and the capacity of stormwater to enter in and transport pollution into the Middle Harbour estuary. In particular it would also decrease the pollution load from residential land-uses in the catchment through containing nutrient and other pollution on-site. Residential land-uses were estimated to be the greatest source of nutrients and the second-greatest source of heavy metals and sediment in Middle Harbour. Further, installation of rainwater tanks throughout the catchment would also decrease stormwater flows onto the Middle Harbour foreshores, minimising the likelihood of beach erosion at each outfall.*

Manly Council, at present, encourages residents to consider installation of residential rainwater tanks as a means to reduce stormwater flows into Middle Harbour, and establish an alternate water source for their gardens and/or properties through its 'Manly Rainwater Tanks Program'.

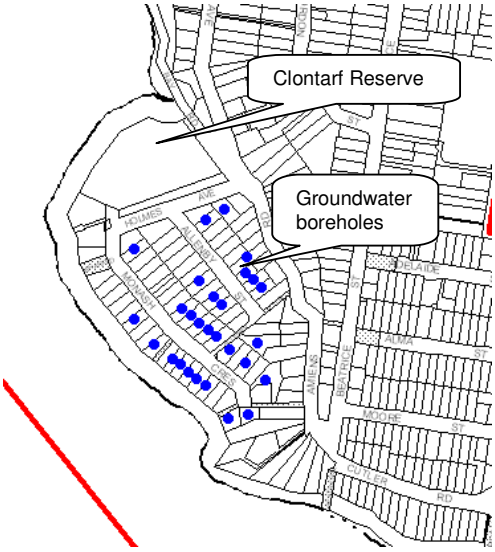
Sydney Water's new Rainwater Tank Rebate Program became available to Manly households from July 01, 2007. The program provides maximum up to $1500 in rebates to install new rainwater storage system in an existing home.

Action: *This option supports continuation of existing programs. Involve local Precincts to facilitate dissemination of best practice messages in regard to residential rainwater harvesting and the associated benefits.*

Objectives addressed: *1.1, 1.3,* ***1.5,*** *1.7, 1.8*
Performance Target: *Increased use of rainwater tank rebate*
Indicative Cost: *Medium*
Time Fame: *Continued*
Responsible Agency: *Manly Council – CEP, Precincts, Sydney Water, CMA*

1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.

Context: *Groundwater has become an attractive and viable alternate water source for irrigation of public and private land. However, groundwater is not an endless resource, and care needs to be taken to ensure that extraction rates are sustainable. Manly Council is extracting groundwater for irrigation of Clontarf Reserve. Many nearby private properties are also extracting groundwater for irrigation. At present, extraction of groundwater is concentrated near Clontarf Reserve. Groundwater abstraction, from bores so close to the estuary, can lead to seawater intruding into the freshwater aquifer. This could render the use of the groundwater unsuitable if contaminated by higher salinity.*



A comprehensive investigation will be undertaken, in conjunction with DECC, to measure total extraction, recharge rates of the aquifer at Clontarf (and potentially other areas, if required), to determine if the current yields are sustainable. Once the sustainability of the current situation is determined, DWE should be approached to take appropriate actions to resolve licensing issues.

Actions:

- *Obtain list of residential license holders (list obtained 6 September 2007 through Wayne Connors, NSW Department of Water & Energy)*
- *Council will update its GIS database showing all known groundwater boreholes (updated 28 September 2007)*
- *Undertake a comprehensive investigation (outsourced if funding available)*
- *Take actions as per recommendations*

Advantages: *Will provide valuable information on groundwater extraction and recharge. This will contribute to an understanding of sustainable groundwater use.*
Disadvantages: -

Objectives addressed: 1.6 , *5.1*
Performance Target: *Study report completed*
Indicative Cost: *Medium*
Time Fame: *Short term*

Responsible Agency: *Manly Council – Natural Resources, DWE*

1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.

Context: *With recent droughts, groundwater has become an attractive and viable alternate water source for irrigation of public and private land. Many properties along the immediate beachfront at Clontarf are extracting groundwater for residential irrigation purposes. Due to the close proximity of these bores to the Manly Council bore, it is assumed that they are accessing water from the same aquifer. Excessive groundwater abstraction, from bores so close to the estuary, can lead to seawater intruding into the freshwater aquifer.*

Actions:

- *Select 10 residential license holders and discuss salinity & importance of monitoring program*
- *Monitor salinity levels weekly by measuring Electrical Conductivity (EC) in micro siemens per centimetre (µS/cm) using an ECScan Low meter. Salinity levels (EC) in freshwater range from 0 to 800 µS/cm and brackish water ranges from 1600 to 4800 µS/cm. Truly saline waters have levels greater than 4800 µS/cm and seawater is approximately 56000 µS/cm.*
- *Monitor bacterial contamination every six months and other heavy metals on annual basis.*
- *Analyse results for any sign of early contamination and to indicate a trend and/or seasonal variation*
- *Take necessary remedial measures if a trend of increasing salinity is detected.*

Advantages: *Will provide valuable information on early sign of groundwater salinity and indications of seawater intrusion in freshwater aquifer.*
Disadvantages: -

Objectives addressed: 1.6, *10.1*
Performance Target: *Salinity & other parameters monitored*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Natural Resources*

1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.

Context: *In the study area, nearly all of the major stormwater pipes extend right to Middle Harbour, and discharge either onto the foreshore or directly into the water. Many of the pipes direct flows over the sandy beaches, which result in erosion. Figure shows a stormwater pipe at the rear of the beach in Sandy Bay during a storm in February 2007, with significant erosion resulting from the flows. Large volumes of sand have been removed from the beach, and the base of the seawall has also been exposed, potentially compromising the integrity of the seawall.*

Actions:

- *Assessment of scour caused by all outfall pipes on sandy beaches.*
- *Explore possibility of diversion and/or creating rocky stable surfaces at outfall points.*
- *Take actions at feasible sites.*

Objectives addressed: 1.7, *4.1, 4.2*
Performance Target: *Remedial measures undertaken*

Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Natural Resources*

1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable stormwater management

Context: *The Stormwater Environment Action (SEA Change) program focuses on the environmental education of residents, businesses and the wider local community to achieve improved water quality for Manly's water ways. It is an integrated program bringing together various disciplines and backgrounds to coordinate and implement a project that includes:*

- *Environment Education*
- *Water Quality Monitoring*
- *Compliance Support*
- *Cleansing and Maintenance*

The Seachange stormwater management program has traditionally target pollution prevention from prioritized catchments utilizing structural and non-structural tools. This model has been effective is targeting considerable pollutant load reduction over the past 5 years.

During Stage III of the program, it is recognized that multiple objectives can be achieved from integrating flood management and stormwater re-use into the pollution prevention model. In prioritizing the stage 3 target catchments the model has embraced, flood re-occurrence, the need for alternate water sourcing and beach pipe removal.

Action: *The option involves introducing this program at a priority site within the study area.*

Advantages: This option has the potential to significantly reduce pollutant input to the estuary, thereby improving water quality and increasing the recreational and ecological amenity of the estuary.
Disadvantages: Usually only a relatively small percentage of residents would take the steps necessary to reduce pollutant runoff. Hence, to ensure that changes are permanent, the education program would need to be on-going.

Objectives addressed: *1.1,* ***1.8***
Performance Target: *Number of educated increased*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – CEP*

1.8.2 Work with residents to implement best practices in storm water management at residential scale.

Context: *Stormwater pollution can substantially be managed at household level with participation from residents. Water pollution is therefore a key issue for Manly, with the following common sources of water pollution including:*

- *car-washing waste water entering the stormwater*
- *sweeping or blowing leaves and lawn clippings into the stormwater*
- *litter and cigarette butts entering the stormwater system - often having been thrown from moving vehicles*
- *sediment or concrete slurry run-off from construction sites*
- *paint discharges or spills*
- *high pressure cleaning causing sediment and cleaning chemicals to enter the stormwater.*

Manly Council is, at present, conducting the Stormwater Environment Action (SEA Change) program and Streamwatch aiming to educate and empower communities to work together for healthy catchments.

Action: *The option involves obtaining enhanced resident participation in these programmes.*

Objectives addressed: *1.1, 1.3, 1.5,* ***1.8***
Performance Target: *Best practices adopted by residents*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – CEP & Precincts*

6.2 OPTIONS ADDRESSING AQUATIC/INTER-TIDAL HABITAT CONSERVATION & MANAGEMENT

2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.

Context: *There occur significant seagrass beds within the study area. The largest seagrass bed is found adjacent to Castle Rock Beach. Clontarf and Sandy Bay also have reasonably large meadows of seagrass. A 1981 Seagrass Map of Port Jackson produced for the Sydney Metropolitan Catchment Management Authority of the time indicates a significant stand of seagrass in Sandy Bay, much larger than that indicated by DPI in the current seagrass map. Many major estuaries in NSW have lost as much as two-thirds of their seagrass beds in the past 30 to 40 years. Because of this, periodic updating of map is important.*

Action: *The option involves periodic up-to-date of seagrass distribution map within the study area.*

Advantages: *Such periodic maps will be useful to understand trend in loss or gain in seagrass beds. Effective measures can be planned based on results from periodic maps.*
Disadvantages: *Inaccurate maps will result in damages of seagrass beds.*

Objectives addressed: 2.1, *2.4, 2.6*
Performance Target: *Updated seagrass maps*
Indicative Cost: *Medium*
Time Fame: *Short term*
Responsible Agency: *DPI (Fisheries), Manly Council - NR, NSW Maritime, CMA*

2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water quality and a potential boat exclusion zone

Context: *The largest seagrass bed, at present, is found adjacent to Castle Rock Beach, where the tidal delta provides a large shallow sandy bottom, with sufficient light penetration suitable for seagrass growth. A large amount of sediment in the water column can cause excess turbidity (muddiness) in estuarine waters blocking out the sunlight needed for growth of seagrasses. Blooms of algae or excessive growth of algal epiphytes can restrict light to seagrasses. Excessive nutrient levels in the water can cause such high algal growth.*

Anecdotal evidence, received through the community consultation undertaken for the Clontarf / Bantry Bay Estuary Management Plan, suggests that Castle Rock have experienced large losses in seagrass.

West et al (2004) confirms this and states that large losses of seagrass have occurred inside Middle Harbour.

Actions:

- *Assessment of loss of seagrass bed at Castle rock by comparing historical data, information and maps.*
- *Compare water quality information from different time and check the relationship.*
- *Assess whether extensive boating has caused such a loss.*
- *Take a comprehensive investigation to arrive at recommendations for better management including a potential boat exclusion zone.*

Advantages: *Implementation of this option would not have any immediate benefits to the physical condition of the estuary. However, the main outcome of this option would be knowledge: knowledge of losses of seagrasses over the past 40 years. Hopefully, this knowledge would lead to strategies that would see an increase in the amount of seagrass in the Castle rock, which could significantly increase the ecological amenity of the estuary.*
Disadvantages: -

Objectives addressed: *1.1, 1.2,* ***2.1,*** *2.5, 8.1*
Performance Target: *Investigation Report*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *DPI (Fisheries), NSW Maritime, Manly Council- NR*

2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.

Context: *Much of seagrass bed has already been lost through the effects of water pollution, foreshore development and the recreational use of our waterways. Mangroves and seagrass are protected under the Fisheries Management Act 1994. Despite this, inconsiderate boating is still regarded as main cause of seagrass loss. Seagrasses can be preserved by adhering to the following:*

- *Avoid driving boat across shallow, weedy areas, as boat propellers act like harvesters on seagrass.*
- *Avoid anchoring on seagrass beds, as anchors can dislodge seagrass plants.*
- *Relocate mooring, in consultation with NSW Maritime, to an area away from seagrass.*

Moreover, existence of seagrass beds is often not known to boat users.

Actions:

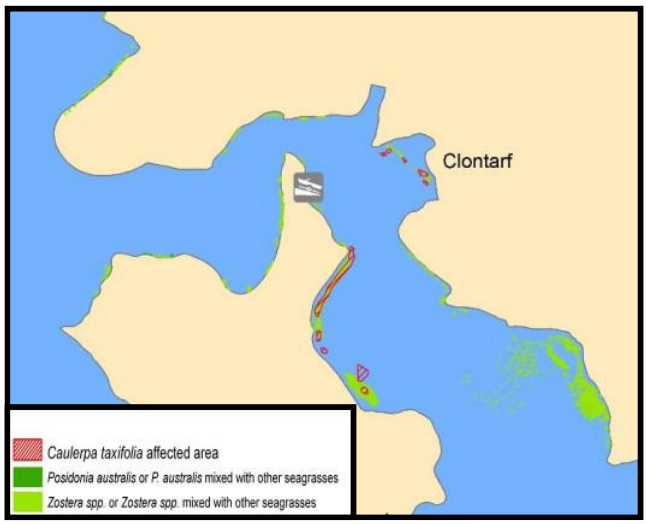
- *Enforcement of boating restrictions on seagrass beds*
- *Develop interpretative signage to notify seagrass beds as protected areas.*
- *Initiate education program.*

Advantages: *Enforcements in combination with supportive signage will facilitate protection of seagrass beds. This will enhance ecological richness of the estuary*
Disadvantages: *Places restriction on boating in the estuary, thereby discourage optimum estuary use.*

Objectives addressed: 2.1, *2.4, 2.5, 6.2*
Performance Target: *Enhanced enforcement, signage installed*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *DPI (Fisheries), NSW Maritime, Manly Council- NR, CMA*

2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.

Context: *Caulerpa taxifolia is an extremely fast growing and recolonise from fragments as small as 1mm. These attributes make it a great concern for the marine environment. Caulerpa has been recorded within the study area at Clontarf, and also at other areas in Middle harbour in close proximity to the study area (see Figure). Caulerpa populations are known to fluctuate between seasons, and this has certainly been the case at Clontarf, with the population expanding, contracting, and moving location between seasons (DPI, 2006). Hence, an updated distribution map is important for all concerned.*



Actions:

- *Obtain regularly updated map from DPI-Fisheries*
- *Incorporate information on Council's GIS database*
- *Disseminate information to community and boat users*

Advantages: *Updated information will help in taking preventive measures to stop spread of Caulerpa taxifolia.*
Disadvantages: -

Objectives addressed: 2.2
Performance Target: *Updated information distributed regularly*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *DPI (Fisheries), NSW Maritime, CMA, SCCG, Manly Council - NR*

2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.

Context: *Caulerpa taxifolia is currently being managed by DPI (Fisheries), who regularly treat the noxious aquatic weed, with salt (causing death by osmotic stress). Council, NSW Maritime and the SMCMA should support DPI Fisheries in their endeavours to control and eradicate this species from Clontarf and other areas of the Middle Harbour Estuary, particularly by way of community education programs and implementation of the NSW Caulerpa Control Plan.*

NSW Department of Primary Industries have been undertaking extensive research into Caulerpa taxifolia, to determine the most effective ways of controlling it, and also limiting its spread to other waterways. Various methods of control have been trialled, including:

- *Salt Treatment – smothering outbreaks with thick layers of salt to poison the plant*
- *Matting – covering outbreaks with matting to remove its ability to photosynthesise*
- *Hand picking – divers remove outbreaks by hand*

The various methods have had limited success, although none have proven to be completely effective in all situations, and Caulerpa continues to pose a serious threat to the marine environment within the study area (DPI, 2006).

Action: *The option involves implementation of the Control Plan. In addition, encourage community including estuary users to report sighting of Caulerpa taxifolia.*

Objectives addressed: 2.2, *2.6*
Performance Target: *Control Plan implemented*
Indicative Cost: *Medium*
Time Fame: *Immediate*
Responsible Agency: *DPI (Fisheries), SMCMA, SCCG, Manly Council - NR*

2.3.1. Undertake mangrove maintenance and regeneration activities at existing sites.

Context: *There is only one small pocket and few individual mangroves remaining within the study area. They are located at:*

- *Fisher Bay – one individual tree*
- *Powderhulk Bay – a small pocket near the swimming enclosure*
- *Pickering Point – several individual trees scattered along the point*

Mangroves are extremely important to intertidal ecosystems, as they provide habitat, shelter and a source of food (Lynch & Burchmore, 2006). They also provide a buffer between the terrestrial environment and the estuary, and can filter runoff before it reaches the waterway.

Action: *This option involves maintenance of existing population and planting more mangrove seedlings in existing isolated pockets.*

Advantages: *This will stop extinction of mangrove population from the study area.*
Disadvantages: -

Objectives addressed: 2.3, *2.4, 6.4*
Performance Target: *Mangrove population maintained or enhanced*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Parks & Reserves, DPI (Fisheries)*

2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.

Context: Mangroves are extremely important to intertidal ecosystems, as they provide habitat, shelter and a source of food (Lynch & Burchmore, 2006). They also provide a buffer between the terrestrial environment and the estuary, and can filter runoff before it reaches the waterway. At present, mangroves occur only in 0.05 ha of the study area. However, there exists opportunity to expand mangroves in Fisher Bay. The bay, at preliminary examination, is found to be ideally suited for mangrove regeneration. At present, one mangrove plant exists in Fisher Bay. It is proposed to initiate a "Fisher Bay Mangrove Restoration/Expansion program." Extensive community support and involvement can be generated in developing and implementing this program.

Actions:

- *Undertake further investigations on suitability of the Fisher Bay for mangrove regeneration.*
- *Prepare a formal proposal for the program*
- *Discuss the program with DPI Fisheries and other relevant agencies to secure grant funding*
- *Organise seedlings and other logistics*
- *Encourage community/ interest groups. Precincts within Manly LGA to work collaboratively in planting and care taking.*
- *Monitor site implementation, seedling health and ecological improvements.*

Advantages: *Mangrove population within the study area will be greatly increased and contribute in restoration of critical intertidal ecosystem*
Disadvantages: -

Objectives addressed: 2.3, *6.4*
Performance Target: *Mangrove expansion program implemented*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Parks & Reserves, DPI (Fisheries)*

2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of voluntary to legal measures.

Context: *The study area has significance for its natural habitat: marine, inter-tidal and terrestrial. In recognition of the diverse array of habitat types, the NSW State Government, under its Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005, has zoned large parts of the study area as Environmental Protection, which aims to "provide for the protection, rehabilitation and long term management of the natural and cultural values of the waterways and adjoining foreshores. In addition, the entire foreshore of the study area is protected as an Intertidal Protected Area (IPA) under the Fisheries Management Act, 1994 due to the significance of the remaining rocky habitats and intertidal species. Large areas of the study area have also been designated as a Wetlands Protection Area (WPA) by the NSW State Government. There exists several floras and fauna recorded as threatened, making the study area important.*

Actions:

- *Collate information and knowledge about ecological habitats*
- *Undertake mapping using GPS and develop a comprehensive ecological map.*
- *Enforce* declared protected areas through various means of legal to voluntary measures.

Objectives addressed: *2.1, 2.3,* ***2.4,*** *2.6, 5.2, 10.1*
Performance Target: *Areas of ecological significance mapped*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Natural Resources, DECC, DPI (Fisheries), SMCMA*

2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings

Context: *The Little Penguin feeds in the estuary during the day and nests on land during the night. Little penguins have been sighted near the Spit Bridge. However, it is unknown whether the Little Penguins that are regularly sighted throughout the study area (as per community consultation for the EMP) are from the endangered North Head Population, or whether they are separate and nesting somewhere in Middle Harbour.*

Action: *The option involves a study to locate penguin nest sites in order to facilitate their protection.*

Advantages: *This will identify possible penguin nest within the study area and help in implementing protection measures.*
Disadvantages: *Identified penguin nest runs the risk of intentional damage*

Objectives addressed: 2.4
Performance Target: *Study completed*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *DECC, Manly Council – Natural Resources, Precincts*

2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).

Context: In consultation with DPI – Fisheries and SCCG, Marine Care Volunteer program is to be initiated to help protect estuarine and coastal environment, aquatic and inter-tidal habitat. Volunteers talk to estuary and coastal users about conservation issues, protection issues, risks, and help in a range of activities, such as ocean care days, use and monitoring surveys and community events.

Anyone aged 18 years or over and with a keen interest in coast, estuary, fishing, boating and the conservation of estuarine resources and habitat, shall be able to become a Marine Care Volunteer.

Volunteers will be expected to give approximately one day per month to assist the program, and occasionally attend events. They will be involved in helping create better awareness among estuary users and the wider community about estuarine and coastal issues, but won't have enforcement powers. Volunteers will be issued with clear identification as well as a distinctive hat, shirt and backpack containing the necessary documentation.

Action: *The option involves creation of Marine Care Volunteer program in consultation with DPI – Fisheries and SCCG*

Objectives addressed: 2.4, *2.6, 6.1*
Performance Target: *Volunteer group initiated*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council - CEP, DPI (Fisheries)*

2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.

Context: *The ecosystems within the study area are highly fragmented. The different habitat types have signs of the many pressures placed on them through development and high usage. Some of these pressures are known and some are still unknown. Many studies are, however, on-going at research institutes and universities.*

Actions:

- *Collate relevant information and knowledge about degeneration of ecological habitats from scientific literature*
- *Identify site specific key factors*
- *Devise management options to arrest degeneration.*

Objectives addressed: *2.4,* ***2.5***
Performance Target: *Updated knowledge collated*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Natural Resources*

2.5.2. Initiate studies and surveys to fill data gaps through collaboration with MEC and/or Universities.

Context: *Various gaps in available data were uncovered. A list of data gaps has been presented in the Estuary Processes Study (Manly Council 2007). It has been resolved that these data gaps will be filled in by initiating further studies and surveys as grant funds become available. Such studies can also be initiated through Manly Environment Centre (MEC) in collaboration with Universities. One such collaboration exists through SCCG with CSIRO and Sunshine Coast University on climate change adaptation.*

Action:

- *Prepare study and survey proposals*
- *Seek funding*
- *Initiate studies and surveys through forging collaboration*

Objectives addressed: 2.5
Performance Target: *Surveys and studies initiated and completed*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council- Natural Resources, MEC and/or Universities*

2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.

Context: *Beach raking is currently carried out daily on Clontarf beach. This captures gross pollutants not prevented by street sweeping or other pollutant reduction measures. This activity is known to be detrimental to the ecology of the intertidal area. Marine debris such as seagrass wrack (not rubbish) washed up on the shore provides an important source of food and habitat for a diverse range of invertebrate species, which are an important part of the intertidal food chain. Raking of the beach removes this habitat and food source.*

Mosman Council (2005) have introduced hand cleaning on Chinamans beach facilitating ecological restorations.

Actions:

- *Review relevant literature including Mosman Council's report*
- *Try hand cleaning on Clontarf beach for 2-3 months and monitor results*
- *Depending on the result, continue hand cleaning or beach raking.*

Advantages: *The gained knowledge will help in balancing between safe beach and eco-sensitive beach management. Beach raking is a routine practice in popular beaches.*
Disadvantages: *Alternative to beach raking is hand picking. Implementation of hand picking is laborious and time consuming.*

Objectives addressed: *2.4,* ***2.5***
Performance Target: *Knowledge gained and applied*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Civic Services, SCCG*

2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat

Context: *Seawalls, both public and private, exist throughout the study area. They are now common features of landscape in shallow coastal waters of urbanised areas. In some areas, they have replaced considerable portions of natural habitats, such as natural rocky shores or beaches. Approximately 46% of the foreshore length within the study area has now seawalls. The Centre for Research on Ecological Impacts of Coastal Cities of the University of Sydney is undertaking extensive research on seawalls.*

As one example, many seawalls in North Sydney have been repaired to be structurally sound and also to be used experimentally to test the effects of different forms of building walls on the marine life. In some parts of the wall, holes between the blocks have been filled or the grouting made flush with the sandstone blocks. In other parts of the wall, holes are left unfilled or the grouting indented, leaving "crevices" between the blocks. In another project elsewhere in the harbour, small holes and grooves are being made in the sandstone blocks themselves, again in an attempt to increase local marine diversity by increasing the complexity of their habitat. Yet elsewhere, small "caves" have been built into the wall to test whether such structures support the same forms of life as found in holes that form naturally.

Actions:

- *Establish contact with the Centre for Research on Ecological Impacts of Coastal Cities of the University of Sydney to have updated knowledge*
- *Explore formal collaboration between the Manly Council and the Centre*
- *Ensure new construction of seawalls accommodate recent knowledge*

Advantages: *Newly designed seawalls will support ecological habitat*
Disadvantages: *Construction of newly designed seawalls could be costly and complicated*

Objectives addressed: *2.4,* ***2.5***
Performance Target: *Knowledge gained and applied*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Civic Services, Urban Services & Natural Resources*

2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.

Context: *Human interactions with the environment can have a significant and potentially devastating effect on its inherent values and quality. Providing further education regarding the estuary, its aquatic habitats and the potential impacts of humans may increase awareness of the environment which may then result in greater consideration of environmental issues in general day-today life. The option involves printing of* an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.

Actions:

- *Work with DPI-Fisheries to prepare a brochure*
- *Print*
- *Disseminate brochure through MEC, Precincts and other opportunities*

Objectives addressed: *2.4,* ***2.6,*** *6.1*

Performance Target: *Brochure prepared & disseminated*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *DPI (Fisheries), Manly Council - NR*

6.3 OPTIONS ADDRESSING BUSHLAND/TERRESTRIAL HABITAT CONSERVATION & MANAGEMENT

3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.

Context: *Manly has a rich diversity of natural landscapes protected in around 55 hectares of bushland reserves. Nearly 90% of Manly's natural environment has been degraded to some extent due to human activities (Manly Council 1997).*

The Local Government Act 1993 requires that all Councils establish Plans of Management for their Parks and Reserves. The management of bushland areas within Manly are covered by a number of plans and programs. Plans of Management that cover bushland areas have the objectives of ensuring the ongoing ecological viability and biodiversity of the land, protection of aesthetic and scientific values, restoration of degraded bushland and to protect landforms and bushland as a natural stabiliser of the soil surface. Whilst these plans and programs satisfy the requirements of the Local Government Act 1993 (as amended), there is merit in preparing a Bushland Management Plan for Manly to encompass all the bushland areas.

A Bushland Management Plan would focus on preserving and regenerating Manly's bushland areas. The Plan would detail the staging, appropriate techniques and methodology for implementation of bushland restoration, various site specific Plans of Management, Threatened Species Conservation Act 1995 and the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999.

Actions: *The preparation of a Bushland Management Plan would be undertaken in consultation with the various volunteer bushcare groups and the Community. The plan should address regular regeneration, weeding, view maintenance, managed bushfires and storm water runoff issues. The aims and objectives of the plan are to:*

- *manage bushland for its aesthetic, recreational, educational and scientific value to the community, and to maximise these values as part of Manly's natural heritage*
- *manage bushland in a way that maintains biodiversity of indigenous species in the long term*
- *fulfill Council's responsibilities under other community and Government plans and programs, NSW legislation.*

Advantages: *Provides a holistic approach to bushland management of the area. The report will provide more structured and prioritized actions considering all options.*
Disadvantages: *Plan preparation is time consuming, costly. Value of the Plan is lost if not implemented readily.*

Objectives addressed: *1.1, 2.4,* ***3.1****, 3.2, 3.3, 3.5, 3.6, 6.1, 6.4, 7.2*
Performance Target: *Bushland Management Plan prepared*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council- Parks & Reserves*

3.1.2. Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.

Context: *The general aim of SEPP No. 19 - Bushland in Urban Areas is to protect and preserve bushland within the Greater Sydney area. It requires that bushland not be disturbed without the consent of Council. The SEPP also provides for the preparation of management plans for SEPP 19 Bushlands. This Policy is integrated into Council's Development Application process. The following six reserves within the study area have the State Environmental Planning Policy No.19 (SEPP 19) status:*

- *Castle Circuit Foreshore (4.04 ha)*
- *Pickering Point – partly (0.73ha)*
- *Gurney Reserve (2.52 ha)*
- *Sangrado Reserve (1.69 ha)*
- *Castle Rock to Clontarf Point (1.20 ha)*
- *Ogilvy Road Reserve (2.47 ha)*

Action: *The option involves preparation of management plans for all these six bushlands.*

Advantages: *Statutory requirement is fulfilled. These bushlands will be subjected to planned and structured management.*
Disadvantages: *Attention is diverted to preparation of plan than actually managing bushlands*

Objectives addressed: 3.1
Performance Target: *Management Plans prepared*
Indicative Cost: *Medium*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Parks & Reserves*

3.1.3. Identify adhoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified standard.

Context: *Pathways have been illegally made to create access to areas such as beaches, formal walking tracks (e.g.- Manly Scenic Walkway) and recreation areas, with many originating from private properties. These tracks are often not well constructed, and exacerbate problems such as erosion, compaction of soil, and weed dispersal. As many of the tracks are also on Council land, they pose a liability risk to Council. The adjacent figure illustrates the issue, with an illegal pathway that has been created between a private property and the Manly Scenic Walkway, with resultant erosion at the base of the stairs. Some of the existing ad hoc pathways (e.g. Gurney Crescent) are the only way to the foreshore and are very difficult to traverse. An option may be to improve these paths as formal access ways.*

Initial efforts to improve public access to the estuary foreshore should focus on the removal of private encroachments that either obstruct public access to or inhibit enjoyment of public foreshore open space. Council would be responsible for managing public access and constructing additional facilities and services around the foreshores of estuary.

Actions:

- *Identify all adhoc track originating from private properties*
- *Prepare safety & maintenance standard for tracks*
- *Approach property owners to ensure their safety and continued maintenance*
- *Enforce closure failing to ensure safety and continued maintenance*

Advantages: *Safety and maintenance issues are addressed. Risks to Council are minimised. Adhoc tracks are either safer or closed*
Disadvantages: *Complicated, will be difficult to implement, specially identifying boundaries*

Objectives addressed: 3.1, *7.1, 7.2*
Performance Target: *Tracks identified and owners approached*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council- Parks & Reserves*

3.1.4. Council to continue to be an active participant in the Die-Back Working Group

Context: *Manly Council is an active participant in the Sydney Harbour Dieback Working Group, a network of land management agencies focusing on the management of vegetation dieback on the lower North Shore of Sydney Harbour. The Working Group is advised by the Botanic Gardens Trust and the University of Sydney, and actively supported by the Sydney Coastal Council Group. The Goal of the Working Group is to protect bushland in the Sydney Harbour region by minimising the risk of the spread and impact of Phytophthora cinnamoni.*

Action: *The option involves continued participation in the working group.*

Objectives addressed: 3.1
Performance Target: *Contributory & active participant*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Parks & Reserves, SCCG*

3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.

Context: *Impact of high nutrient stormwater on Manly Bushland Reserves was investigated (Skelton et al. 2002). High nutrient loads were found to occur at 14 of 22 sites located all over the study area. They recommended various remedial management including sediment traps, energy dissipation structures, rainforest planting, mini wetlands, bush regeneration and litter control for each of the sites. It is felt that recommendations of this study are reviewed based on the present condition.*

Actions:
- *Revisit all sites and record any change of condition*
- *Re-establish priority ranks*
- *Revise recommendations for remedial management*
- *Implement revised remedial management*

Advantages: *Contributes in prioritised implementation of mitigation measures*
Disadvantages: *Attention is focused only on existing and known outfalls*

Objectives addressed: 3.2
Performance Target: *Recommendations revisited*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Parks & Reserves*

3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources.

Context: *Impact of high nutrient stormwater on Manly Bushland Reserves was investigated (Skelton et al. 2002). High nutrient loads were found to occur at 14 of 22 sites located all over the study area. They, however, did not investigate the sources of nutrient load. They indicated problem in the stormwater system, such as a sewage leak.*

Actions:

- *Revisit all sites and record any observable sources of contamination*
- *Investigate leakage by CCTV, dye testing or other measures*
- *Implement appropriate control measures at sources*

Objectives addressed: *1.1,* ***3.2***
Performance Target: *Control measures implemented*
Indicative Cost: *Medium*
Time Fame: *Long term*
Responsible Agency: *Manly Council- Parks & Reserves, Natural Resources*

3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.

Context: *Bushland reserves occur in a total 18.49 hectares and are scattered throughout the study area. Smaller patches of bushland on both public and private land do exist throughout, and in some places provide corridors between the reserves. Skelton et al (2004) noted important corridors between the Castle Circuit Foreshore and Pickering Point reserves, and also the Castle Rock to Clontarf Point and Weekes Road reserves. These corridors are extremely important habitat features, and allow for fauna to move throughout the study area and maintain populations. Seek University collaboration in doing assessments through student projects.*

Actions:

- *Revisit identified corridors and assess any other*
- *Assess ecological significance of each of these corridors*
- *Initiate plant regeneration strengthening these corridors*

Advantages: *Identified corridors will enrich flora and fauna of the area and create interconnectivity between different bushlands. These links will encourage faunal movement over a wider area*
Disadvantages: *It will be difficult to control spread of weeds and other noxious plants in the area.*

Objectives addressed: *2.4,* ***3.3***
Performance Target: *Assessment Report & new vegetation*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – Parks & Reserves*

3.4.1. Continue & reassess Council's Street Tree Planting Programme within the study area.

Context: *Manly Council's policy is to maintain the attractiveness, appeal and amenity of the area by preserving healthy trees in recognition of the value and importance of trees held by the community. Trees play an important part in maintaining the health of our environment, they help to protect soil and water supplies, provide habitat, food, shelter and protection for wildlife. Trees in urban areas act as extensions of and links between core bushland, also known as bushland corridors. However, there exists no list of recommended trees within the Council.*

The Manly Council Tree Preservation Order 2001 applies to all trees in the Manly LGA. It is illegal to remove or prune any trees on public land, parks, bushland reserves or foreshore areas.

Actions:

- *Review the present programme of tree plantation*
- *Develop a comprehensive list of site specific recommended and appropriate trees*
- *Accommodate view eminence by selecting suitable plant type*

Objectives addressed: *2.4,* ***3.4***
Performance Target: *Recommended list prepared & program continued*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council-Parks & Reserves*

3.5.1. Continue Community Bush Care Volunteers programme in the study area.

Context: *The Manly Council Bushcare Programme encourages the community to get involved and help protect and restore precious urban bushland. Bushcare groups work each week in a variety of bushland areas.*

Bushcare activities include

- *encouraging natural bushland regeneration by removing weeds*
- *native plant and weed species identification*
- *recreating bushland by planting native species*
- *erosion control and mulching*
- *recreating habitat.*

Council supports the bushcare programme by providing qualified supervisors, tools and gloves to use on site, plants and mulch as needed and any additional support.

Action: *The option involves continuation of the program.*

Objectives addressed: *2.6,* ***3.5,*** *10.3*
Performance Target: *Program supported & continued*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council- Parks & Reserves*

3.5.2. Continue publication of 'Bushland News' and circulate widely in the community

Context: *Manly Council publishes Bushland News regularly and circulates widely among community. It contains news about bushcare activities, council initiatives, technical information and others. This newsletter is popular among readers.*

Action: *The option involves continuation of the newsletter.*

Objectives addressed: *2.6,* ***3.5***
Performance Target: *Publication continued*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council- Parks & Reserves*

3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.

Context: *Manly Council organises 'Native Plant Giveaway' program annually. This program is very popular.*

Action: *The option involves continuation of the program.*

Advantages: *Support restoration of native vegetation, especially on privately owned backyards.*
Disadvantages: -

Objectives addressed: *2.4,* ***3.5***
Performance Target: *Program continued*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council- Parks & Reserves, CEP*

3.6.1. Involve Precincts to discuss the issue of view maintenance with property owners.

Context: *Views are important for all residents, particularly for harbour side properties. Residents do not like tall trees to obstruct their views of the bay. Cutting, even poisoning of trees have often been reported to maintain harbour & estuary view.*

Actions: *This can be avoided by undertaking consultations with harbour side residents during bush regeneration through the involvement of Precincts.*

Objectives addressed: *3.5,* ***3.6***
Performance Target: *Meetings held as required*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Parks & Reserves, Precincts*

6.4 OPTIONS ADDRESSING SEDIMENTATION & BEACH EROSION

4.1.1. Carry out a comprehensive study on estuarine sediment transport patterns

Context: *The broad issue of sediment movement (both erosion and accretion) in the Castle Rock Beach to Spit Bridge section of the study area is a significant issue according to the results of community consultation and findings of this study. Individual issue such as beach erosion has been identified, and, according to some limited research that was undertaken in the early 1980s for Clontarf Marina, it is likely that sediment processes throughout this area are linked.*

Actions:

- *Undertake a photogrammetric study of the area*
- *Undertake additional hydro surveys of the area*
- *Based on these studies, obtain a comprehensive understanding of sediment transport pattern of the area*
- *Utilize findings to formulate and/or modify management options.*

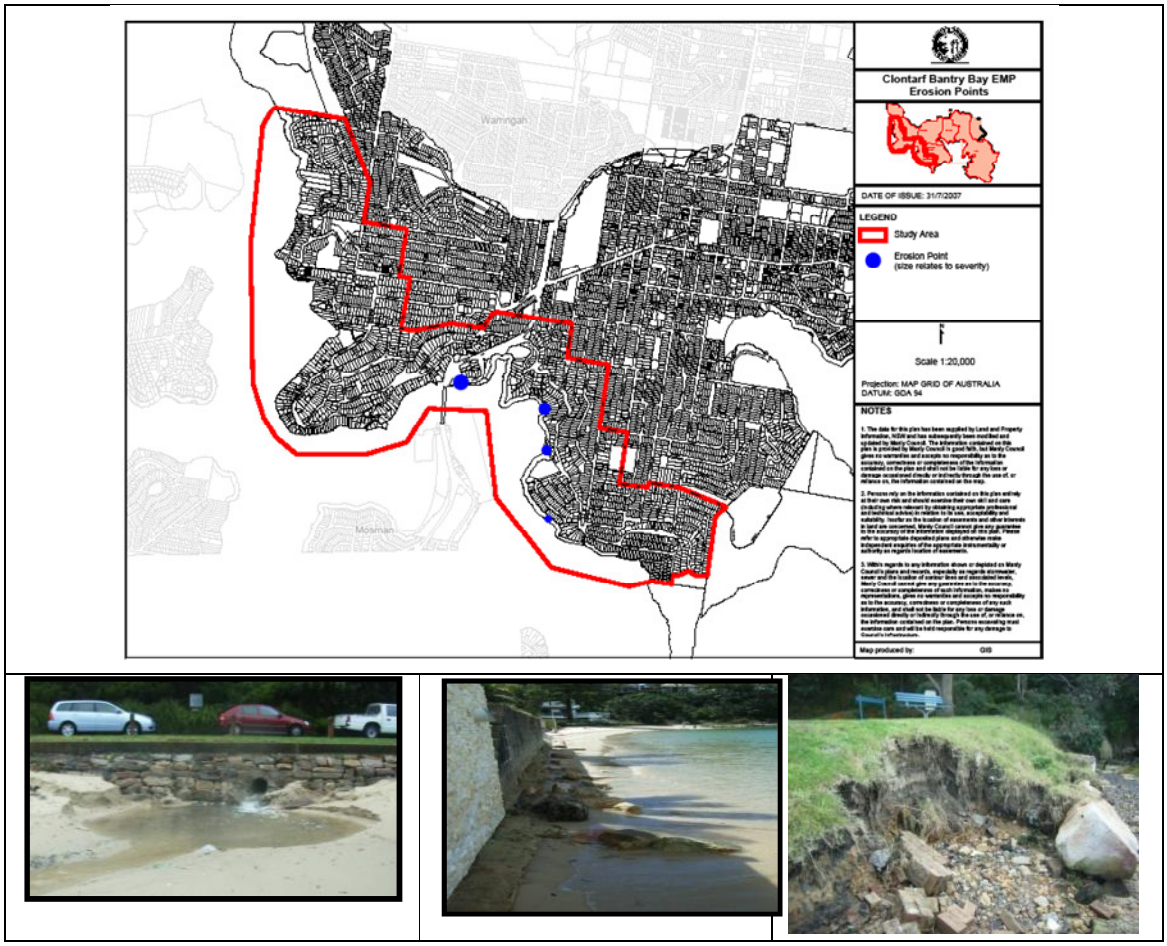
DECC has already undertaken photogrammetric study. Council has submitted grant application to DECC to carry out this comprehensive study.

Advantages: *A comprehensive study of the entire system will provide greater understanding of the sediment budget and movement throughout the lower reaches of the Middle Harbour estuary. Findings have implications on navigability around Clontarf Marina, erosion at different sites, siltation of Clontarf pool and related management options to address these issues.*
Disadvantages: *Costly, may not be implemented if grant is not approved*

Objectives addressed: *2.1,* ***4.1***
Performance Target: *Study Report*
Indicative Cost: *Medium*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – NR, DECC*

4.2.1. Define and implement mitigation measures for erosion prone sites.

Context: *Erosion is an intrinsic natural process but in many places it is increased by human land use. Excessive erosion, however, does cause problems, such as receiving water sedimentation, ecosystem damage and outright loss of soil. Beach erosion has been experienced in sections of Clontarf Beach and Sandy Bay with varying degrees of severity (Figure), and fluctuations over time. Outcomes of beach erosion have included the undermining of seawalls and foreshore garden beds, and exposure of buried rocks.*



Actions: *Further detailed investigation of bank erosion mechanisms and remediation options for each site affected would need to be conducted prior to implementing work associated with this option.*

Preference should be given to soft-engineering for remediation works, such as shoreline re-grading and revegetation, rather than construction of additional rock walls around the foreshore. An alternative to treating the eroded surface may be to modify the mechanism of erosion.

Advantages: *Risks at erosion prone sites are prevented or minimised*
Disadvantages: -

Objectives addressed: 4.2, *6.1*
Performance Target: *Mitigation measures implemented*
Indicative Cost: *High*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – NR, Urban Services*

4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.

Context: *The swimming enclosure at Clontarf Beach is used regularly by locals and tourists who visit the beach every year. However at low tide there is so little water in the pool that it is virtually unusable (Figures a & b). This is heritage listed pool.*

The pool lies directly in the path of the sand transport corridor between the tidal delta and Sandy Bay, and disrupting this natural flow of sand may have undesirable consequences further down the corridor. Further, as the supply of sand is continuous, the enclosure simply fills back up, and the dredging would need to be done regularly to maintain depths. Dredging has been undertaken in the enclosure in the past, and sand returned to the pool in a month (GSE, 1990).

Figure a - Clontarf Swimming Enclosure at Low Tide, 20/12/1949		**Figure b – Clontarf Swimming Enclosure at Low Tide, 03/01/2007**
		

Possible options to make this pool usable could be:
a) Regular dredging prior to the start of summer season
b) Flow guide bunds to force flow water towards the pool, thus preventing siltation
c) Relocating the pool forward towards deeper water
d) Shifting the pool, probably 80-100 meters south

All these options are costly, require a detailed proper understanding of sediment transport patterns, are subject to heritage assessment and will have impacts on boating, ecology and estuarine/sediment processes. But as this is located near the most popular reserve, status quo is not desirable and may not be acceptable. The bottom line is people want this pool to be made usable.

Actions:

- *Initiate a feasibility study to evaluate all four and other options to make the pool usable.*
- *Obtain feedback from community and boating organisations*
- *Engage NSW Maritime, DECC and DPI Fisheries in the consultation process*
- *Identify grant funding opportunities*
- *Implement desirable and feasible option*

Advantages: *This popular swimming enclosure is made comprehensively usable again responding to public demand*
Disadvantages: *Implementation of possible solutions is costly and each has negative impacts on boating, ecology and sediment processes.*

Objectives addressed: 4.2, *6.1, 8.4*
Performance Target: *Mitigation measures implemented*
Indicative Cost: *High*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – NR, Urban Services*

4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.

Context: *The marina at Clontarf lies directly in the path of the sand transport corridor between the tidal delta and Sandy Bay. However, the beach profile appears to have been modified from its natural state, due to the irregular shape of the shoreline between Clontarf Reserve and Sandy Bay.*

Dredging occurred at the marina to maintain sufficiently deep access for boats to their berths, and the natural beach profile would be a continuous sand flat between Clontarf Reserve and Sandy Bay. Clontarf Marina undertook 'propeller wash maintenance operations' to maintain navigable depth around the marina. This was done by securing a boat at the bow, and using the wash from the propeller at the rear to flush sand away. Clontarf Marina should be pursued to take formal steps to undertake dredging operations

Actions:

- *Identify areas to be dredged through detailed hydrographic surveys.*
- *Obtain necessary approvals from relevant agencies (NSW Maritime, Department of Lands, and DPI- Fisheries).*
- *Invest & undertake dredging operations (Clontarf Marina).*
- *As the dredging works are likely to be expensive, funding arrangements would need to be resolved as a matter of priority. Joint funding between Clontarf Marina and the State Government (through NSW Maritime) may be considered.*

Advantages: *Allow safe and smooth navigation on estuary waterways.*
Disadvantages: *Expensive, dredging operation has impact on ecology, especially on sea grass beds.*

Objectives addressed: 4.2, *6.1, 6.2*
Performance Target: *Navigable depth maintained*
Indicative Cost: *High*
Time Fame: *Medium term*
Responsible Agency: *Clontarf Marina*

6.5 OPTIONS ADDRESSING HAZARDS & RISKS INCLUDING CLIMATE CHANGE

5.1.1. Commission a geotechnical study for specific sections of foreshore areas to identify and prioritise risks, and establish risk based management options.

Context: *Hazards within 'Castle Rock to the Spit Bridge' section involve beach erosion, siltation, storm surge, shoreline recession, inundation, stormwater erosion, slope and cliff instability and climate change. All these hazards do not pose equal risks to all parts of the section. This option involves a comprehensive geotechnical study including review of earlier studies to prioritise risks.*

Having defined the type, nature and risks of different hazards, the study should establish risk based management options.

Actions:

- *Commission a geotechnical study for hazard prone section of the study area*
- *Present preliminary results and assess risks*
- *Prepare hazard risks map*
- *Engage community in defining risk management options*
- *Adopt risk management options in development plans.*
- *Install appropriate warning signs advising the community of known potential hazards.*

Advantages: *All potential risk locations are identified and appropriate warning signs erected.*
Disadvantages: -

Objectives addressed: *4.1,* ***5.1,*** *6.1*
Performance Target: *Geotechnical Study Report*
Indicative Cost: *High*
Time Fame: *Medium term*
Responsible Agency: *Manly Council-NR, Urban Services*

5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.

Context: *Based on hazard risk map, prepared under option 5.1.1, control new development by revising Council's DCPs. Take a long term perspective of climate change impacts especially with sea level rise. Ensure that public facilities are well protected against potential geotechnical hazards.*

Actions:

- *Revise Council's DCPs to control development in hazard prone areas*
- *Ensure any redevelopment and public facilities are compatible with potential hazards*

Advantages: *Risks against climate change impacts are mainstreamed and mitigated through Council's DCPs*
Disadvantages: *Over precautionary approach may restrict normal development of the area.*

Objectives addressed: *4.2,* ***5.1,*** *6.1*
Performance Target: *DCPs revised*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council - Planning & Strategy, Dev. Assessment & Determination Unit*

5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco- friendly sea walls.

Context: *Based on findings of geotechnical study (option 5.1.1), regular inspections should be carried out, especially after storms, to assess conditions of seawalls protecting public properties. Site inspections should include, but not necessarily be limited to a visual assessment of the condition of the walls and inspection pits to confirm foundation levels where necessary to determine soil properties of the foundation and backfill material. Appropriate geotechnical analysis will be required to determine the stability of the seawall's under design scour conditions.*

Actions: *The option involves regular inspection of seawalls, especially after storms. If upgrading is found necessary, construct eco-friendly seawalls (option 2.5.4).*

Objectives addressed: *4.3,* ***5.1,*** *6.1*
Performance Target: *Regular Inspection Report*
Indicative Cost: *Medium*
Time Fame: *Immediate*
Responsible Agency: *Manly Council- Urban Services & NR*

5.1.4. Work with SES and other agencies to continuously update Emergency Action Plan including evacuation procedures in the event of storm surges and tsunami.

Context: *The State Emergency Service (SES) is an emergency and rescue service dedicated to assisting the community. It is made up almost entirely of volunteers, with 232 Units located throughout New South Wales. The Manly Unit was established in 1960. The SES is responsible for preparing plans for flood and storm emergencies. So far, three different plans, NSW State flood Plan, NSW State Storm Plan and NSW State Tsunami Plan have been prepared. As the study area poses risks from storms, tsunami and other hazards, it is necessary to have local Emergency Action Plan in place.*

Actions:

- *Work with SES to prepare local Emergency Action Plan in consultation with the community*
- *Involve Community to take responsibilities during emergency*
- *Enlist new volunteers*
- *Continue training program for volunteers*

Objectives addressed: ***5.1,*** *5.2, 5.3, 7.1*
Performance Target: *Emergency Action Plan updated*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *SES, Manly Council- Civic Services & NR*

5.2.1. Continue to work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.

Context: *Manly Council is collaborating, at present, with the Sydney Coastal Councils Group (SCCG) to understand implications of climate change at regional level through participation in susceptibility modeling. In a preliminary assessment, Manly LGA has been found to possess a moderate degree of vulnerability to climate change. The study area, however, faces high vulnerability to sea level rise, ecosystems and extreme rainfall and subsequent stormwater management. This collaboration has already proved to be fruitful. It has been indicated that modeling does not consider the level of protection provided by existing seawalls. At a later stage, the model results have to be refined by inclusion of the parameter.*

Action: *The option involves continuation of collaboration.*

Objectives addressed: *2.4, 2.5,* ***5.1,*** *5.2, 5.3*
Performance Target: *Model Results & Impact Report*
Indicative Cost: *High*

Time Fame: *Short term*
Responsible Agency: *SCCG, DECC, NSW GO, Manly Council- NR*

5.2.2. Continue to collaborate with the Sydney Coastal Councils Group investigating climate change adaptations in Manly.

Context: *Manly Council is collaborating, at present, with the Sydney Coastal Councils Group in systems approach to regional climate change adaptation strategies. In this project, CSIRO and the University of Sunshine Coast are contributing partners. Based on vulnerability assessment, suitable local level adaptation strategy and subsequently adaptation action plan will be prepared.*

Action: *The option involves continuation of collaboration.*

Objectives addressed: 5.2
Performance Target: *Adaptation Action Plan made*
Indicative Cost: *Medium*
Time Fame: *Continued*
Responsible Agency: *SCCG, DECC, Manly Council - NR*

5.2.3. Assess impact of climate change on areas of ecological significance and devise adaptive measures

Context: *In a preliminary assessment, the study area is expected to face high vulnerability to ecosystems due to impact of climate change. However, this has not yet been specified. It is believed that natural ecosystems have low resilience to the effects of climate change. Hence, there is need to plan and implement adaptive measures to prevent further damage to critical ecosystem of the study area.*
Actions: *Overlay map of areas of ecological significance (option 2.4.1) on climate change impact area map (option 5.2.1), define vulnerable ecosystems and devise adaptation measures.*

Advantages: *Impacts on ecosystems of the area will be specified. Adaptive measures will prevent further damage to critical ecosystems.*
Disadvantages: -

Objectives addressed: 5.2
Performance Target: *Ecological impact maps*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council - NR, SCCG*

5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and national projections

Context: *Prioritised and achievable adaptation measures to address the potential impacts of climate change in the Manly LGA need to be introduced.*

Actions: *This could be best achieved by integrating these measures into the existing strategic planning activities and risk management practices of Council. The process should be undertaken in accordance with the guidelines provided by the Australian Greenhouse Office in its publication - Climate Change Impacts and Risk Management – A Guide for Business and Government.*

Objectives addressed: 5.2, *5.3*
Performance Target: *New or revised policy documents accommodating CC*
Indicative Cost: *Low*

Time Fame: *Short term*
Responsible Agency: *Manly Council – Corporate Planning & Strategy*

6.6 OPTIONS ADDRESSING ESTUARY USE

6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.

Context: *In order to maintain and improve public recreational use of foreshore reserves and to achieve safer and better public areas, some facilities may need to be checked for their safety regularly. This includes visitor car parks, seats, lighting, picnic tables, barbecue facilities, landscaping and walking tracks (either formal or informal, and taking into consideration the need for disabled access to the foreshore). Council is already doing this on a regular basis.*

Actions:

- *Continuation of maintenance and safety checks.*
- *Increased patrolling of popular public places*
- *Work with Precincts to achieve safer and better public areas*

Objectives addressed: *5.1,* ***6.1****, 7.1, 8.5*
Performance Target: *Regular safety checks*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Urban Services & Risk Manager*

6.1.2. Install adequate garbage and waste recycling stations in public places.

Context: *Wastes from public places are collected twice daily by Council. There are 8 120-litre bins and 16 240-litre bins in public places within the study area including 5 recycle bins at Clontarf Reserve. Benefits of recycling include conservation of natural resources, for example, forests, energy and water; reduced amount of waste disposed in landfill and reduced greenhouse gases (carbon dioxide, methane, nitrous oxide). It is argued that recycling bins are inadequate. There is also complaining of inadequate number of general bins, especially in Ellery's Punt Reserve.*

Actions: *The option involves reassessment of bin numbers and locations to adequately attend to waste collection.*

Objectives addressed: *1.1, 1.3,* ***6.1***
Performance Target: *Recycling stations installed*
Indicative Cost: *Medium*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Waste Services*

6.1.3. Liaise with relevant state authorities regarding the replacement of existing signage with signage more sympathetic to the area.

Context: *Signs play an important role in the management of natural areas. This communication tool provides an important link between the various management authorities and the public. Signs can be used to orientate visitors (directional), inform them about their surroundings (interpretive), or influence their behavior (managerial).*

The improper, inconsistent or excessive use of signs may weaken their value as a means of communication and adversely affect the scenic amenity of the area and the quality of visitor experiences. Uniform sign design including appearance, construction and placement contributes to a recognisable identity for the management authority.

Actions: *This option involves replacement of such signage with signage more sympathetic to the area.*

Advantages: *Reduction of too many signages in any particular locations. Replaced signage should be simpler and easy to understand*
Disadvantages: *Important information/warnings may be lost with replaced signage.*

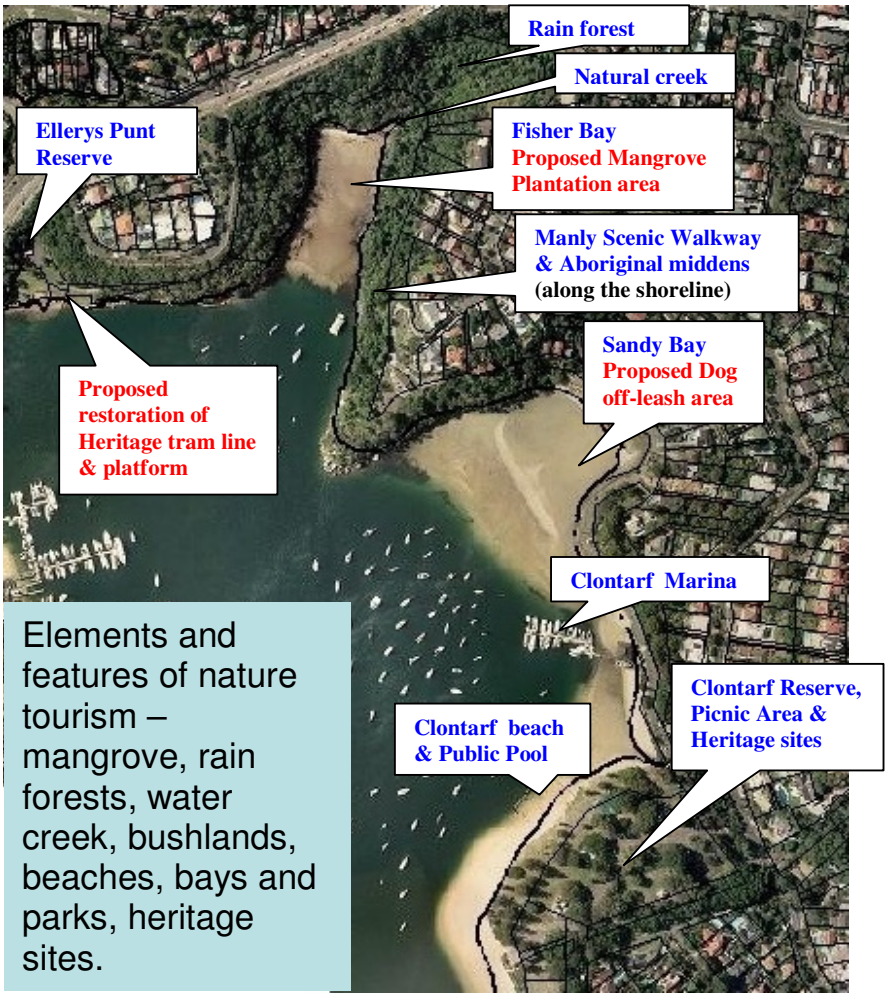
Objectives addressed: *1.8, 2.6,* ***6.1,*** *6.5, 9.3*
Performance Target: *Signage replaced with new ones*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – CEP, NR*

6.1.4. Promote natural features of Clontarf – Sandy Bay – Fisher Bay – Ellery's Punt Reserve' of the study area.

Context: *The study area, being more natural and green, is destination of mainly nature lovers and family visitors. There is an opportunity to enhance estuary and eco-based visitation in the study area. Clontarf Reserve, Sandy Bay, Fisher Bay and Ellerys Punt Reserve together can advantageously be promoted as 'Eco-educational Trail'. This part has all the elements and features – rain forests, mangrove, water creek, bushlands, beaches, bays, parks and heritage sites. Manly Scenic Walkway runs through the area.*

Actions:

- *Develop brochure and place interpretive signage at strategic locations*
- *Develop a school education program*



Advantages: The trails would serve to educate the public about the considerable values of estuary and its environs to the local flora and fauna. With a better knowledge of the environmental values, the public would be less likely to damage of threaten these values either intentionally or unintentionally.
Disadvantages: Poorly designed eco-educational trails could potentially do more harm than good, if increased traffic disturbs the native flora and fauna.

Objectives addressed: *2.3, 2.4,* ***6.4,*** *10.2*
Performance Target: *Brochure prepared*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council - NR*

6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.

Context: *Non-motorised boating activities such as sailing, rowing, kayaking, windsurfing and canoeing are popular activities in the study area. Kayaking is increasing in popularity as an individual pastime and as a commercial recreation activity. The use of non-motorised vessels provides access for water-based sightseeing and nature appreciation without the intrusive sounds and smells associated with motorised vessels. Potential impacts of non-motorised vessel based activities include fire, as well as littering and erosion, which are most noticeable on shore near anchorages and where people land vessels to go ashore. However, the impacts of non-motorised vessels on bank erosion are generally less than those of motorised vessels owing to the different design, displacement and speed of non-motorised vessels.*

Actions: *The option involves facilitating (option 8.3.1) and encouraging non-motorised boating.*

Objectives addressed: 6.2
Performance Target: *Facilities created*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – CEP, NR, NSW Maritime*

6.2.2. Encourage NSW Maritime to enforce current speed limits and mooring restrictions by increased patrolling.

Context: *The vast majority of users of Middle Harbour estuary does the right thing and is considerate of others. However, like most waterways, there is a small element of the boating community that continues to disobey restrictions and behaves inappropriately.*
Actions: *NSW Maritime, with assistance of the Water Police and other regulatory agencies, should consider ways that they can increase patrols of the estuary to enforce compliance with the boating rules and regulations.*

Objectives addressed: *6.1,* ***6.2***
Performance Target: *Patrolling increased*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *NSW Maritime*

6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.

Context: *There is overall support of the community to boating and other recreational activities but safety issue is very important. Clontarf Beach is used by swimmers and recreational boating in a*

largely harmonious manner. However, boats are not supposed to anchor within a certain number of metres from shore (particularly on a swimming beach). Boats clearly trespass within this limit on a regular basis and smaller boats even anchor on the shoreline posing a very serious safety concern for small children and adults alike. Boats mooring close to shore and landing at Castle Rock Beach are a safety hazard for children.

A 'swimming only' enclosure would restrict use of kayaks, windsurfers and small boats – this is not necessary. There was a proposal to close off Clontarf Beach to kayaks and boats some time ago, for alleged safety reasons but it failed for lack of resident support. A corridor for boats and kayaks is proposed.

Actions:

- *Discuss further with the community and boat owners regarding proposed corridor*
- *Work with NSW Maritime to investigate possibility of a corridor (marked with buoys)*
- *Assess enforcement and safety of child swimmers*

Advantages: *Will ensure safety of swimmers*
Disadvantages: -

Objectives addressed: *6.1,* ***6.2***
Performance Target: *Proposal prepared and considered*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *NSW Maritime, Manly Council - NR*

6.2.4. Maintain jetski (PWC) ban.

Context: *NSW State Government has placed a Ban on Jet Skis from October 01, 2001 within Sydney Harbour including Middle Harbour. There are 8,300 registered jet skis in NSW. While jet skis represent only eight per cent of all boating licenses, they accounted for 29 percent of all complaints (2000) to the Waterways Authority and 28 percent of all infringements. Water Police report indicated Clontarf in Middle Harbour as one of the hot spots where 50 jet skis get together. The request for the ban has come from councils, environmental groups, police and citizens' groups. The Government has taken these tough measures in response to:*

- *the excessive use of police resources to monitor jet ski behavior;*
- *safety concerns relating to jet skis;*
- *concerns about the impact of jet skis on native animals;*
- *hazard to other harbour craft such as ferries and pleasure and commercial craft;*
- *noise nuisance to families on the coastline and on the water.*

The penalties for breaching the exclusion zone will be:

- *A $800 on-the-spot fine and disqualification for two years for a first offence;*
- *A $1,200 on the spot fine and disqualification for four years for a second offence; and*
- *A $1,500 fine and disqualification for life for a third offence.*

Action: *The option involves continuation of the ban.*

Objectives addressed: *6.1,* ***6.2***
Performance Target: *Ban maintained*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *NSW Maritime*

6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment.

Context: *The social acceptability and community ownership of waterway usage could be improved by increasing the knowledge base of all boat users in relation to acceptable and safe forms of boating. Starboard Right & Green is a marine environmental education program undertaken by Manly Council. It aims to educate recreational boat users (RBU's), industry and the general community about ways to interact with the marine environment in a sustainable way. The program targets five key marine issues*

- *Caulerpa taxifolia - raising awareness of the invasive seaweed that is colonising Manly's waterways*
- *Waste - encouraging the proper management of waste during marine activities*
- *Pollution – encouraging the minimisation of pollution as a result of marine activities*
- *Little (Fairy) Penguins – raising awareness about the existence and protection of Manly's critically endangered Little Penguin colony*
- *Seagrass – raising awareness about ways to protect this vital habitat in our marine ecosystems*

Manly's marine environment is highly diverse and supports many delicate ecosystems and an abundance of life, including 16 protected, vulnerable, or endangered species, such as the Little Penguin. Starboard Right & Green aims to educate people about the preservation of this marine environment to ensure its survival for future generations to enjoy.

Action: *The option involves continuation of the program.*

Objectives addressed: 6.2, *6.5*
Performance Target: *Education program continued*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – CEP*

6.3.1. Support continuation of ban on commercial fishing.

Context: *A ban has been placed on commercial fishing as a precautionary measure when test results have revealed elevated levels of dioxins in fish and crustaceans across the Harbour, including Parramatta River and other connected tidal waterways. This fishing closure took effect at 5:00pm on 10 February 2006 and remains in effect until 9 Feb 2011, unless sooner amended or revoked.*

Recreational fishing in the Harbour has not been banned, but fishers are urged to follow dietary advice on the consumption of seafood from the Harbour and to be aware of existing fishing restrictions. An expert panel has recommended that fish and crustaceans caught west of the Sydney Harbour Bridge should not be eaten. For fish caught east of the Sydney Harbour Bridge, dietary limitation of not more than 150 grams per month has been placed. Higher amounts of some fish and crustacean species may be eaten.

Action: *The option involves continuation of the ban.*

Objectives addressed**:** 2.4, 6.1, **6.3**
Performance Target: *Ban maintained*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *DPI-Fisheries, SCCG, SMCMA, MC (NR)*

6.3.2. Encourage DPI (Fisheries) & NSW Health to monitor Dioxin levels in Sydney Harbour waters.

Context: *The Department of Primary Industries acts on advice from NSW Health and the NSW Food Authority on fish contamination issues. The Department of Primary Industries also acts on advice from the Department of Environment and Climate Change on ecosystem contamination issues. When advised by these agencies, the Department of Primary Industries takes action by implementing fishing closures where appropriate, communicating health warnings where appropriate, and assisting these agencies with sampling of fish.*

About 400 fish have been tested in total as part of the comprehensive testing regime till December 2006 (DPI 2007). Some good news for the State's anglers with several recreational fish species caught east of the Sydney Harbour Bridge found to be relatively free of dioxin. Unfortunately, the tests for commercial species such as Bream, Prawns and Squid are so high as to make it impossible for commercial fishing to return to the Harbour in the foreseeable future.

Action: *The option involves continuation of monitoring of dioxin levels.*

Objectives addressed: *2.5, 6.1,* ***6.3***
Performance Target: *Dioxin level monitored*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *DPI – Fisheries, NSW Health, SCCG, CMA*

6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag limits, size limits and species types) through NSW Fishcare Program

Context: *Fishing is possibly the most common recreational activity undertaken within the study area. Various bag and size limits apply to recreational fisher people for most common fish species. However, not everyone adheres to these regulations.*

Actions: *The option involves facilitating recreational fishing through educational program. Fishcare Volunteers talk to anglers about fishing rules and responsible fishing and help in a range of activities, such as fishing clinics, catch surveys and community fishing events.*

Objectives addressed: *2.6, 6.1,* ***6.3***
Performance Target: *Education program implemented*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council - CEP, DPI - Fisheries*

6.4.1. Promote community events and education program to achieve sustainable use of the estuary.

Context: *Targeted community events and education programs always contribute to sustainable use of natural resources. Education should target the appropriate and considerate use of foreshore areas. This would include:*

- *Litter collection;*
- *Picking up dog faeces (with bins provided);*
- *Conservation of foreshore habitats and the ecology of the inter-tidal zone;*
- *Areas unsuitable for swimming;*
- *Consideration of wading or roosting migratory birds (and the potential disturbance by humans, dogs and noisy activities).*
- *Responsible bait collection and compliance with Fisheries Bag Limits.*

Community events, such as Clontarf 700, a recently initiated swimming event held in December, can be used to promote sustainable use of the estuary

Actions: *This option involves education of users of the foreshore areas. Signage should be placed at key access points, while follow-up education should be carried out through specific or general mail-outs (e.g. with general Council rates notices). Manly Council can support and promote 'Clontarf 700' and use the event to promote messages of sustainable use of the estuary.*

Objectives addressed: *1.8, 2.6, 3.5, 4.1, 6.4,* ***6.5***
Performance Target: *Education program*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – CEP, NSW Maritime & DPI-Fisheries*

6.7 OPTIONS ADDRESSING ACCESS

7.1.1. Assess and improve safety condition and maintain natural vegetation along existing foreshore access paths.

Context: *In order to improve public access to the foreshores and increase opportunities for public recreational use of foreshore reserves, some facilities may need to be upgraded. Wherever possible, public access ways should be confined to areas of low conservation significance. Where there is a strong demand for public access to foreshore areas of high conservation significance, such access should be formalised and closely controlled to minimise environmental damage. Any foreshore restoration or rehabilitation works necessary should also be undertaken as a part of the access improvement works. Council would be responsible for managing public access and constructing additional facilities and services around the foreshores of estuary.*

Actions:

- *Assess safety condition of existing access paths*
- *Improve safety condition*
- *Maintain natural vegetation along existing paths*

Objectives addressed: *2.4, 6.1,* ***7.1****, 10.2*
Performance Target: *Safety of access paths improved*
Indicative Cost: *Medium*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Parks & Reserves*

7.2.1. Enhance maintenance schedule and retain and enhance the native vegetation along the Manly Scenic Walkway.

Context: *The Manly Scenic Walkway (MSW), opened in 1988, is one of the key attractions of the study area. It is also one of the popular destinations of visitors. Encompassing panoramic views of the majestic entrance to Sydney Harbour and swathes of bushland, walkers are able to contrast the old and new Australia as they pass by modern harbourside suburbs juxtaposed with Aboriginal sites, native coastal heath and pockets of sub-tropical rainforest. This walkway is regularly maintained jointly by the Manly Council and National Parks and Wildlife Services. However, there are often complaints of low maintenance and weeding.*

Actions:

- *Assess ways to increased maintenance, especially during high use season*
- *Encourage native vegetation all along the route*

- *Place interpretive signage on interesting plants*

Objectives addressed: *6.1,* ***7.1,*** *7.2*
Performance Target: *Maintenance enhanced*
Indicative Cost: *Medium*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Parks & Reserves*

7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.

Context: *The Manly Scenic Walkway (MSW), opened in 1988, is one of the key attractions of the study area. It is also one of the popular destinations of visitors. Walkers are able to contrast the modern harbourside suburbs juxtaposed with Aboriginal sites, especially middens. Of the* recorded 22 Aboriginal sites within the study area (personal communication, AHO), 16 are middens. One of them is located near Sandy Bay in the middle of Manly Scenic Walkway and is badly eroded. In order to protect this midden, there is need also to realign MSW or take alternative measures. In this case realignment is not possible.

Actions:
Conservation effort is already included in Aboriginal Sites Works Program 2007 (AHO 2007). The plan includes upgrading of track and viewing area.

- *Assist AHO in implementation*
- *Revise interpretive signage*

Objectives addressed: ***7.2,*** *9.1*
Performance Target: *Boardwalk installed*
Indicative Cost: *Medium*
Time Fame: *Immediate*
Responsible Agency: *AHO, Manly Council – Parks & Reserves*

7.2.3. Assess ways to improve use value of the MSW and implement.

Context: *The Manly Scenic Walkway (MSW), opened in 1988, is one of the key attractions of the study area. It is also one of the popular destinations of visitors. In order to enhance its use value, the Manly Scenic Walkway is comprised of a number of connecting walks, with walking grades to suit everyone. The walkway passes through Sydney Harbour National Park, Council bushland reserves, local harbourside streets and paved paths. Newer section of the walk is always added and include Blue Fish track, taking in North Head and allowing walkers to access the clifftops of this remarkable headland via Shelly Beach. In order to maintain continuous interest, the use value of the walkway needs to be improved. This can be done by increased signage, creating variations on tracks etc. Signage has recently been upgraded along the Walkway.*

Actions:

- *Organise regular guided walk*
- *Organise art or essay competition among school students*
- *Create further variations on the walk*

Objectives addressed: *6.1, 6.4,* ***7.2,*** *10.2*
Performance Target: *Various programs implemented*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Parks & Reserves*

7.3.1. Audit disability access of all parks and bays within the study area.

Context: *An audit is required to plan improving facilities for persons with disabilities and seniors through the provision of enhanced infrastructure and facilities. This will allow them easy access to reserves and where possible to bays and water fronts. An access audit was done around Seaforth shopping area earlier (Hockley & Stanbury 1997). The need for an audit is in line with the federal Disability Discrimination Act and also Manly Council's Social Plan 2004. People with a disability and services identified problems with wheelchair access to theatres, libraries, parks, shops, doctors' surgeries and banks. This issue was also related to the problem of uneven footpath surfaces. People with a disability and service providers identified the supply of accessible transport services including taxis for the disabled, transport for medical appointments in an emergency, and wheelchair friendly public transport as a high priority need for Manly residents. Accompanying this issue were the problems associated with infrastructure such as a lack of waterproof bus shelters and the short time phasing of lights at intersections.*

Actions:

- *Revise Seaforth Access Audit: Findings and Recommendations based on present context.*
- *Extend Seaforth Access Audit to include parks, bays and beaches of the study area*
- *Discuss the proposal with the Access Committee, Manly council*
- *Implement disability access at priority locations.*

Objectives addressed: *7.1,* ***7.3***
Performance Target: *Audit completed*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Planning & Strategy*

7.4.1 Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flat as off-leash dog area.

Context: *Dog exercising is a popular activity for many members of the community. There are a number of leash-free areas along the foreshores that are frequented by the public and their companion animals. Dogs are allowed on a leash in the Clontarf Reserve during specified time and days. Alternative dog routes are marked on the Manly Scenic Walkway. Dogs are allowed off the leash in most of Council's reserves. Dogs are not permitted on any beaches or in swimming enclosures.*

However, dogs are seen both on and off the leash, though illegally, on Sandy Bay tidal flat. Hence, there is both desire and demand by dog owners to declare Sandy Bay as an official (legal) off-leash dog area. Companion Animal Committee of the Manly Council has also recommended similar resolution.

An official declaration may require approval under the Federal legislation through the Environmental Protection and Biodiversity Conservation Act 1999 of Environment Australia.

Actions:

- *Obtain further community feedback and support on the proposal*
- *Analyse feed back to formalise a proposal to seek legislative approval*
- *Declare Sandy Bay as off-leash dog area with appropriate signage*
- *Enforce controls in other areas through education and increased patrols.*

Objectives addressed: *6.1, 6.5,* ***7.4***
Performance Target: *Off-leash dog area declared*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Planning & Strategy, Rangers, Precincts*

7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.

Context: *Dogs are a valued part of our community, but their faeces contribute to stormwater pollution and, subsequently, to pollution of waterways and beaches. Uncollected dog faeces have long been the scourge of sports fields and recreation reserves, for the impact they have on both amenity and human health. Dog faeces are a significant contributor to the pollution of our estuary and bushlands, as they are washed into the stormwater system after rain. Dog faeces are a source of nutrients, a potential source of pathogens and reduce the available oxygen in water when they are broken down.*

Manly Council was participating in the Community Watch-dog Project to set up a system so dog owners could be responsible for their pets' waste and dispose of it thoughtfully. Councils recruited volunteers, many of whom were dog owners. Volunteers were trained to inform other pet owners about stormwater pollution from dog faeces and provide them with Pooch Pouches (small purses that could be attached to dog leads and contained biodegradable dog litterbags).

In addition, Manly Council has already made a number of dog faeces bins and dog dispensers at key locations. These are not regarded as adequate.

Actions:

- *run a systematic education program around dog owners and water pollution*
- *Install additional dog faeces bins and bag dispensers*
- *Schedule regular and frequent collections from these bins*
- *Install regulatory signs advising dog owners of appropriate conduct and penalties associated with non-compliance through increased patrol.*

Objectives addressed: *6.1,* ***7.4,*** *8.5*
Performance Target: *Facilities established*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Waste Services*

6.8 OPTIONS ADDRESSING FORESHORE INFRASTRUCTURE & FACILITIES

8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.

Context: *Seagrass beds are usually damaged through the effects of water pollution, foreshore development and the recreational use of our waterways. This can be avoided by adhering to the following:*

- *Avoid driving boat across shallow, weedy areas, as boat propellers act like harvesters on seagrass;*
- *Avoid anchoring on seagrass beds, as anchors can dislodge seagrass plants; and*
- *Contact local NSW Maritime Office to discuss relocating current mooring if it is currently over a seagrass bed.*

Actions:

- *DPI is also undertaking an inventory of sea grasses in NSW which, once completed, will be included in NSW Maritime' boating maps to assist to avoid anchoring, and to determine mooring areas.*
- Mark out seagrass beds with buoys

Objectives addressed: *2.1, 2.2, 2.4, 6.1,* ***8.1***
Performance Target: *Seagrass beds marked*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *DPI – Fisheries, NSW Maritime, Manly Council - NR*

8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings

Context: The NSW Maritime is currently trialing seagrass friendly moorings in an attempt to minimise the impact of boating on seagrass beds. Many private companies have patented and marketed seagrass friendly mooring. One of such mooring system uses a single point screwed into place mooring post as the anchor point. Attached to the mooring post just below the sea bed is a set of load spreaders to stabilize the post. This is then attached to shock absorber to the swivel head and run a hawser rope from the shock absorber to a surface buoy.

Actions: The option involves working with NSW Maritime to introduce seagrass friendly moorings in the study area.

Objectives addressed: *2.1,* ***8.1***
Performance Target: *Moorings introduced*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *NSW Maritime, SCCG, CMA*

8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.

Context: *Clontarf beach is subjected to erosion/siltation due to various factors including boating. The number of license holders along Clontarf Beach is one (Clontarf Marina) for commercial and eight for private moorings. Huge number of boats crams in to the southern end of Clontarf beach creating a navigation and safety hazard and damage the sea bed of dragging anchors. These boats present a danger to swimmers in the water. Additional risk is created by sewerage discharge from vessels anchor in a popular swimming area*

Actions: *As also discussed with Nick Richards of NSW Maritime, are:*

- *That a moratorium be placed on the number of permanent moorings along Clontarf Beach*
- *That the moorings be re-aligned to form a sort of buffer to visiting day vessels*
- *That consideration be given to install*

where possible a small number of sea grass friendly temporary use moorings towards the Northern end of Clontarf Beach

Objectives addressed: *6.1,* ***8.1***
Performance Target: *Moorings realigned*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *NSW Maritime, Manly Council - NR*

8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area and specify alternative locations.

Context: *Pontoons and jetties within the study area are generally privately owned and are located along foreshores between the Spit Bridge and the Pickering Point. There are no public pontoon/jetties.*

However, there is a proposal to install a jetty access and public floating pontoon at Powder Hulk Bay, beside or the site of the collapsed Sangrado Pool, to provide recreational boating access to the Harbour for boat owners, nearby residents and the general public. There are a significant number of boat moorings in Powder Hulk Bay which will benefit from this new access. Manly Council has already received a grant from the NSW Maritime to construct this pontoon. Although the tentative time of construction is yet to decided, detailed designs of the pontoon has already been made.

There is overwhelming demand for a public pontoon near Clontarf Swimming Enclosure.

Besides, there is remnant of a 1906 wharf located off Laura Street, Seaforth. Laura Street Wharf site is still used by mooring licensees for Seaforth to store their dinghies, as there is no other public access (personal communication, Anita Robinson, NSW Maritime).

Actions:
- *Review existing public waterway infrastructures within the study area*
- *Assess adequacy of existing public structures and identify additional needs*
- *Identify alternative locations considering public demand for a public pontoon near Clontarf Swimming Enclosure.*
- *Carry out environmental study of any selected site*
- *Seek financial support from the NSW Maritime to build additional public pontoons within the study area.*

Objectives addressed: *6.1, 7.1,* ***8.2***
Performance Target: *Assessment made*
Indicative Cost: *Medium*
Time Fame: *Short term*
Responsible Agency: *NSW Maritime, Manly Council – Urban Services*

8.3.1. Install horizontal dinghy and kayak storage racks at Sandy Bay in consultation with nearby residents and dinghy owners.

Context: *Lack of dinghy and kayak storage was identified as a key issue. Historically dinghies have been stored along the foreshore of Sandy Bay, Sangrado and Pickering Point. The extensive number and random storage of dinghies and other boats along the foreshore of the study area impact on the aesthetic and environmental nature of the area. Installation of horizontal dinghy storage is proposed for safety, park maintenance and liability reasons. In determining dinghy storage arrangements in the area, Council should also consult with Clontarf Marina and Northbridge/Seaforth Moth sailing Club to seek involvement in maintaining and administering dinghy storage facilities for use by those using moorings licensed directly from Waterways. This option should be explored in light of the space limitations within the reserve areas. Similar to Council facilitated formal dinghy storage facilities at*

Little Manly and Forty Basket, new storage is also subject to registration and 'boat storage fee' charged per annum.

The presence of dinghies along the foreshore has been found to damage tree bark and numerous informal tracks have been formed due to inappropriate dinghy storage and access. It was also recommended that chaining boats to trees and dragging them through the bush should be prohibited. At places, Aboriginal midden sites have been affected.

Actions:

- *Consult with Clontarf Marina and Northbridge/Seaforth Moth Sailing Club regarding opportunities for formal dinghy & kayak storage system at their premises.*
- *Investigate appropriate design and location for dinghy and kayak storage facilities within Sandy Bay*
- *Seek community and Precinct feedback*
- *Introduce a dinghy registration/licensing system to establish improved storage.*
- *Regulate dinghy storage to ensure vessels are consolidated into identified dinghy storage facility*

Objectives addressed: *6.2,* ***8.3***
Performance Target: *Storage rack installed*
Indicative Cost: *Medium*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Urban Services, Design & Technical Group*

8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore

Context: *Dinghy storage facilities can be installed at limited sites within the study area. At some sites, like Gurney Crescent and Castle Circuit, it will not be feasible to install storage facilities. It is expected that dinghy and kayak owners will continue to store dinghy by chaining to trees. The presence of dinghies along the foreshore has been found to damage tree bark and numerous informal tracks have been formed due to inappropriate dinghy storage and access. One of the alternatives is to install rods/poles to allow owners tie dinghies to these poles instead of trees. Simultaneously run educational programs and enforce compliance*

Actions:

- *Assess and install rods/poles at convenient locations at Gurney Crescent & Castle Circuit*
- *Initiate educational programs. It aims to educate recreational boat users (RBU's), industry and the general community about ways to interact with the foreshore environment in a sustainable way.*
- *Seek community support and enforce compliance.*

Objectives addressed: *6.2,* ***8.3***
Performance Target: *Rods/poles installed & Education program initiated*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – CEP, Precincts*

8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.

Context: *Sangrado Bath is a 25-metre by 20-metre netted swimming enclosure in Powder Hulk Bay. This bath has recently collapsed (August 2007) and community, in general, desire restoration of the bath.*

Unlike Clontarf Swimming enclosure, this bath does not experience siltation. However, water quality is affected by bacterial contamination from nearby sewage overflow point. Sangrado Bath is clearly the worst of the three sites, and has a history of bacterial contamination. It did have 100% compliance with faecal coliform guidelines for two years between 1999 and 2007, but in all of the other years its compliance was lower than the other sites. Compliance with enterococci guidelines was much worse, with only three years between 1999 and 2007 above 80% compliance, and one year below 30% compliance.

This bath is subject to significant marine growth, particularly oysters. The oysters cover not only the enclosures themselves, but also the steps leading into the pools, and the floor of the pools. This has made these pools also virtually unusable, due to the dangers associated with the extremely sharp oysters.

Actions: *Council, at its meeting on 10th September 2007, has resolved to refurbish/replace the Sangrado bath. This will be done in conjunction with construction of a wharf and pontoon (mentioned under 8.2.1). . Following the Council motion, relevant actions are:*

- *Seek community input and feedback on this decision.*
- *Design the refurbishment to incorporate the access wharf and pontoon to synergise costs subject to heritage considerations and appropriate clearances from Fisheries.*
- *Seek grant funding from appropriate sources.*
- *Review the maintenance programme for the new pool.*
- *Raise the sewer overflow at Sangrado Pool at the Sydney Water partnership meeting.*

The replacement cost has been estimated to be between $100,000 to 150,000.

Objectives addressed: *6.1,* ***8.4***
Performance Target: *Sangrado swimming enclosure restored*
Indicative Cost: *High*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – Urban Services*

8.5.1. Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations

Context: *Clontarf Reserve and other reserves near beaches are popular places, especially for both local and visitor families. It is important that general amenities are not only maintained but also enhanced and upgraded. Additional public toilets and telephone booths are located conveniently for general and emergency use. Street lights are also upgraded in popular reserves.*

Actions: *The option involves auditing of existing public facilities and in consultation with Precincts, encourages relevant agencies to establish further additional facilities. Indicate locations and directions of Clontarf Reserve and beach with additional signage on main roads.*

Objectives addressed: *6.1, 7.3,* ***8.5***
Performance Target: *Facilities enhanced*

Indicative Cost: *High*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Urban Services*

8.5.2. Improve and facilitate traffic management around public reserves and beaches

Context: *According to community consultations, traffic is well managed at present.* Traffic / parking management only required on Boxing Day and New Years Day at Clontarf. Blocking of footpaths by illegal parking of cars and trucks (generally) remains a problem. Installation of more parking meters is not favoured by resident as they attract more cars in the area. However, pedestrian crossings and traffic lights should be reviewed to facilitate better traffic arrangements and safety.

Actions:

- *Continue Freebie bus as a permanent service to the community*
- *Prune trees at Holmes Avenue for safety reasons*
- *Install a pedestrian crossing at Ethel Street (already planned)*
- *Overhaul traffic management with the proposed Seaforth town centre upgrade.*

Objectives addressed: *6.1, 7.1,* ***8.5***
Performance Target: *Improved traffic management*
Indicative Cost: *Medium*
Time Fame: *Short term*
Responsible Agency: *RTA, Manly Council – Urban Services, Risk Manager*

8.5.3 Ensure safety and crime prevention in public areas

Context: *Vandalism and theft are contained at present but can increase any time. Graffiti on* the Seaforth public toilets, Seaforth community centre and the Middle Harbour Siphon are a disgrace, and the areas close to the water have been similarly afflicted. Community, as a whole, can participate in preventing these damages. Installation of more street lighting, CCTV cameras can facilitate crime prevention

Actions:

- *Enhance street lighting*
- *Install CCTV cameras at strategic locations*
- *Continue & strengthen Neighbourhood Watch program*

Objectives addressed: *6.1, 7.1,* ***8.5***
Performance Target: *Improved safety*
Indicative Cost: *Medium*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Urban Services*

6.9 OPTIONS ADDRESSING HERITAGE CONSERVATION

9.1.1 Review Aboriginal Site Management Report for Manly Council (2006) and associated reports to prioritize management needs and develop a plan of implementation.

Context: *The Aboriginal Heritage office (AHO) has prepared the Aboriginal Site Management Report (2006) for Manly Council. This report has been reviewed. While 9 sites are in good to reasonable condition, others show signs of degrees of degradation because of exposure to external uses. Two of the sites are located on the Manly Scenic Walkway. This report has been used to prioritize management needs. An annual Sites Works Program 2007 has been prepared.*

Action: *The option involves continuation of Aboriginal site management through formulation of Works program. Consult and maintain liaison and seek approval with the Metropolitan Aboriginal Lands Council and Aboriginal Heritage Office.*

Objectives addressed: 9.1
Performance Target: *Prioritisation done*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *AHO, Manly Council – Planning & Strategy*

9.1.2. Prevent further damage to Aboriginal middens in critical condition.

Context: *Of the 22 Aboriginal sites within the study area, 16 are open middens and/or shelters with middens. Shell middens are places where the debris from eating shellfish and other food has accumulated over time and may contain: shellfish remains, bones of fish, birds, and land and sea mammals used for food, charcoal from campfires and tools made from stone, shell, and bone. Estuarine and coastal middens tend to be larger than riverbank middens.*

Many of the middens are in critical condition. Aboriginal Site Management Report (2006) for Manly Council has recorded conditions of each midden. At places, dinghies are stored on Aboriginal middens.

Actions: *The option involves supporting AHO in site conservation through Annual Works Program. In fact, Aboriginal Sites Works Program 2007 (AHO 2007) has listed five midden sites within the study area for conservation efforts: one at Sangrado Reserve and four at Fisher Bay. Boardwalk is being considered for middens on or beside Manly Scenic Walkway.*

The option 7.2.2 describes protection measure of a midden at Fisher bay.

Consult and maintain liaison and seek approval with the Metropolitan Aboriginal Lands Council and Aboriginal Heritage Office.

Objectives addressed: 9.1
Performance Target: *Physical protection done*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Planning & Strategy, Parks & Reserves; AHO*

9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.

Context: *Outdoor education programs can champion ecological sustainability through activities which demonstrate and build respect for places of natural and cultural significance. Some visitors may not be aware that certain places have spiritual and cultural significance for Aboriginal people. This may mean that visiting particular sites by men or women or other groups is not culturally appropriate. In these cases, explaining why it is not possible to visit a particular site will build greater appreciation and understanding about cultural heritage. Respect towards Aboriginal sites and the wishes of local Aboriginal people is the key issue in managing negative cultural impacts.*

Physical impacts on Aboriginal sites are also important, as these sites may be fragile and subject to natural weathering or erosion. Eating or drinking at an Aboriginal site is not appropriate. Touching or walking on sites, damaging grooves by rubbing stones or sticks in them, drawing or outlining marks, scattering sand or pouring water on sites for better photographs, or disturbing artifacts, vegetation or rocks can all contribute to significant physical impact on Aboriginal sites.

Physical impacts on natural heritage can be minimised by encouraging behaviors which support environmental sustainability.

Actions: *This option requires a few sites to be identified, in consultation with the Aboriginal community, for educational purposes.*

Consult and maintain liaison and seek approval with the Metropolitan Aboriginal Lands Council and Aboriginal Heritage Office.

Objectives addressed: *6.4,* ***9.1,*** *9.3*
Performance Target: *Educational sites identified & used*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *AHO, Manly Council – Planning & Strategy*

9.1.4. Develop management guidelines for sites that are located within private properties.

Context: *Two of the 22 Aboriginal sites are located on private properties within the study area. One of the management options is to sign Voluntary Conservation Agreements. This will facilitate permanent protection of areas of Aboriginal sites and historic places. Agreement is registered on property title & continues with change of ownership. The Agreement is usually supported with providing assistance to landholders with local Government rate relief, state land tax concessions and financial assistance for on ground works*

Actions: *AHO can be encouraged to prepare management guidelines for these sites. Consult and maintain liaison and seek approval with the Metropolitan Aboriginal Lands Council.*

Objectives addressed: 9.1, *9.3*
Performance Target: *Guidelines prepared*
Indicative Cost: *Low*
Time Fame: *Medium Term*
Responsible Agency: *AHO*

9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.

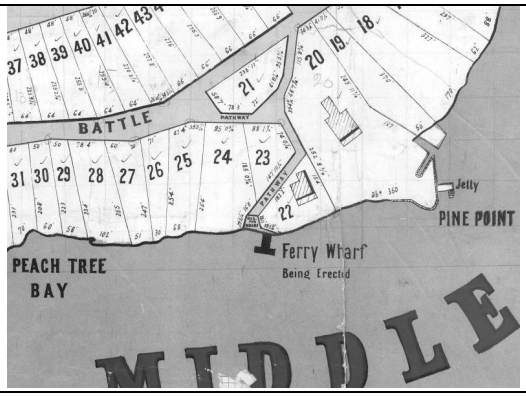
Context: *"Items of the environmental heritage" means a building, work, relic, place or tree, of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the Manly Council area and situated on (or within) land. Under the Schedule 4 of the Manly LEP (1988 updated in 2006) identifies all landscape, architectural and archeological heritage items.*

Actions: *Manly Council is currently undertaking a comprehensive heritage review for the local government area to prepare Manly's Sustainable Heritage Conservation Plan. This review will include the assessment of approximately 200 potential additional heritage items of the built and natural environment for possible listing on the Manly LEP.*

Objectives addressed: 9.2
Performance Target: *Review completed*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – Planning & Strategy*

9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.

Context: *There is remnant of a 1906 wharf located off Laura Street, Seaforth (Figure a). The wharf site is not heritage listed individually. As the record goes, "In 1906 Henry Halloran envisaged a ferry service to the city from a wharf at the bottom of stairs that go down from Seaforth Crescent alongside Laura Street. It is shown on the 1906 Seaforth subdivision plan as "under construction" (Figure b). "It will not take Seaforth long to have a fleet of regular ferry steamers equal to Manly's", stated Halloran's publicity." The ferry did not eventuate.*

Figure a. Remnants of Laura Street Wharf (08/08/2007)		**Figure b: Laura Street Ferry Wharf as shown in 1906 Seaforth Subdivision Plan**
		

Action: *The option involves assessment of heritage status and possible inclusion in the heritage list.*

Objectives addressed: 9.2
Performance Target: *Assessment made*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Planning & Strategy*

9.2.3. Ensure physical protection and maintenance of all heritage listed items.

Context: *It is likely that many sites of historical significance (primarily European heritage) have become degraded with time. Some of these sites are still used on a regular basis (e.g. swimming enclosures and seawalls) and in some cases, may represent a public risk.*

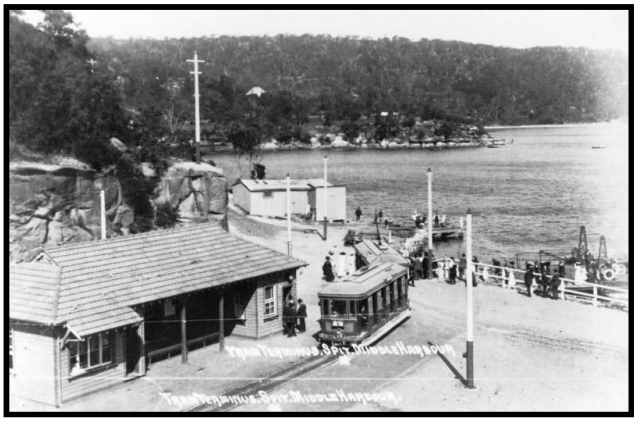
Action: *This option involves Council carrying out repairs to these structures to ensure their integrity, or possibly restoring currently degraded structures / sites as show-pieces of former usage and estuary based activities.*

Council would primarily be responsible for the repairs and restoration of historical items / structures under its control, however, for structures on the water edge below the high water mark (and therefore on Crown Land), DPI -Fisheries) and DECC may also be partially responsible.

Objectives addressed: 9.2
Performance Target: *Maintained & cleaned*
Indicative Cost: *Low*
Time Fame: *Immediate*
Responsible Agency: *Manly Council – Urban Services, AHO*

9.2.4. Explore feasibility of restoring a small part of old tram line near the Spit Bridge to signify historical past.

Context: Tram was an important means of transport in Manly. The tramline was opened in 1911 and remained operational till 1939. Part of its permanent way is now covered by Manly Road. Some ballast that the track was laid on can still be seen near the end of Manly Scenic Walkway. It is proposed to restore a part of the track with a replica of the tram. This will be added as attraction of the area with both historical and educational values.



Actions:

- *Seek community support*
- *Discuss with Sydney Railway Museum and/or NSW Tourism*
- *Implement*

Objectives addressed: *6.4,* ***9.2,*** *9.3*
Performance Target: *Proposal prepared & discussed*
Indicative Cost: *High*
Time Fame: *Long term*
Responsible Agency: *Manly Council – Planning & Strategy*

9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children

Context: *There is a range of activities already being carried out in the region to promote Aboriginal heritage and culture. From the annual Guringai Festival to a local council training course, to a sign on a track visited by tourists, Aboriginal heritage is being increasingly highlighted. A large proportion of the education and training programs conducted by the AHO are held outdoors on guided walks. Awareness campaign can be based on Aboriginal Heritage Promotion (AHO 2007).*

Actions: *The option involves assisting AHO in continued awareness campaign.*

Objectives addressed: 9.3
Performance Target: *Regular campaign organised*
Indicative Cost: *Low*
Time Fame: *Continued*
Responsible Agency: *Manly Council – CEP, AHO*

9.3.2. Place appropriate interpretative signage on key Aboriginal heritage sites.

Context: *One of the main threats to Aboriginal sites is ignorance, with people causing damage to sites either because they are unaware of their presence or unaware of their values and significance. Appropriate and well-designed permanent signage can provide to a much greater audience (AHO 2007). There are many sites on or near public tracks and vantage points which are visited or passed by the public every day. Some sites already have signage. It is important to consider what sites could be signposted to help protect them, while also carefully weighing up the possible risks. AHO has recently identified and prioritised the best sites for signage works (AHO 2007).*

AHO has identified 17 sites within Manly LGA suitable to consider for future signage and promotion. Of these, six are located within the study area (AHO 2007).

However, the placement of signage should not negatively impact the physical fabric of a site. Works should also aim to be complementary to the local environment from an aesthetic point of view. The principles below, among others, are provided with these aims in mind:

- *Signage should not be placed within the site's fabric*
- *All Physical work should be reversible i.e. should be able to be removed without leaving any permanent damage*
- *Signage should promote, not dominate the place*
- *Works near a site to be authorised by the AHO and MLALC*
- *Works should not involve any excavation or cutting into any potential archaeological deposit*
- *All works should be documented and appended to site cards for future reference.*

Actions: *The option involves assisting AHO in placing appropriate interpretative signage on key sites. Consult and maintain liaison and seek approval with the Metropolitan Aboriginal Lands Council.*

Objectives addressed: 9.3
Performance Target: *Signage installed*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *AHO, Manly Council – CEP*

6.10 OPTIONS ADDRESSING MONITORING

10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.

Context: *Monitoring is a critical component of both estuary management in general and estuary process modeling in particular. When used for management purposes, monitoring provides an on-going picture of the health and response of the estuary e.g. water quality levels, species diversity, seagrass beds etc. To obtain the best value from estuarine monitoring programs, monitoring objectives have to be carefully defined before monitoring operations commence. Further, monitoring results need to be continuously reviewed during the program to facilitate program modification. It is customary to prepare an M&E (Monitoring & Evaluation) Program report describing parameters, indicators, mechanisms including frequency and agency responsible.*

Actions:
- *Prepare M&E Program report*
- *Ensure wider participation and acceptance by different agencies and interest groups*
- *Establish collaborative MoUs with other agencies to undertake monitoring program*
- *Implement*

Objectives addressed: 10.1, *10.2, 10.3*
Performance Target: *M& E Program Report prepared*
Indicative Cost: *Medium*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – NR, Environmental Health*

10.1.2. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.

Context: *Based on the M&E Report (option 10.1.1), monitor the environmental health of the estuary.*

Actions: *In order to monitor environmental health of the estuary, the following parameters will require on-going monitoring:*

Water quality

Water quality monitoring will need to include a basic suite of physico-chemical parameters, including nutrients, as well as chlorophyll-a (a proxy for algal growth) and toxicants, such as metals. Supplementary monitoring programs assessing the phytoplankton (algae) / zooplankton relationships within Bantry Bay estuary could also be carried out, subject to funding constraints and relevant research opportunities. In addition to water quality, bacterial monitoring (i.e. faecal coliforms and enterococci) will also be required at all designated swimming areas. This is mostly covered already by the DECC Harbourwatch program. Council could also consider monitoring for faecal sterols, which is proving to be a good indicator of faecal contamination and may be a better proxy for the viruses and pathogens that pose a risk to human health. Further testing should be undertaken to determine the origins of faecal contamination of the waterway (i.e., whether from humans or animals) in order to better tailor future management options.

Stormwater around Manly is being monitored via automated stormwater samplers that have been installed in each catchment to target key pollutants of concern. These pollutants drain into and affect Burnt Bridge Creek, Manly Lagoon and Manly Beach. Information gathered by the automated stormwater samplers helps Council to understand how we can continually improve the quality of our waterways and what areas are hot spots needing more attention.

Sediments

Sediments are unlikely to change very rapidly, so monitoring of sediments can occur on a more infrequent basis. Sediments will need to be monitored for:

- *Rate of accumulation (siltation);*
- *Rate of runoff from the catchment (which can be determined by the capture rates of gross pollutant traps (GPTs) and other silt trapping devices);*
- *Toxicants;*
- *Organic and inorganic nutrients (and associated release to the water column).*

Sites of foreshore erosion will also need to be monitored to determine the rate of foreshore recession, and once remediated, to ensure that erosion processes are not continuing to degrade the foreshore.

Ecology

Habitat structure, along with species composition (diversity and abundance) will need to be monitored on a periodic basis. Again, this is unlikely to change rapidly, so monitoring can be relatively infrequent.

Similarly, short term changes in the location and extent of mudflats, sand spits and mangroves will need to be monitored to ensure that appropriate management actions are implemented to maintain a balance between estuarine habitat types. Of particular importance is the extent of Caulerpa taxifolia within the Middle Harbour estuary and adjoining waterways, and as such, more frequent monitoring of this species will be required, particularly in regard to its effects upon seagrasses habitat.

The timescale for the monitoring of the above will vary for each, from every few weeks (for bacteria I the summer swimming season) to every few years (for sedimentation rates, ecological communities and estuary usage). A detailed monitoring program will need to be developed for each, based on the objectives for monitoring and the budgetary allowances for each. It is possible that some of the longer interval ecological and social monitoring could be carried out by researchers (e.g.

universities). Monitoring of other parameters may be addressed through broader state-wide programs, such as the DECC Harbourwatch program.

Objectives addressed: *1.1, 1.2, 1.3, 1.4, 1.5, 2.4, 3.2, 4.2, 5.2,* ***10.1***
Performance Target: *Monitoring initiated and continued*
Indicative Cost: *High*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Environmental Health, NR, Parks & Reserves*

10.2.1. Monitor use of the Manly Scenic Walkway.

Context: *The Manly Scenic Walkway (MSW), opened in 1988, is one of the key attractions of the study area. It is also one of the popular destinations of visitors. Encompassing panoramic views of the majestic entrance to Sydney Harbour and swathes of bushland, walkers are able to contrast the old and new Australia as they pass by modern harbourside suburbs juxtaposed with Aboriginal sites, native coastal heath and pockets of sub-tropical rainforest. In order to enhance its use value, the Manly Scenic Walkway is comprised of a number of connecting walks, with walking grades to suit everyone. However, there is no information available about use of the walkway. It is proposed to initiate a monitoring program to assess use of the MSW.*

Actions:

- *Monitor the use of Manly Scenic Walkway at different sections during different days, time of the week and of the season.*
- *Use volunteers to carry out the survey*
- *Analyse the results to schedule and upgrade maintenance*
- *To estimate economic value of the MSW.*

Objectives addressed: *7.2,* ***10.2***
Performance Target: *Monitoring initiated & continued*
Indicative Cost: *Low*
Time Fame: *Short term*
Responsible Agency: *Manly Council – Parks & Reserve*

10.2.2. Monitor use of waterways at different points of the estuary.

Context: *The Middle Harbour is one of the scenic waterways in NSW. It is one of the popular destinations of boat owners and users. Non-motorised boating activities such as sailing, rowing, kayaking, windsurfing and canoeing are popular activities in the study area. Kayaking is increasing in popularity as an individual pastime and as a commercial recreation activity. The use of non-motorised vessels provides access for water-based sightseeing and nature appreciation without the intrusive sounds and smells associated with motorised vessels. However, there is no information available about use of the waterway. It is proposed to initiate a monitoring program to assess use of the waterways.*

Actions:

- *Monitor the use of Middle Harbour waterway at different sections during different days, time of the week and of the season.*
- *Use volunteers to carry out the survey*
- *Analyse the results to schedule and upgrade maintenance and safety*
- *To estimate economic value of the waterway.*

Objectives addressed: *6.2, 6.3, 8.2, 8.3,* ***10.2***
Performance Target: *Monitoring initiated & continued*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council- CEP, NSW Maritime,*

10.2.3. Monitor use of public reserves and dog exercise areas.

Context: *There are number of public reserves and dog exercise areas within the study area. These are used extensively by various users. There are often complains of inadequate facilities. These facilities can be established rationally with specific information about the use of various reserves and dog exercise areas.*

Actions:

- *Monitor the use of public reserves and dog exercise areas during different days, time of the week and of the season.*
- *Use volunteers to carry out the survey*
- *Analyse the results to schedule and upgrade facilities and maintenance*

Objectives addressed: *3.1, 6.4,* ***10.2***
Performance Target: *Monitoring initiated & continued*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council – Parks & Reserves*

10.3.1. Establish participatory monitoring and encourage community participation.

Context: Open and meaningful community participation in planning and decision making on the management of estuary can contribute to the social, economic and ecological health of estuary systems. This option seeks to achieve this goal by identifying ways in which a wide sense of community ownership and involvement in estuary issues, and responsibility for them can be encouraged throughout study area. Involvement of Precincts is seen as important entry point in establishing participatory monitoring.

Actions:

- Discuss with the Precincts about the concept of participatory monitoring to identify community support.
- Establish and agree on a modality including monitoring sites and reporting format.
- Encourage community participation in result analysis, interpretation and management measures

Objectives addressed: *1.8, 2.8, 3.5, 9.3,* ***10.3***
Performance Target: *Participatory monitoring initiated*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council- CEP, MEC*

10.4.1. Review monitoring results and revise/update management options.

Actions: *Monitoring results will be reviewed every six months to gauge any changes in the estuary in the future, either positive or negative and to assess the success of implementation of this Plan, and if necessary, to justify modifications to actions being implemented.*

Objectives addressed: *10.1, 10.2,* ***10.4***
Performance Target: *Results reviewed and management options revised*
Indicative Cost: *Low*
Time Fame: *Medium term*
Responsible Agency: *Manly Council - NR*

6.11 PRIORITISATION OF MANAGEMENT OPTIONS

The prioritisation process is an important step in focusing activities and funding towards addressing those issues which will potentially provide benefit to the many aspects of the estuary. Typically the highest priorities for implementation are those, which have the greatest potential to bring about required change within the estuary.

The process of prioritising the management options is complex. The reasons for this include:

- There are many different aspects of the estuary which can be improved, and it can be difficult to determine whether commercial benefits are more important than ecosystem benefits, etc; and
- The likely level of benefit of some strategies is difficult to estimate. This is often a function of how easy or how well implemented the objective is.

Prioritisation is based on the relative importance of the objectives to the general community of Clontarf/Bantry Bay estuary, stakeholders and users of the estuary, to the various statutory bodies responsible for estuary management. Members of the Council staff, MSW Management Committee and the Clontarf/Bantry Bay Estuary Management Working Group participated in prioritisation of options.

While it would be ideal to implement all high priority options immediately, funding limitations means that some options will need to be allocated as part of future financial budgets. Those high priority options that require minimal expenditure can be commenced as soon as possible.

Table 6.11 : Attributes and Prioritisation of Management Options

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
Water Quality & Pollution						
1.1.1. Formulate comprehensive Stormwater Management Plan for Manly LGA encompassing the study area.	Management plan completed	M	Medium term	MC (NR)[2]	H (5), M (4),	**High**
1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf catchment.	*Efficient GPT maintenance*	L	Continued	MC (NR)	H (7), M (2)	**High**
1.1.3. Install new Stormwater Quality improvement Devices (SQIDs) at priority locations taking into account current best practice technologies.	SQIDs installed	H	Medium term	MC (NR & US)	H (3), M (5), L (1)	**Medium**
1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.	Sweeping rescheduled targeting priority areas	L	Short term	MC (CS & NR)	H (5), M (3), L (1)	**High**
1.2.1. Confirm, with Sydney Water, the presence of all sewerage overflow points within the Clontarf / Bantry Bay study area including the five known ones.	All overflow points known and mapped	L	Immediate	Sydney Water, MC (NR)	H (9)	**High**
1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from surrounding catchments and identify litter hotspots.	Survey completed	L	Immediate	MC (CEP & NR)	H (1), M (5), L (3)	**Medium**
1.3.2. Install pit inserts in litter hotspots throughout the study area.	Pit inserts tried and installed in hotspots	M	Short term	MC (US)	H (3), M (5), L (1)	**Medium**
1.4.1. Work with relevant agencies to manage faecal *coliforms* and *enterococci* levels at all three public swimming enclosures.	Bacterial contamination managed & water quality improved	L	Immediate	Harbour Watch, Sydney Water, MC (NR)	H (8), M (1)	**High**
1.4.2. Investigate possible sources of high faecal coliforms and enterococci levels in Sangrado swimming enclosure.	Investigation Report	L	Immediate	Sydney Water, MC (NR)	H (5), M (2), - (2)	**High**
1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced storm water generation.	Increased use of Rainwater tank rebate	M	Continued	MC (CEP), Sydney Water, Precincts, SMCMA	H (4), M (2), L (3)	**Medium**

[2] AHO – Aboriginal Heritage Office; CPS – Corporate Planning & Strategy (of MC); CS – Civic Services (of MC); DADU – Development Assessment & Determination Unit (of MC); DECC – Department of Environment & Climate Change; DWE – Department of Water & Energy; DPI (Fisheries) – Department of Primary Industries (Fisheries); GO- Greenhouse Office; SCCG – Sydney Coastal Council Group; P&R – Parks & Reserves (of MC); MEC – Manly Environment Centre; WS – Waste Services (of MC); MC – Manly Council; P&S – Planning & Strategy (of MC); NR – Natural Resources (of MC); US – Urban Services (of MC); SMCMA – Sydney Metropolitan Catchment Management Authority;

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.	Study Report completed	M	Short term	MC (NR), DWE	H (3), M (2), L (4)	**Medium**
1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.	Salinity & other parameters monitored	L	Medium term	MC (NR)	H (1), M (4), L (4)	**Medium**
1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.	Remedial measures undertaken	M	Medium term	MC (NR)	H (3), M (1), L (5)	**Low**
1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable stormwater management	Number of Educated increased	L	Immediate	MC (CEP)	H (1), M (5), L (2), - (1)	**Medium**
1.8.2 Work with residents to implement best practices in storm water management at residential scale.	Best practices adopted by residents	L	Medium term	MC (CEP), Precincts	H (2), M (4), L (2), - (1)	**Medium**
Aquatic / Inter-tidal Habitat Conservation & Management						
2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.	Updated seagrass map	M	Short term	DPI (Fisheries), MC (NR), NSW Maritime, SMCMA	H (2), M (4), L (2), - (1)	**Medium**
2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water quality and a potential boat exclusion zone	Investigation Report	L	Medium term	DPI (Fisheries), NSW Maritime, MC (NR)	H (1), M (4), L (4)	**Medium**
2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.	Enhanced enforcement , Signage installed	L	Short term	DPI (Fisheries), NSW Maritime, MC (NR), SMCMA	H (5), M (4)	**High**
2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.	Updated information distributed regularly	L	Immediate	DPI (Fisheries), NSW Maritime, SMCMA,SCCG, MC (NR)	H (2), M (5), L (1), - (1)	**Medium**
2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.	Control Plan implemented	M	Immediate	DPI (Fisheries), SMCMA, SCCG, MC (NR)	H (2), M (5), L (1), - (1)	**Medium**
2.3.1. Undertake mangrove maintenance and	Mangrove	L	Short term	MC (P&R),	H (3), M (4),	**Medium**

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
regeneration activities at existing sites.	population maintained or enhanced			DPI (Fisheries)	L (1), - (1)	
2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.	Mangrove expansion Programme implemented	M	Medium term	MC (P&R), DPI (Fisheries)	H (2), M (4), L (2), - (1)	**Medium**
2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of legal to voluntary measures.	Areas of ecological significance mapped	L	Short term	MC (NR), DECC, DPI (Fisheries), SMCMA	M (7), L (2)	**Medium**
2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings	Study completed	L	Short term	DECC, MC (NR), Precincts	H (1), M (3), L (5)	**Low**
2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).	Volunteer Group initiated	L	Medium term	MC (CEP), DPI (Fisheries)	M (5), L (3), - (1)	**Medium**
2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.	Updated knowledge collated	L	Short term	MC (NR)	M (3), L (5), - (1)	**Low**
2.5.2 Initiate studies and surveys to fill data gaps through collaboration MEC and/or Universities.	Surveys and studies initiated and completed	M	Medium term	MC (NR), MEC, Universities	M (4), L (5)	**Low**
2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.	Knowledge gained & applied	L	Short term	MC (CS), SCCG	H (1), M (3), L (5)	**Low**
2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat	Knowledge gained & utilized	L	Medium term	MC (CS, US & NR)	H (3), M (1), L (5)	**Low**
2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.	Brochure prepared & disseminated	L	Immediate	DPI (Fisheries), MC (NR)	H (1), M (6), L (2)	**Medium**
Bushland / Terrestrial Habitat Conservation & Management						

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.	Bushland Management Plan prepared	M	Medium term	MC (P&R)	M (6), L (2), - (1)	**Medium**
3.1.2. Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.	Management Plans prepared	M	Short term	MC (P&R)	H (2), M (5), L (2)	**Medium**
3.1.3. Identify adhoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified standard.	Tracks identified and owners approached	L	Short term	MC (P&R)	H (1), M (5), L (2), - (1)	**Medium**
3.1.4. Council to continue to be an active participant in the Die-Back Working Group	Contributory & active participant	L	Continued	MC(P&R), SCCG	M (5), L (4)	**Medium**
3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.	Recommendations revisited	L	Short term	MC (P&R)	M (3), L (6)	**Low**
3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources.	Control measures implemented	M	Long term	MC (P&R, NR)	H (3), M (3), L (3)	**Medium**
3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.	Assessment Report	L	Long term	MC (P&R)	M (5), L(4)	**Medium**
3.4.1. Continue and reassess Council's Street Tree Planting Programme within the study area.	Recommended list prepared & Program continued	L	Continued	MC (P&R)	M (3), L (6)	**Low**
3.5.1. Continue Community Bush Care Volunteers programme in the study area.	Program supported & continued	L	Continued	MC (P&R)	H (1), M (8)	**Medium**
3.5.2. Continue publication of 'Bushland News' and circulate widely in the community	Publication continued	L	Continued	MC (P&R)	M (6), L(2), - (1)	**Medium**
3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.	Program continued	L	Continued	MC (P&R, CEP)	H (1), M (4), L (4)	**Medium**
3.6.1. Involve Precincts to discuss the issue of view maintenance with property owners.	Meetings held as required	L	Continued	MC (P&R), Precincts	H (4), M (3), L (2)	**Medium**
Sedimentation & Beach Erosion						
4.1.1. Carry out a comprehensive study on estuarine	Study Report	M	Immediate	MC (NR), DECC	H (8), M (1)	**High**

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
sediment transport patterns						
4.2.1. Define and implement mitigation measures for erosion prone sites.	Mitigation measures implemented	H	Medium term	MC (NR, US)	H (6), M (2), L (1)	**High**
4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.	Mitigation measures implemented	H	Immediate	MC (NR, US)	H (7), M (1), L(1)	**High**
4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.	Navigable depth maintained	H	Medium	Clontarf Marina	H (3), M (4), L (1), - (1)	**Medium**
Hazards & Risks including Climate Change						
5.1.1. Commission a geotechnical study for specific sections of foreshore areas to identify and prioritise risks, and establish risk based management options.	Geotechnical Study Report	H	Medium	MC (NR, US)	H (1), M (4), L (2), - (2)	**Medium**
5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.	DCPs revised	L	Medium term	MC (P&S, DADU)	H (3), M (3), L (2), - (1)	**Medium**
5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco- friendly sea walls.	Regular Inspection Reports	M	Immediate	MC (US & NR)	H (2), M (4), L (2), - (1)	**Medium**
5.1.4. Work with SES and other agencies to continuously update Emergency Action Plan including evacuation procedures in the event of storm surges and tsunami.	Emergency Action Plan updated	L	Short term	SES, MC (CS & NR)	H (2), M (3), L (3), - (1)	**Medium**
5.2.1. Work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.	Model Results & Impact Report	H	Short term	SCCG, DECC, NSW GO, MC (NR)	H (3), M (4), L (1), - (1)	**Medium**
5.2.2. Collaborate with the Sydney Coastal Councils Group/ Macquarie Unit /CSIRO project investigating climate change adaptations in Manly.	Adaptation Action plan made	M	Continued	SCCG, DECC, MC (NR)	H (3), M (5), L (1)	**Medium**
5.2..3. Assess impact of climate change on areas of ecological significance and devise adaptive measures	Ecological impact map	L	Medium tern	MC (NR), SCCG,	H (1), M (5), L (2), - (1)	**Medium**
5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and	*New or revised policy documents*	L	Short term	MC (CPS)	H (4), M (2), L (2), - (1)	**High**

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
national projections	*accommodating CC*					
Estuary Use						
6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.	Regular safety checks	L	Continued	MC (US and Risk Manager)	H (5), M (2), L (1), - (1)	**High**
6.1.2. Install adequate garbage and waste recycling stations in public places.	Recycling stations installed	M	Continued	MC (WS)	H (5), M (3), - (1)	**High**
6.1.3. Liaise with relevant state authorities regarding the replacement of existing signage with signage more sympathetic to the area.	Signage replaced with new ones	M	Medium term	MC (CEP, NR)	H (1), M (6), L (2)	**Medium**
6.1.4. Promote natural features of 'Clontarf – Sandy Bay – Fisher Bay – Ellery's Punt Reserve' of the study area'.	*Brochure prepared*	M	Medium term	MC (NR), Tourism NSW	H (1), M (3), L (1), - (3)	**Medium**
6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.	Facilities created	L	Continued	MC (CEP, NR), NSW Maritime	H (4), M (4), L (1)	**Medium**
6.2.2. Encourage NSW Maritime to enforce current speed limits and mooring restrictions by increased patrolling.	Patrolling increased	L	Continued	NSW Maritime	H (4), M (5)	**Medium**
6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.	Proposal prepared and considered	L	Short term	NSW Maritime, MC (NR)	H (3), M (2), L (4)	**Medium**
6.2.4. Maintain jetski (PWC) ban.	Ban maintained	L	Continued	NSW Maritime	H (7), L (1), - (1)	**High**
6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment.	Education program continued	L	Continued	MC (CEP)	H (1), M (4), L (4)	**Medium**
6.3.1. Support continuation of ban on commercial fishing.	Ban maintained	L	Continued	DPI (Fisheries), SCCG, SMCMA, MC (NR)	H (5), M (2), L (1), - (1)	**High**
6.3.2. Encourage DPI (Fisheries) & NSW Health to monitor Dioxin levels in Sydney harbour waters.	Dioxin Level monitored	L	Short term	DPI (Fisheries), NSW Health, SCCG, CMA	H (3), M (4), L (2)	**Medium**
6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag	Education program implemented	M	Short term	MC (CEP), DPI Fisheries	H (2), M (4), L (3)	**Medium**

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
limits, size limits and species types) through Council's SR& G Program.						
6.4.1. Promote community events and education program to achieve sustainable use of the estuary.	Community events & Education program promoted	L	Continued	MC (CEP), NSW Maritime & DPI-Fisheries	H (1), M (4), L (4)	**Medium**
Access						
7.1.1. Assess and improve safety condition and maintain natural vegetation along existing access points	*Safety of access paths improved*	M	Continued	MC (P&R)	H (3), M (2), L (3), - (1)	**Medium**
7.2.1. Enhance maintenance schedule and retain native vegetation along the Manly Scenic Walkway.	Maintenance enhanced	M	Continued	MC (P&R)	H (1), M (5), L (3)	**Medium**
7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.	Boardwalk installed	M	Immediate	MC (P&R), AHO	H (4), M (3), L (1), - (1)	**High**
7.2.3. Assess ways to improve use value of the MSW and implement.	*Various programs implemented*	L	Short term	MC (P&R)	H (1), M (3), L (3), - (2)	**Medium**
7.3.1. Audit disability access of all parks and bays within the study area.	Audit completed	L	Short term	MC (P&S)	H (3), M (4), L (2)	**Medium**
7.4.1. Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flat as off-leash dog area.	*Off-leash dog area declared*	L	Short term	MC (P&S, Rangers), Precincts	H (2), M (1), L (3), - (3)	**Low**
7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.	Facilities established	L	Continued	MC (WS)	H (7), M (2)	**High**
Foreshore Infrastructure & facilities						
8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.	Seagrass beds marked	L	Immediate	DPI Fisheries, NSW Maritime, MC (NR)	H (2), M (5), L (1), - (1)	**Medium**
8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings	Moorings introduced	M	Medium term	NSW Maritime, SCCG, SMCMA	H (4), M (3), L (2)	**Medium**
8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.	Moorings realigned	L	Short term	NSW Maritime, MC (NR)	H (2), M (6), L (1)	**Medium**
8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area and specify alternative locations.	Assessment made	M	Short term	NSW Maritime, MC (US)	H (2), M (3), L (4)	**Medium**

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
8.3.1. Install horizontal dinghy and kayak storage racks at Sandy Bay in consultation with nearby residents and dinghy owners and implement.	Storage rack established	M	Short term	MC (US, Design & Technical)	H (5), M (2), L (1), - (1)	**High**
8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore	Rods/poles installed & Education program initiated	L	Short term	MC (CEP), Precincts	H (4), M(2), L (2), - (1)	**High**
8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.	Sangrado swimming enclosure restored	H	Immediate	MC (US)	H (5), M (2), - (2)	**High**
8.5.1 Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations	Facilities enhanced	H	Continued	MC (Urban Services)	H (5), M (2), L (1), - (1)	**High**
8.5.2 Improve and facilitate traffic management around public reserves and beaches	Improved traffic management	M	Short term	RTA, MC (Urban Services)	H (2), M (3), L (2), - (2)	**Medium**
8.5.3 Ensure safety and crime prevention in public areas	Improved safety	M	Continued	MC (Urban Services)	H (6), L (2), - (1)	**High**
Heritage Conservation						
9.1.1 Review Aboriginal Site Management Report for Manly Council (2006) and associated reports to prioritize management needs and develop a plan of implementation.	Prioritisation done	L	Short term	AHO, MC (P&S)	H (3), M (5), - (1)	**Medium**
9.1.2. Prevent further damage to Aboriginal middens in critical condition.	Physical protection done	M	Medium term	MC (P&S, P&R), AHO	H (5), M (3), - (1)	**High**
9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.	Brochure on selected sites	L	Medium term	AHO, MC (P&S)	H (3), M (5), L (1)	**Medium**
9.1.4. Develop management guidelines for Aboriginal sites that are located within private properties.	Guidelines prepared	L	Medium term	AHO	H (3), M (2), L (3), - (1)	**Medium**
9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.	Review completed	L	Continued	MC (P&S)	H (2), M (4), L (2), - (1)	**Medium**
9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.	Assessment made	L	Short term	MC (P&S)	M (3), L (5), - (1)	**Low**
9.2.3. Ensure physical protection and maintenance of all heritage listed items.	Physical protection done	M	Medium term	MC (US), AHO	H (5), M (3), L (1)	**High**
9.2.4. Explore feasibility of restoring a small part of old	Feasibility	H	Long term	MC (P&S)	H (1), L (7), -	**Low**

Management Options	Performance Target	Indicative Cost	Time Frame	Responsible Agencies	Democratic ranks	Priority
tram line near the Spit Bridge to signify historical past.	study				(1)	
9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children	Regular campaign organised	L	Continued	MC (CEP), AHO	H (1), M (4), L (4)	**Medium**
9.3.2. Place appropriate interpretative signage on key Aboriginal heritage sites.	Signage installed	L	Short term	MC (CEP)	H (3), M (4), L (1), - (1)	**Medium**
Monitoring						
10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.	Monitoring Program made	L	Medium term	MC (NR, Environmental Health)	H (4), M (4), - (1)	**Medium**
10.1.3. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.	Monitoring initiated and continued	H	Long term	MC (Environmental Health, NR, P&R)	H (8), L (1)	**High**
10.2.1. Monitor use of the Manly Scenic Walkway.	Monitoring initiated and continued	L	Short term	MC (P&R)	H (4), M (4), L (1)	**Medium**
10.2.2. Monitor use of waterways at different points of the estuary.	Monitoring initiated and continued	L	Medium term	MC (CEP), NSW Maritime	H (2), M (6), L (1)	**Medium**
10.2.3. Monitor use of public reserves and dog exercise areas.	Monitoring initiated and continued	L	Medium term	MC (P&S)	H (2), M (3), L (4)	**Medium**
10.3.1. Establish participatory monitoring and encourage community participation.	Concept developed & discussed	L	Short term	MC (CEP), MEC	H (3), M (4), L (2)	**Medium**
10.4.1. Review monitoring results and revise/update management options.	Results reviewed & Options revised	L	Medium term	MC (NR)	H (4), M (4), L (1)	**Medium**

7. ASSESSMENT OF OPTIONS

All identified management options are investigated through an open and transparent evaluation process. The aim of this process is to enable the Clontarf/Bantry Bay Estuary Management Working Group to choose the particular combination of management responses that best meet the vision, goals and objectives set for the study area. The evaluation process, thus, reflect the emerging principle of 'community right to know'. This expresses the community's right to access all information that may affect their quality of life. It acknowledges community demands for more information and increased transparency in decision-making.

Evaluation Criteria

Options are evaluated according to explicit criteria that reflect a wide range of social, economic, environmental and financial considerations. The most favorable options are those that best satisfy the criteria. The following criteria are used for evaluation management options.

- **Sustainability**: the option is consistent with the principles of ecologically sustainable development (ESD) and other relevant principles.
- **Consistency with vision and goals:** the option promotes achievement of adopted goals and objectives.
- **Likely impacts:** the social, economic and environmental impacts are acceptable to the community.
- **Planning framework:** the option is consistent with relevant policies and plans at the State, regional, catchment and local levels.
- **Public domain:** the option protects or enhances the public domain, particularly, the public's right to access and enjoy foreshore reserves, beaches, waterways and the estuary
- **Cultural:** the option respects and promotes the cultural, social or spiritual value of estuarine environment
- **Acceptable risk:** the level of risk to life, property and the environment is accessible
- **Indicative Cost-benefit:** the cost-benefit of the option is positive and is superior to alternative options
- **Financial:** the option can be adequately finances, both initially and in the long-term
- **Legal and regulatory:** the option is compatible with legal and regulatory constrains, including land tenure issues and approvals by Commonwealth and state agencies
- **Community support:** the community understands and supports the option.

A preferred management option is the option that best meets the evaluation criteria. It may include a number of actions.

Table 7.1: Evaluation of Management Options

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
1.0 Water Quality & Pollution *Goal: Ensure that the water quality of the estuary is suitable for maintaining healthy natural aquatic ecosystems, and for recreational pursuits*														
1.1.1. Formulate comprehensive Stormwater Management Plan for Manly LGA encompassing the study area.	N/A	Yes	++	++	++	Yes	N/A	N/A	N/A	++	++	+	High	
1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf catchment.	High	Yes	N/A	N/A	+++	Yes	+++	N/A	Low	+++	+	+++	High	
1.1.3. Install new Stormwater Quality Improvement Devices (SQIDs) at priority locations taking into account current best practice technologies.	N/A	Yes	N/A	N/A	+	Yes	N/A	N/A	N/A	++	++	++	Medium	
1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.	High	Yes	++	++	+++	Yes	+++	N/A	N/A	+++	+++	+++	High	
1.2.1. Confirm, with Sydney Water, the presence of all sewerage overflow points within the Clontarf / Bantry Bay study area including the five known ones.	N/A	Yes	N/A	N/A	+	Yes	N/A	N/A	N/A	N/A	N/A	++	High	
1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from surrounding catchments and identify litter hotspots.	High	Yes	N/A	N/A	++	Yes	N/A	N/A	N/A	N/A	+	++	Medium	
1.3.2. Install pit inserts in litter hotspots throughout the study area.	High	Yes	+++	++	+++	Yes	+++	+	Low	+++	++	+++	Medium	
1.4.1. Work with relevant agencies to manage *faecal coliforms* and *enterococci* levels at all three public swimming enclosures.	High	Yes	+++	+	+++	Yes	+++	+	Low	++	++	+++	High	
1.4.2. Investigate possible sources of	N/A	Yes	+++	N/A	+++	Yes	++	N/A	N/A	N/A	+++	+++	High	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
high faecal coliforms and enterococci levels in Sangrado swimming enclosure.														
1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced stormwater generation.	Medium	Yes	+++	++	+++	Yes	+++	N/A	Low	+++	+	+++	Medium	
1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.	N/A	Yes	N/A	N/A	+++	Yes	N/A	N/A	N/A	+	+	N/A	Medium	
1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.	Medium	Yes	++	++	+++	Yes	++	N/A	Low	++	+	++	Medium	
1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.	Medium	Yes	N/A	N/A	++	Yes	++	N/A	N/A	+	+	++	Low	
1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable stormwater management	High	Yes	+++	+++	+++	Yes	+++	++	Low	++	+	+++	Medium	
1.8.2 Work with residents to implement best practices in storm water management at residential scale.	High	Yes	+++	++	+++	Yes	++	++	Low	+++	++	+++	Medium	
2.0 Aquatic / Inter-tidal Habitat Conservation & Management *Goal: Restore and maintain a healthy and diverse mix of aquatic and intertidal habitats that will maintain and improve biodiversity and ecological functions of the estuary.*														
2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.	Medium	Yes	++	++	+++	Yes	N/A	N/A	N/A	++	+++	++	Medium	
2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water	High	Yes	++	N/A	++	Yes	N/A	N/A	Low	++	++	N/A	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
quality and a potential boat exclusion zone														
2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.	High	Yes	++	+	+++	Yes	++	N/A	N/A	++	+	++	High	
2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.	Medium	Yes	++	N/A	++	Yes	N/A	N/A	N/A	N/A	N/A	++	Medium	
2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.	High	Yes	N/A	++	+++	Yes	++	N/A	Low	+++	++	+++	Medium	
2.3.1. Undertake mangrove maintenance and regeneration activities at existing sites.	Medium	Yes	N/A	N/A	+++	Yes	N/A	N/A	Low	++	++	+	Medium	
2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.	High	Yes	++	++	+++	Yes	+++	N/A	Low	+++	+++	+++	Medium	
2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of legal to voluntary measures.	Medium	Yes	N/A	N/A	++	Yes	N/A	N/A	N/A	N/A	N/A	N/A	Medium	
2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings	High	Yes	N/A	N/A	++	Yes	N/A	N/A	N/A	N/A	N/A	+++	Low	
2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).	Medium	Yes	+++	++	+++	Yes	++	N/A	N/A	+++	N/A	+++	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.	High	Yes	N/A	N/A	++	Yes	N/A	N/A	N/A	N/A	N/A	N/A	Low	
2.5.2 Initiate studies and surveys to fill data gaps through collaboration.	Medium	Yes	++	+	+++	Yes	++	N/A	Low	++	+	++	Low	
2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.	Medium	Yes	+	+	++	Yes	++	++	Low	+	N/A	+	Low	
2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat	High	Yes	N/A	N/A	++	Yes	+	N/A	Medium	++	+	++	Low	
2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.	Medium	Yes	++	N/A	++	Yes	+	N/A	N/A	++	++	++	Medium	
3.0 Bushland / Terrestrial Habitat Conservation & Management *Goal: Protect and enhance urban bush land and native vegetation areas*														
3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.	High	Yes	N/A	+	++	Yes	++	N/A	N/A	+++	++	N/A	Medium	
3.1.2. Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.	High	Yes	N/A	+	++	Yes	+	N/A	N/A	++	+	N/A	Medium	
3.1.3. Identify adhoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified	Low	Yes	++	N/A	+	Yes	+++	N/A	High	++	+	++	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
standard.														
3.1.4. Council to continue to be an active participant in the Die-Back Working Group	N/A	Yes	N/A	N/A	++	Yes	N/A	N/A	N/A	N/A	N/A	N/A	Medium	
3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.	Medium	Yes	N/A	N/A	++	Yes	N/A	N/A	N/A	N/A	++	N/A	Low	
3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources.	High	Yes	N/A	N/A	++	Yes	N/A	N/A	Low	N/A	++	N/A	Medium	
3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.	High	Yes	++	N/A	+++	Yes	++	N/A	Low	N/A	N/A	+++	Medium	
3.4.1. Continue and reassess Council's Street Tree Planting Programme within the study area.	Medium	Yes	+++	+	++	Yes	++	N/A	Low	++	++	++	Low	
3.5.1. Continue Community Bush Care Volunteers programme in the study area.	High	Yes	+++	+	++	Yes	++	N/A	N/A	++	N/A	+++	Medium	
3.5.2. Continue publication of 'Bushland News' and circulate widely in the community	Medium	Yes	+	N/A	+	Yes	+	N/A	N/A	N/A	N/A	++	Medium	
3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.	High	Yes	+++	+	++	Yes	N/A	++	N/A	++	+	+++	Medium	
3.6.1. Involve Precincts to discuss the issue of view maintenance with property owners.	Medium	Yes	++	N/A	N/A	Yes	+++	N/A	N/A	N/A	N/A	++	Medium	
4.0 Sedimentation & Beach Erosion *Goal: Manage erosion and sedimentation to reduce their impact on the natural environment and recreational amenity*														

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
4.1.1. Carry out a comprehensive study on estuarine sediment transport patterns	N/A	Yes	N/A	N/A	N/A	Yes	N/A	N/A	N/A	++	++	N/A	High	
4.2.1. Define and implement mitigation measures for erosion prone sites.	High	Yes	++	++	+	Yes	++	N/A	Medium	+	+	+	High	
4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.	High	Yes	+++	++	+++	Yes	+++	+++	Medium	++	+	+++	High	
4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.	Medium	Yes	+	N/A	+	Yes	++	N/A	High	??	-	+	Medium	
5.0 Hazards & Risks including Climate Change *Goal: Assess, minimize and mitigate risks from natural hazards including climate change*														
5.1.1. Commission a geotechnical study for specific sections of foreshore areas to identify and prioritise risks, and establish risk based management options.	N/A	Yes	N/A	+	+	Yes	N/A	N/A	N/A	++	++	N/A	Medium	
5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.	Medium	Yes	N/A	N/A	++	Yes	++	N/A	High	+++	++	++	Medium	
5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco- friendly sea walls.	High	Yes	++	++	+++	Yes	+++	N/A	Medium	+	++	+++	Medium	
5.1.4. Work with SES and other agencies to continuously update Emergency Action Plan including evacuation procedures in the event of storm surges and tsunami.	Medium	Yes	++	+	+	Yes	++	N/A	Medium	++	++	++	Medium	
5.2.1. Assess impact of climate change on areas of ecological significance and	High	Yes	N/A	N/A	+++	Yes	N/A	N/A	Low	N/A	+	+	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
devise adaptive measures														
5.2.2. Work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.	Medium	Yes	+	+	+	Yes	++	N/A	Medium	N/A	+	++	Medium	
5.2.3. Collaborate with the Sydney Coastal Councils Group/ Macquarie Uni /CSIRO project investigating climate change adaptations in Manly.	High	Yes	++	+	+++	Yes	+++	N/A	Medium	++	+++	+++	Medium	
5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and national projections	High	Yes	+	N/A	++	Yes	+	N/A	Low	N/A	N/A	++	High	
6.0 Estuary Use *Goal: Improve and meet the environmental, socio-economic and recreational needs of estuary use*														
6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.	Medium	Yes	++	+	++	Yes	++	++	None	++	++	+++	High	
6.1.2. Install adequate garbage and waste recycling stations in public places.	Medium	Yes	+++	+++	+++	Yes	+++	++	Low	+++	+++	+++	High	
6.1.3. Liaise with relevant state authorities regarding the replacement of existing signage with signage more sympathetic to the area.	N/A	Yes	+	+	N/A	Yes	+	+	Low	N/A	+	+	Medium	
6.1.4. Promote natural features of 'Clontarf – Sandy Bay – Fisher Bay – Ellery's Punt Reserve' of the study area.	Medium	Yes	++	++	+++	Yes	+++	+++	Low	++	+	++	Medium	
6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.	N/A	Yes	++	N/A	N/A	Yes	+++	++	Low	N/A	N/A	+++	Medium	
6.2.2. Encourage NSW Maritime to	N/A	Yes	++	N/A	++	Yes	+++	+	None	N/A	N/A	++	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
enforce current speed limits and mooring restrictions by increased patrolling.														
6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.	N/A	Yes	++	N/A	N/A	Yes	++	++	None	N/A	N/A	++	Medium	
6.2.4. Maintain jetski (PWC) ban.	N/A	Yes	++	N/A	++	Yes	++	N/A	None	N/A	N/A	+++	High	
6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment.	Medium	Yes	++	N/A	++	Yes	+	N/A	None	++	+	++	Medium	
6.3.1. Support continuation of ban on commercial fishing.	High	Yes	+++	+	+++	Yes	++	N/A	Medium	??	N/A	+++	High	
6.3.2. Encourage DPI (Fisheries) & NSW Health to monitor Dioxin levels in Sydney waters.	N/A	Yes	N/A	N/A	++	Yes	+	N/A	N/A	N/A	N/A	++	Medium	
6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag limits, size limits and species types) through NSW Fishcare Program	Medium	Yes	++	++	++	Yes	++	N/A	Low	++	N/A	++	Medium	
6.4.1. Promote community events and education program to achieve sustainable use of the estuary.	High	Yes	++	N/A	++	Yes	++	N/A	N/A	+++	++	++	Medium	
7.0 Access *Goal: Ensure safe public accessibility of waterways, foreshores and other areas of the estuary.*														
7.1.1. Assess and improve safety condition and maintain natural vegetation along access paths.	High	Yes	++	N/A	++	Yes	++	N/A	None	N/A	N/A	+++	Medium	
7.2.1. Enhance maintenance schedule and retain and enhance the native	High	Yes	+	N/A	+++	Yes	+	N/A	N/A	++	++	+++	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
vegetation along the Manly Scenic Walkway.														
7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.	Medium	Yes	+++	N/A	+	Yes	++	+++	Low	++	++	+++	High	
7.2.3. Assess ways to improve use value of the MSW and implement.	Medium	Yes	++	++	++	Yes	+++	++	N/A	N/A	N/A	++	Medium	
7.3.1. Audit disability access of all parks and bays within the study area.	N/A	Yes	+++	++	N/A	Yes	+++	+++	Medium	+	+++	+++	Medium	
7.4.1. Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flat as off-leash dog area.	++	Yes	??	N/A	??	Yes	++	N/A	Medium	N/A	N/A	??	Low	
7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.	++	Yes	+++	N/A	+	Yes	++	N/A	None	++	+	+++	High	
8.0 Foreshore Infrastructure & facilities *Goal: Improve social amenity through rationalisation of foreshore structures which are sympathetic to social and ecological needs and manage public risks.*														
8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.	High	Yes	++	++	++	Yes	++	N/A	Medium	++	+	+++	Medium	
8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings	Medium	Yes	+++	++	+++	Yes	+++	N/A	None	+++	++	++	Medium	
8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.	Medium	Yes	++	++	+	Yes	++	N/A	Low	++	+	++	Medium	
8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area and specify alternative locations.	N/A	Yes	++	N/A	++	Yes	++	N/A	N/A	N/A	N/A	++	Medium	
8.3.1. Install horizontal dinghy and kayak storage racks at Sandy Bay in	Medium	Yes	+++	++	+++	Yes	+++	++	Medium	+++	++	+++	High	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
consultation with nearby residents and dinghy owners.														
8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore	High	Yes	++	++	+++	Yes	++	+	Low	++	+	++	High	
8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.	Medium	Yes	+++	++	++	Yes	+++	+++	Medium	??	+++	+++	High	
8.5.1 Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations	Medium	Yes	+++	++	+	Yes	+++	N/A	None	+	++	+++	High	
8.5.2 Improve and facilitate traffic management around public reserves and beaches	N/A	Yes	++	+	N/A	Yes	++	N/A	Medium	++	+	++	Medium	
8.5.3 Ensure safety and crime prevention in public areas	N/A	Yes	+++	+	N/A	Yes	++	N/A	Medium	++	++	+++	High	
9.0 Heritage Conservation *Goal: Ensure that all Aboriginal and European (cultural and natural) heritage areas in the estuary are preserved and protected in consultation with appropriate bodies.*														
9.1.1 Review Aboriginal Site Management Report for Manly Council (2006) and associated reports to prioritize management needs and develop a plan of implementation.	N/A	Yes	++	N/A	N/A	Yes	N/A	++	N/A	N/A	N/A	N/A	Medium	
9.1.2. Prevent further damage to Aboriginal middens in critical condition.	High	Yes	+++	N/A	++	Yes	+++	+++	Low	++	+++	+++	High	
9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.	Medium	Yes	+++	N/A	+	Yes	++	+++	None	+++	++	+++	Medium	
9.1.4. Develop management guidelines for sites that are located within private	Medium	Yes	++	N/A	+	Yes	++	++	N/A	++	++	+++	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
properties.														
9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.	High	Yes	++	N/A	++	Yes	N/A	+++	N/A	N/A	N/A	++	Medium	
9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.	Medium	Yes	+	N/A	++	Yes	N/A	+++	N/A	N/A	N/A	++	Low	
9.2.3. Ensure physical protection and maintenance of all heritage listed items.	High	Yes	+++	++	++	Yes	++	+++	Low	++	+	++	High	
9.2.4. Explore feasibility of restoring a small part of old tram line near the Spit Bridge to signify historical past.	Medium	Yes	+	++	N/A	Yes	++	+++	Medium	+	??	??	Low	
9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children	High	Yes	++	++	++	Yes	++	++	None	++	+	+++	Medium	
9.3.2. Place appropriate interpretative signage on key Aboriginal heritage sites.	Medium	Yes	++	+	+	Yes	+++	++	None	N/A	+	++	Medium	
10. Monitoring *Goal: Measure the condition and usage of the estuary to gauge the effectiveness of the Estuary Management Plan in achieving its goal and management objectives*														
10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.	Low	Yes	++	++	++	Yes	N/A	N/A	N/A	++	++	++	Medium	
10.1.2. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.	High	Yes	+++	+++	+++	Yes	+++	N/A	Low	+++	+++	+++	High	
10.2.1. Monitor use of the Manly Scenic Walkway.	Medium	Yes	+++	N/A	++	Yes	++	++	None	++	+	+++	Medium	

Options	Sustain-ability	Consistency with goals/ objectives	Likely Impact			Consistent with planning framework	Public Domain	Cultural	Risks	Indicative cost-benefit	Financial acceptability	Community Support	Overall priority	Remarks
			Social	Economic	Environ-mental									
10.2.2. Monitor use of waterways at different points of the estuary.	Medium	Yes	+++	++	++	Yes	++	++	None	++	+	++	Medium	
10.2.3. Monitor use of public reserves and dog exercise areas.	Medium	Yes	++	N/A	++	Yes	+	++	None	+	+	+	Medium	
10.3.1. Establish participatory monitoring and encourage community participation	High	Yes	+++	++	++	Yes	++	N/A	N/A	+++	++	+++	Medium	
10.4.1. Review monitoring results and revise/update management options.	High	Yes	+++	++	++	Yes	++	N/A	N/A	++	+	++	Medium	

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9. GLOSSARY

Sources:
[1] = Australian Government, Department of Environment & Heritage, 2007
[2] = OzEstuaries, 2006
[3] = Department of Natural Resources, 2006
[4] = Department of Environment & Climate Change, 2007

Accretion[2]	When average (small) swell waves deliver sediment back to the shoreline
Aeolian[2]	The erosion, transport, and deposition of material by wind, and work best when vegetation cover is sparse, or absent.
Benthic[2]	Pertaining to the seafloor (or bottom) of a river, coastal waterway, or ocean.
Catchment[2]	The area of land which collects and transfers rainwater into a waterway.
Corridor[4]	Lines of native vegetation connecting separate habitat areas that are essential for maintaining biodiversity. Corridors enable fauna to access larger habitats by encouraging mobility between areas. Corridors may also assist native plant species to spread and colonise new areas over time.
Diffraction[1]	The "spreading" of waves into the lee of obstacles such as breakwaters by the transfer of wave energy along wave crests. Diffracted waves are lower in height than the incident waves.
Estuary (definition 1)[3]	The tidal portions of river mouths, bays and coastal lagoons, irrespective of whether they are dominated by hyper saline, marine or fresh water conditions
Estuary (definition 2) [3]	a semi enclosed coastal body of water which has a free connection with the open sea and within which sea water is measurably diluted with fresh water derived from land drainage
Fetch[2]	The horizontal distance over which a wind blows in generating waves.
Flushing[2]	Exchange of water between an estuary or coastal waterway and the ocean.
Intertidal[2]	The environment between the level of high tide and low tide.
Mud[2]	Fine sedimentary material, typically comprising both inorganic (mineral) and organic material.
Organic Material[2]	Once-living material (typically with high carbon content), mostly of plant origin.
Refraction[1]	The tendency of wave crests to become parallel to bottom contours as waves move into shallower waters. This effect is caused by the shoaling process which slows down waves in shallower waters.
Seagrass[2]	Marine flowering plants which generally attach to the substrate with roots.
Seawalls[1]	Walls built parallel to the shoreline to limit shoreline recession.
Sediment Budget[1]	An accounting of the rate of sediment supply from all sources (credits) and the rate of sediment loss to all sinks (debits) from an area of coastline to obtain the net sediment supply/loss.

Semi-diurnal Tide[1]	Tides with a period, or time interval between two successive high or low waters, of about 12.5 hours. Tides along the New South Wales coast are semi-diurnal.
Shoreline Recession[1]	A net long term landward movement of the shoreline caused by a net loss in the sediment budget.
Spring Tide[2]	A tide greater than the mean tidal range. Occurs about every two weeks, when the Moon is full or new.
Storm Surge[1]	The increase in coastal water level caused by the effects of storms. Storm surge consists of two components: the increase in water level caused by the reduction in barometric pressure (barometric setup) and the increase in water level caused by the action of wind blowing over the sea surface (wind setup).
Swell Waves[1]	Wind waves remote from the area of generation (fetch) having a uniform and orderly appearance characterised by regularly spaced wave crests.
Turbidity[2]	The condition resulting from the presence of suspended particles in the water column which attenuate or reduce light penetration.
Wave Height[1]	The vertical distance between a wave trough and a wave crest.
Wind Waves[1]	The waves initially formed by the action of wind blowing over the sea surface. Wind waves are characterised by a range of heights, periods and wavelengths. As they leave the area of generation (fetch), wind waves develop a more ordered and uniform appearance and are referred to as swell or swell waves.

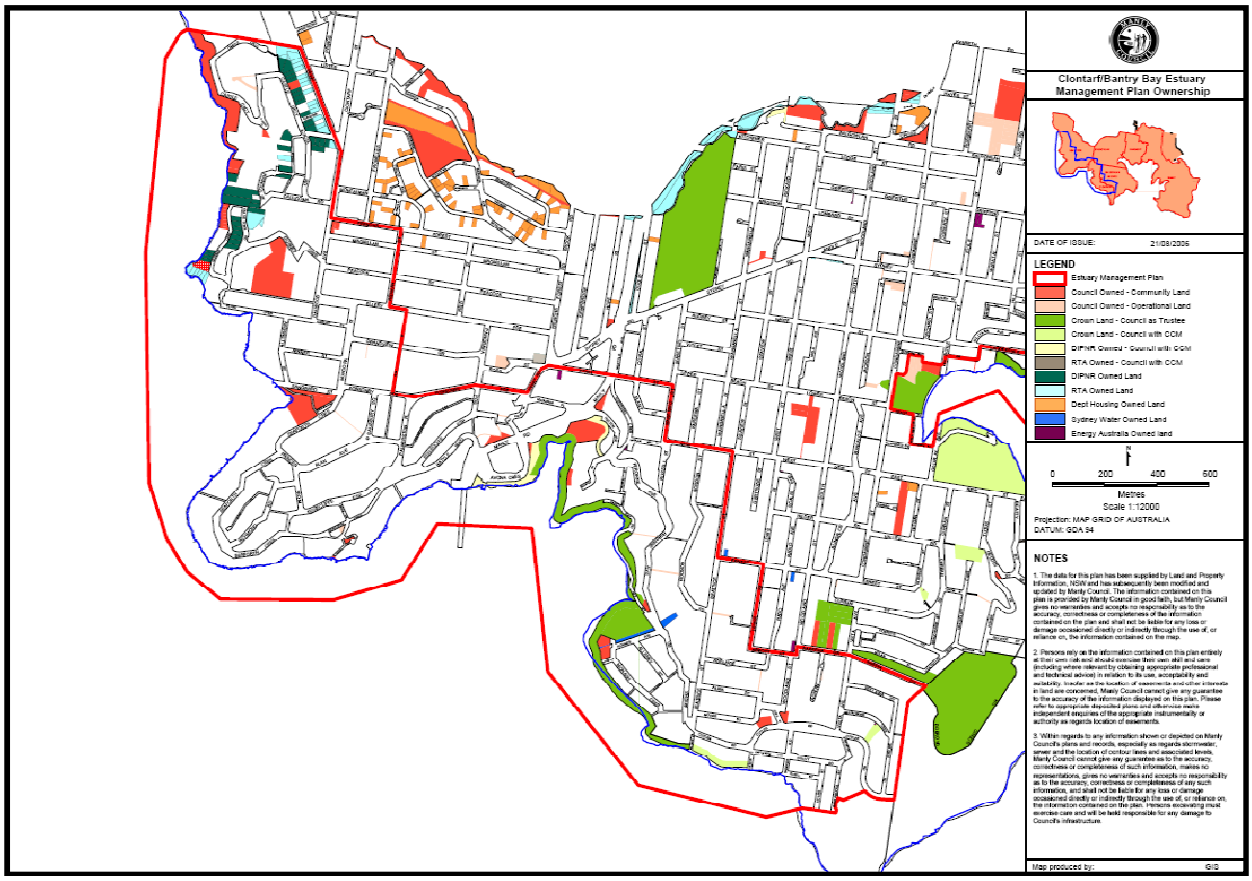
APPENDIX A: LAND TENURE, USE AND MANAGEMENT

A.1 LAND TENURE

Ownership and management responsibilities for the land and seabed within the study area are shared by a number of government agencies and Manly Council. Ownership of land within the Clontarf/Bantry Bay EMP study area is identified in **Figure A.1 –** Clontarf/Bantry Bay **Land Ownership map**.

In general, land of Clontarf/Bantry Bay EMP study area consists of private, crown, Manly Council, Department of Planning, Sydney Water and Energy Australia owned and administered land, with Crown Land representing by far the major public land holding. NSW Maritime is responsible for the management of waterways and the Department of Lands is the owner of the seabed.

Figure A.1 - Land ownership within the Clontarf / Bantry Bay study area



As indicated by Figure A.1 there is a mix of land tenure within the study area including:

- Council Owned Land: community classification
- Council Owned Land: operational classification
- Crown Land: Council as Trustee
- Crown Land: Council with CCM (care, control & management)
- DoP (Department of Planning) Owned Land: Council with CCM
- DoP Owned Land
- RTA Owned Land

- Sydney Water Owned Land
- Energy Australia Owned Land

Council Owned Land: community classification
Manly Council owns a total of 89,391 sq.m of land under community classification in 38 different parcels. Twenty nine of these parcels occur in Seaforth and nine in Clontarf. These lands are used either as reserve, public reserve, park or recreation parks and include Sangrado Park, Fisher Bay Park and others.

Council Owned Land: operational classification
Manly Council owns a total of 8,964 sq.m of land under operational classification in 15 different parcels. Eight of these parcels occur in Clontarf, six in Seaforth and one in Balgowlah Heights. These lands are drainage, rights of carriageway, pathway, road, lane and corners play. Four parcels shown as road on Peronne Avenue/Gordon Street are being converted to residential lands for subsequent sale.

Crown Land: Council as Trustee
Manly Council acts as trustee of a total of 100,845 sq.m of crown land. These are bushlands occurring in six parcels of land covering Sandy Bay Reserve in Clontarf. One parcel of crown land occur each in Fisher Bay Reserve and Clontarf Park.

Crown Land: Council with CCM
Manly Council has CCM (care, control and management) responsibility of a total of 6,116 sq.m of crown land. These occur in 2 parcels, one of 46 sq.m of land as Laura Street Wharf and the other as Duke of Edinburgh Reserve.

DoP Owned Land
The Department of Planning (DoP) owns a total of 31,999 sq.m of land in 32 parcels in Seaforth within the study area. These are vacant lands with only two parcels being used as reserve.

DoP Owned Land: Council as trustee
Manly Council acts as trustee of a total of 3,067 sq.m of DoP owned land. These are bushlands occurring in one parcels of land within Fisher Bay Reserve in Seaforth.

DoP Owned Land: Council with CCM
Manly Council has CCM responsibility of a total of 11,812 sq.m of DoP land. These occur in nine parcels, all forming parts of the Fisher Bay.

RTA Owned Land
RTA owns a total of 19,500 sq.m of land in 35 parcels in Seaforth within the study area. These are either RTA buildings or vacant lands kept for road widening.

Sydney Water Owned Land
Sydney Water owns a total of 3,685 sq.m of land in five parcels in Clontarf within the study area.

Energy Australia Owned Land
Energy Australia owns a total of 181 sq.m of land in two parcels in the study area.

A.2 LAND USE PLANNING

The Clontarf/Bantry Bay EMP study area consists of land, foreshore and waterways areas. Land use planning of the study area is governed by two documents, the *Manly Local Environment Plan* 1988 (Manly LEP) and the Sydney Regional Environmental Plan - Sydney Harbour Catchments 2005 or simply the Harbour REP, both enacted under the Environmental Planning and Assessment Act 1979.

The *Manly Local Environment Plan* 1988 (Manly LEP) is the main statutory control over local development within the Manly Local Government Area and applies to all land including the Clontarf/Bantry Bay EMP study area. The Clause 9 of the Manly LEP establishes land use zones (presented in section A.2.1). The LEP also identifies Items of Environmental Heritage, Environmentally Sensitive Areas, Foreshore Scenic Protection Areas and Potential Acid Sulphate Soils.

The *Sydney Regional Environmental Plan - Sydney Harbour Catchments 2005* applies to the hydrological catchment of the harbour. It also defines and contains specific provisions for the 'Foreshores and Waterways Area' (which is generally the area 'one-street back' from the foreshore), strategic foreshore sites, heritage items and wetlands protection areas. The relevant council is the consent authority for land-based development and land–water interface development. The Minister administering the Ports and Maritime Administration Act 1995 is the consent authority for water-based development. The Minister for Planning is the consent authority only where development is state significant or if any Environmental Planning Instrument nominates the Minister as the consent authority (whether within or outside of a council's Local Government Area (see Clause 5).

The Sydney Regional Environmental Plan - Sydney Harbour Catchments 2005 contains a set of planning principles relating to land within the Sydney Harbour catchment, land within the Foreshores and Waterways Area and heritage conservation. The planning principles need to be taken into consideration in the preparation of environmental planning instruments and development control plans under Part 3 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the preparation of environmental studies and master plans for the purposes of the Act. This will ensure that all strategic land use decisions with the potential to impact on the harbour are made having regard to such impacts. The catchment planning principles include a number of natural resource management principles that relate to water quality and quantity, implementation of the actions outlined in the Sydney Harbour Catchment Blueprint (Department of Land and Water Conservation, 2003), soil management (salinity and acid sulphate soils) and the protection and rehabilitation of wetlands, remnant native vegetation (including riparian vegetation) and the enhancement of ecological connectivity.

A.2.1 Land Zoning

Land within the study area is zoned under the Manly LEP as zone 2 – Residential, 3 – Business Zone, 5 – Special Uses Zone, 6 - Open Space (including areas to be acquired) and Zone 8 – National Parks existing (including parks to be acquired) , as shown in Figure A.2.1. The objectives of each of the zone need to be addressed in any of the proposed management options that represent development under the LEP. Those objectives, described separately for each zone, are as follows:

Zone 2 Residential

(a) to set aside land to be used for the purposes of housing and associated facilities;
(b) to delineate, by means of development control in the supporting material, the nature and intended future of the residential areas within the Municipality;
(c) to allow a variety of housing types while maintaining the existing character of residential areas throughout the Manly Council area;
(d) to ensure that building form, including alterations and additions, does not degrade the amenity of surrounding residents or the existing quality of the environment;
(e) to improve the quality of the residential areas by encouraging landscaping and permitting greater flexibility of design in both new development and renovations;
(f) to allow development for purposes other than housing within the zone only if it is compatible with the character and amenity of the locality;
(g) to ensure full and efficient use of existing social and physical infrastructure and the future provisions of services and facilities to meet any increased demand;
(h) to encourage the revitalisation of residential areas by rehabilitation and suitable redevelopment; and
(i) to encourage the provision and retention of tourist accommodation that enhances the role of Manly as an international tourist destination, and particularly in relation to the land to which Manly Local Environmental Plan 1988 (Amendment No 57) applies.

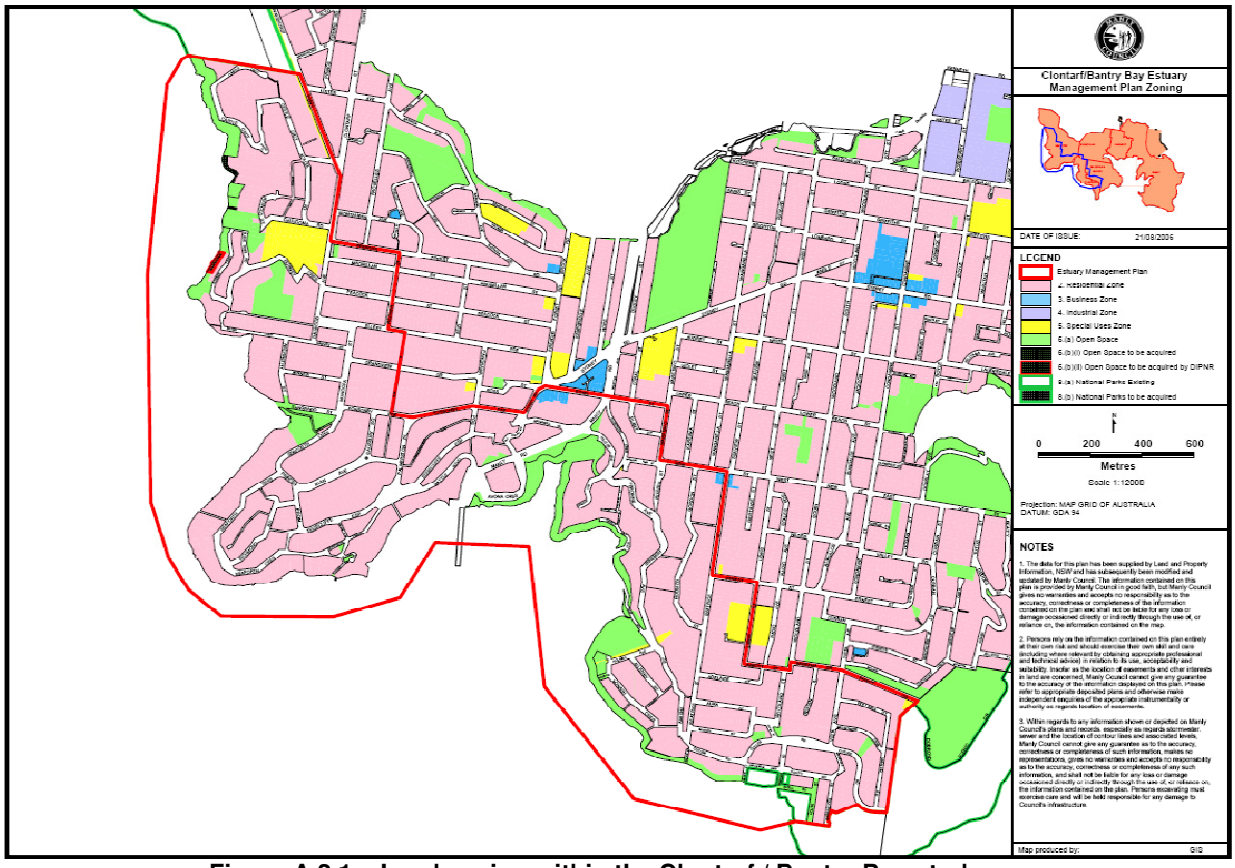


Figure A.2.1 – Land zoning within the Clontarf / Bantry Bay study area

Zone 3 Business

(a) to provide for and encourage the development and expansion of business activities which will contribute to the economic growth and employment opportunities within the Manly Council area;
(b) to accommodate retail, commercial and professional services in established locations in the residential neighbourhoods where such development is compatible with the amenity of the surrounding areas;
(c) to ensure there is adequate provision for car parking in future development in the business areas; and
(d) to minimise conflicts between pedestrians and vehicular movement systems within the business areas.

Zone 5 Special Uses Zone

(a) in the case of land shown unhatched on the map, is now owned or used for public or community purposes; or
(b) in the case of land shown hatched on the map, will be acquired by a public authority for the particular public or community purpose shown on the map.

Zone 6 Open Space

a) to ensure there is provision of adequate open space areas to meet the needs of all residents and provide opportunities to enhance the total environmental quality of the Council;

b) to encourage a diversity of recreation activities suitable for youths and adults;

c) to identify, protect and preserve land which is environmentally sensitive, visually exposed to the waters of Middle Harbour, North Harbour and the Pacific Ocean and of natural or aesthetic significance at the water edge;

d) to facilitate access to open areas, particularly along the foreshore, to achieve desired environmental, social and recreational benefits;

e) to conserve the landscape, particularly at the foreshore and visually exposed locations, while allowing recreational uses for those areas; and'

f) to identify areas which:

i. in the case of areas shown unhatched on the map are now used for open space purposes, and

ii. in the case of land shown hatched on the map are proposed for open space purposes.

Zone 8 National Parks

(a) to conserve areas of natural, ecological, scenic, educational, scientific, cultural or historic importance while permitting compatible development; and
(b) to identify areas which —
(i) in the case of areas shown unhatched on the map, are now used for national park purposes; or
(ii) in the case of land shown hatched on the map, are proposed for national park purposes.

A.2.2 Foreshore & Waterways Area Zoning

Under the Sydney Regional Environmental Plan - Sydney Harbour Catchments 2005 or simply the Harbour REP, the entire waterways of the harbour and its tributaries are classified into nine zones. These waterways zones have been specifically tailored to suit the differing environmental characteristics and land uses of the Harbour. This has resulted in a system that provides greater clarity and certainty for applicants and consent authorities in development considerations and applications.

The study area is classed in five of the nine zones covered in Harbour REP: W1 (Maritime Waters), W2 (Environment Protection), W5 (Water Recreation), W6 (Scenic Waters – Active Use) and W8 (Scenic Waters – Passive Use).

Zone W1 – Maritime Waters:
The zone covers the main navigation channels, public transport, port and maritime industry activities of the Harbour and permits a wide range of waterway activities and facilities.

The objectives of this zone are as follows:
(a) to give preference to and protect waters required for the effective and efficient movement of commercial shipping, public water transport and maritime industrial operations generally,
(b) to allow development only where it is demonstrated that it is compatible with, and will not adversely affect the effective and efficient movement of, commercial shipping, public water transport and maritime industry operations,
(c) to promote equitable use of the waterway, including use by passive recreation craft.

Zone W2 – Environment Protection
The zone provides for the protection, rehabilitation and long term management of the natural and cultural values of the waterways and adjoining foreshores.

The objectives of this zone are as follows:
(a) to protect the natural and cultural values of waters in this zone,
(b) to prevent damage or the possibility of longer term detrimental impacts to the natural and cultural values of waters in this zone and adjoining foreshores,
(c) to give preference to enhancing and rehabilitating the natural and cultural values of waters in this zone and adjoining foreshores,
(d) to provide for the long-term management of the natural and cultural values of waters in this zone and adjoining foreshores.

Zone W5 – Water Recreation

The zone is a public recreation zone which gives priority to public use and access to the water through appropriate water recreation facilities, including charter and tourism facilities and commercial marinas. Generally, the adjoining land is in public ownership and is intensively used by the general public, for example, parks and public roads. While many waterfronts have been modified, new development will need to protect any remnant natural features, retain important views and harmonise with the landscape. As water recreation facilities and marinas generally occupy a large amount of the waterway they will need to meet a demonstrated need and avoid conflicts with other water users.

The objectives of this zone are as follows:

(a) to give preference to and increase public water-dependent development so that people can enjoy and freely access the waters of Sydney Harbour and its tributaries,
(b) to allow development only where it is demonstrated that the public use of waters in this zone is enhanced and will not be compromised now or in the future,
(c) to minimise the number, scale and extent of artificial structures consistent with their function,
(d) to allow commercial water-dependent development, but only where it is demonstrated that it meets a justified demand, provides benefits to the general and boating public and results in a visual outcome that harmonises with the planned character of the locality,
(e) to minimise congestion of and conflict between people using waters in this zone and the foreshore,
(f) to protect and preserve beach environments and ensure they are free from artificial structures,
(g) to ensure that the scale and size of development are appropriate to the locality, and protect and improve the natural assets and natural and cultural scenic quality of the surrounding area, particularly when viewed from waters in this zone or from areas of public access.

The following Scenic Waters zones (Zone W6 and W8) apply to a 30 metre fringe measured from Mean High Water Mark.

Zone W6 – Scenic Waters – Active Use

The Active Use Fringe is a multi-purpose zone which has the potential to cater for a wide range of private and commercial water-dependent uses, including boat storage. The zone primarily adjoins residential land with highly modified foreshores and already contains a number of private waterside facilities, such as parts of Seaforth. While there are few major physical constraints to locating structures in the zone the aim is to ensure new development is minimal, appropriate to the landscape setting and does not conflict with other water users. While scarce in this zone, remnant natural shorelines and intertidal public access is to be protected and take precedence over proposals for improved private water access.

The objectives of this zone are as follows:

(a) to allow a range of public and private water-dependent development close to shore only where it can be demonstrated that such development minimizes alienation of waters in this zone from public use and is not constrained by shallow water depth, navigational conflicts or severe wave action,
(b) to minimise the number and extent of structures over waters in this zone through mechanisms such as the sharing of structures between adjoining waterfront property owners,
(c) to ensure remnant natural features, aquatic habitat (including wetlands) and public access along the intertidal zone are not damaged or impaired in any way by development,
(d) to minimise any adverse effect on views to and from waters in this zone and on the scenic values of the locality as a result of the size of vessels capable of being accommodated within the development.

Zone W8 – Scenic Waters – Passive Use Fringe

The Passive Use Fringe aims to give effect to the inter-tidal public access zones and gives priority to protecting the environmental and scenic values of predominantly natural shores and waters. The Passive Use Fringe Zone may adjoin residential land and often waters are too shallow for private landing facilities. Low-impact uses associated with ground-hugging structures, such as small boat launching from skids, will be considered if they do not impede intertidal public access or prejudice the natural environment.

The objectives of this zone are as follows:

(a) to give preference to unimpeded public access along the intertidal zone, to the visual continuity and significance of the landform and to the ecological value of waters and foreshores,

(b) to allow low-lying private water-dependent development close to shore only where it can be demonstrated that the preferences referred to in paragraph (a) are not damaged or impaired in any way, that any proposed structure conforms closely to the shore, that development maximises open and unobstructed waterways and maintains and enhances views to and from waters in this zone,
(c) to restrict development for permanent boat storage and private landing facilities in unsuitable locations,
(d) to allow water-dependent development only where it can be demonstrated that it meets a demonstrated demand and harmonises with the planned character of the locality,
(e) to ensure that the scale and size of development are appropriate to the locality and protect and improve the natural assets and natural and cultural scenic quality of the surrounding area, particularly when viewed from waters in this zone or areas of public access.

A.3 DEVELOPMENT CONTROL PLANS

A.3.1 Manly LEP 1988

The *Manly Local Environment Plan* 1988 (Manly LEP)[3] is the main statutory control over local development within the Manly Local Government Area and applies to all land including the Clontarf/Bantry Bay EMP study area.

The Manly Local Environment Plan (LEP) establishes Council as the consent authority for all purposes of the LEP and is the main statutory control on development within Manly Local Government Area. Clause 10 of the Manly LEP establishes that in order for consent to be granted for development, the Consent Authority must be of the opinion that the proposed development is consistent with the objectives of the relevant zone. Clause 10 also identifies the types of development that are permissible without development consent (item 2), permissible with development consent (item 3) and development that is prohibited (item 4) within each of the land use zones (Table A.3.1a).

Table A.3.1a –Development controls within 5 land zones in the Clontarf/Bantry Bay EMP study area

Zones	Without Development Consent (Item 2)	Only with Development Consent (item 3)	Prohibited (Item 4)
Zone 2 – Residential zone	Bed and breakfast accommodation; home occupations.	Any purpose other than a purpose included in item 2 or 4.	Advertising structures; amusement centres; bulk stores; car repair stations; backpacker accommodation; clubs; hotels; motels; refreshment rooms; service stations and tourist facilities (other than backpacker accommodation; clubs, hotels, motels, refreshment rooms, service stations and tourist facilities in the Tourist Area); commercial premises; gas holders; generating works; heliports; industries other than home industries; institutions; junk yards; liquid fuel depots; mines; motor show rooms; public buildings; retail plant nurseries; roadside stalls; sawmills; service stations; shops other than small shops; transport terminals; warehouses.
Zone 3 - Business	Bed and breakfast accommodation,	Any purpose other than a purpose included in item 2 or 4.	Bulk stores; bus depots; car repair stations; dwelling-houses ;

[3] The present version of the Manly LEP 1988 is updated and amended in September 2006. Simultaneously, work is going on to revise the present LEP into the standard LEP template.

Zones	Without Development Consent (Item 2)	Only with Development Consent (item 3)	Prohibited (Item 4)
zone	home occupations.		fuel depots; gas holders; generating works; heliports; purposes specified in Schedule 3; junk yards; liquid fuel depots; mines; road transport terminals; roadside stalls; sawmills; warehouses.
zone 5 – Special Uses Zone	Nil	The particular purpose indicated by red lettering on the map; child care centres and other child care facilities; drainage; educational establishments; landscaping; roads; telecommunications facilities; utility installations other than generating works or gas holders.	Any purpose other than those included in item 3.
6 - open space zone	Works for the purpose of landscaping, gardening or bush fire hazard reduction.	Agriculture; boating facilities; car parking ancillary to a use permitted in this item; child care centres; drainage; forestry; golf courses; marinas; parks; public baths; public dressing pavilions; race courses; recreation areas; refreshments rooms; roads; sports clubs; sports grounds; surf life saving clubs; telecommunications facilities; tennis courts; utility installations other than gas holders or generating works or both.	Any purpose other than a purpose included in items 2 or 3.
8 – National Parks zone	Any purpose authorised by the National Parks and Wildlife Act 1974.	Nil	Any purpose other than those included in item 2.

The LEP also identifies Items of Access land, Foreshore Scenic Protection Areas, Environmental Heritage, vicinity of Aboriginal Relics and Potential Acid Sulphate Soils and provides planning controls for the ongoing appropriate management of each of these items and areas.

Arrangements for access to certain land
Under Clause 15 of the Manly LEP, no development shall be carried out on land within Zone No. 2, being land in the vicinity of Rignold Street, Seaforth, within the study area, until arrangements satisfactory to the council have been made for access to the land.

Open Space Land Owned by Council or Public Authority
Under Clause 16 of the Manly LEP, Council shall not consent to an application to carry out development on land which is zoned 6 and owned by Council or another public authority unless it has made an assessment of:

a) *the need for the proposed development on that land;*
b) the impact of the proposed development on the existing or likely future use of the land; and
c) the need to retain the land for its existing or likely future use.

Foreshore Scenic Protection Area
A Foreshore Scenic Protection Area has been established by the Manly LEP.

Manly LEP (Clause 17) establishes that a Consent Authority shall not grant consent unless it is satisfied that proposed development requiring consent will not have a detrimental effect on the amenity of the Foreshore Scenic Protection Area.

Items of Environmental Heritage
The Manly LEP identifies a number of specific items, including many within the Clontarf/Bantry Bay study area, listed as being of Environmental Heritage Value. Clauses 18 and 19 of the Manly LEP identifies the restrictions on development of or adjacent to items of Environmental Heritage and considerations require by the consent authority prior to approval.

Development in the vicinity of Aboriginal relics
Clause 20 of the Manly LEP establishes that the Council shall not grant consent to an application to carry out development on land within the vicinity of an Aboriginal relic unless it has notified the Director of National Parks and Wildlife of the proposed development within 14 days of the receipt of the application.

Acid Sulphate Soils
Clause 33 of the Manly LEP relates to the development of land identified on potential Acid Sulphate Soils (ASS). Mapping of ASS has been undertaken across the Manly LGA and areas subsequently placed into 5 separate Classes. The study area is identified as Class 3 (only near Clontarf Reserve) or Class 5 land. Unless otherwise indicated by Council, consent is required for the carrying out works, as described in Table A.3.1b.

Table A.3.1b –Detail of land categorization for Potential Acid Sulphate Soils

Class of Land	Works
3	Works beyond1metre below the natural ground surface;-Works by which the watertable is likely to be lowered beyond 1 metre below the natural surface.
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 lands which are likely to lower the water table below 1 metre AHD on adjacent Class 1, 2, 3 or 4 lands.

A.3.2 Development Control Plan for Sydney Regional Environmental Plan -Sydney Harbour Catchments (2005)

Council is the responsible authority for land/water interface development under the provisions of the Sydney Regional Environmental Plan -Sydney Harbour Catchments (2005).

Land/water interface development consists of boating industry facilities; boat launching ramps; boardwalks; large marinas; marinas; public water transport facilities; water based restaurants and entertainment facilities; water recreational facilities; development for the purposes of dwellings of any type (inc serviced apartments), commercial premises, tourist facilities, shops and retailing, restaurants, recreation facilities, car parking when carried out wholly or partly in the waterway.

The Development Control Plan (DCP) of the Sydney Regional Environmental Plan - Sydney Harbour Catchments (2005) sets out in detail Council's town planning controls and guidelines on key development factors. As mentioned already, the study area is located in five of the nine zones covered in Harbour REP. These zones are: W1 (Maritime Waters), W2 (Environment Protection), W5 (Water Recreation), W6 (Scenic Waters – Active Use) and W8 (Scenic Waters – Passive Use).

Activities that may be carried out without development consent in all 5 zones of the study area
Aids to navigation, demolition (other than demolition of a heritage Item), general restoration works and single mooring (other than associated with a commercial marina or a boating industry facility)

Activities that may be carried out only with development consent in all 5 zones of the study area
Boat launching ramps (Public), community facilities, dredging, private landing steps, public boardwalks, public water recreational facilities, recreational or club facilities and telecommunications facilities

Development activities that is prohibited in all 5 zones of the study area
Advertisements, advertising structures, boat lifts for the storage of vessels above water, boat sheds (private), houseboats, intertidal dredging, reclamation works, residential development, swimming pools, tourist facilities, water-based restaurants and entertainment facilities and waterfront access stairs

In addition, activities that can or cannot be done in all 5 zones are mentioned in Table A.3.2.

Table A.3.2 –Zone specific development Control in the waterways of five zones within the Clontarf/Bantry Bay EMP study area

	Zone W1 (maritime waters)	Zone W2 (Environmental protection)	Zone W5 (Water Recreation)	Zone W6 (Scenic waters: active use)	Zone W8 (Scenic waters: passive use
Aviation facilities	Y	N	N	N	N
Boat lifts (other than boat lifts for storage of vessels above water)	Y	N	Y	Y	Y
Boat repair facilities	Y	N	Y	Y	Y
Charter and tourism facilities	Y	N	Y	Y	N
Commercial marinas	Y	N	Y	Y	N
Commercial port facilities	Y	N	N	N	N
Flora and fauna enclosures	Y	Y	P	P	P
Maintenance dredging	P	Y	P	P	P
Mooring pens	N	N	N	Y	N
Naval activities	P	P	P	Y	Y
Private landing facilities	N	N	N	Y	N
Private marinas	N	N	N	Y	N
Skids	Y	N	Y	Y	Y
Slipways	N	N	N	Y	Y
Swimming enclosures (private)	N	N	N	Y	N

P = the development (if any) that may be carried out without development consent Source: NSW Department of Planning (2005)
Y = the development (if any) that may be carried out only with development consent
N = the development (if any) that is prohibited.

In this DCP, different landscape character types in and around Sydney Harbour are recognised. These landscape character types provide a statement of character and intent and sets out performance criteria that are to be met for development within each landscape character types. Four different landscape character types exist in the Clontarf/Bantry Bay EMP study area. These are Landscape Character Type 1 (Middle Harbour in general), Type 3 (residential bays such as Fisher Bay, Powder Hulk Bay), Type 4 (residential long shores such as Seaforth) and Type 6 (main beaches along Clontarf).

LANDSCAPE CHARACTER TYPE 1
(For example, Middle Harbour in general)

Statement of Character and Intent: The foreshores have been subject to minimal development pressure and generally the shoreline and vegetation are well conserved. The bays and inlets create a sense of enclosure with natural elements, such as vegetation and headlands, dominating the landscape. Development should ensure that the key features which contribute to this landscape are protected.
Performance Criteria: Any development within this landscape is to satisfy the following criteria:
- headlands, points and the shoreline are retained in their undeveloped state;
- development is sited and designed to maintain the visual dominance of the tree canopy and other key natural features;
- visual continuity of elements such as cliffs, rock shelves and beaches is not lost or broken;
- ridgeline development does not encroach into natural areas and does not detract from the natural appearance of the landscape;
- the sense of enclosure of the inlets is protected by minimising the intrusion of water-based structures;

- the predominance of the natural shoreline is retained. When considering a proposal, the cumulative and incremental effect of structures along the foreshores must be considered; and
- overall colours should match native vegetation and geological features as closely as possible with trim colours drawn from natural elements such as tree trunks and stone.

LANDSCAPE CHARACTER TYPE 3
(Residential bays such as Fisher bay, Powder Hulk bay)

Statement of Character and Intent: This area is characterised by the natural interface between water and land with rocky outcrops and steep topography dominating the foreshore. Residential development in the surrounding areas provides a backdrop. The intent in this area is to allow suitable development that is of an appropriate scale and sitting to maintain natural shorelines and vegetation.
Performance Criteria: Any development within this landscape is to satisfy the following criteria:
- development at the water's edge has been sited so that the view of the natural shoreline remains predominant;
- significant natural features such as rock outcrops, dominance of the tree canopy, native vegetation, ridgelines, rock ledges and platforms are protected and enhanced;
- development is sited and designed so that the visual dominance of the tree canopy on the slopes and along the skyline is maintained;
- development retains the character of the enclosed water body or bay by maintaining the visual dominance of the natural features and preserving key points and entry into these areas in their natural state; and
- overall colours should match native vegetation and geological features as closely as possible with trim colours drawn from natural elements such as tree trunks and stone.

LANDSCAPE CHARACTER TYPE 4
(residential long shores such as Seaforth)

Statement of Character and Intent: The area is characterised by long natural shorelines which contain significant cliff lines, rocky outcrops and ledges and native vegetation. Development occupies the upper slopes and ridgelines and the shoreline has been developed with boat sheds, wharves and jetties.
The intent in this area is to allow development which does not obscure the natural topographic features and vegetation which contribute to this landscape.
Performance Criteria: Any development within this landscape is to satisfy the following criteria:
- it is sited and designed so that it does not break or contribute to the loss of the visual continuity of the landform;
- it is sited and designed so that the visual dominance of the tree canopy on the slopes and along the skyline is maintained;
- the visual significance of the cliff lines, rocky outcrops and ledges is retained;
- it is sited to avoid disturbing and obscuring rock outcrops and areas of native vegetation; and
- overall colours should match native vegetation and geological features as closely as possible with trim colours drawn from natural elements such as tree trunks and stone.

LANDSCAPE CHARACTER TYPE 6
(main beaches along Clontarf)

Statement of Character and Intent: The key features of these areas are the uninterrupted sandy beaches and headlands where the backdrop of development is interspersed with vegetation. While development is suitable in parts of these areas, the key natural features should be retained and protected. Each bay has key beaches and headlands that contain significant vegetation and rocky outcrops which should be preserved. The leafy nature of the upper slopes and ridgelines provides an important contribution to the visual character.
Performance Criteria: Any development within this landscape is to satisfy the following criteria:
- headlands, points and shorelines are retained in their current, generally undeveloped, state;
- it is sited and designed to maintain the visual character of shorelines and to maximise retention of existing vegetation;
- visual continuity of elements such as beaches is not lost or broken by development;
- the scale of the built form of development is consistent with predominantly low density residential;
- it is sited so that it follows the topography and minimises cut and fill of slopes; and

- overall colours should match native vegetation as closely as possible with trim colours drawn from natural elements such as tree trunks and stone.

A.3.3 Development Control Plan for Residential Zone 2007

This DCP provides controls, considerations and requirements for development in the Residential Zone under Manly LEP 1988. It applies to all forms of residential development in the zone with the objectives of this Plan also applying to residential development in other zones and non-residential development in the Residential Zone. This has established standard for dwelling density, floor space ratio, building height, setbacks, open spaces and landscaping, swimming pools, car parking and access.

The residential zone is divided into 7 density sub-zones with the study area designated within sub-zone 6 (with minimum allotment size of 600 m2) and sub-zone 7 (with minimum allotment size of 750 m2)
This DCP establishes following Foreshore setbacks and existing foreshore building lines:

a) Development on any property having frontage to the foreshore shall be setback a minimum of either 15m from mean high water mark, or the maximum wall height of the proposed building on the foreshore frontage, whichever is the greater.
b) In residential areas which have been subject to foreshore building lines set by Council at less than 15m from mean high water mark, the setback will be determined individually taking into account the terrain, the adjoining development and the Council's existing and any future foreshore walkway.

Part E of this DCP applies to selected sites, localities or circumstances including the following sites within the study area:

- Rignold Street, Seaforth
- Gurney Crescent And Clavering Road, Seaforth
- Boronia Lane

A.3.4 Development Control Plan for Access 1996

This DCP is pursuant to Section 72 of the *Environmental Planning and Assessment Act* 1979 and applies to the entirety of the Manly Council area. It sets out in detail Councils controls and guidelines to provide for an environment accessible to all people (including those with disabilities) in order to assist in achieving the aims and objectives and the policies and strategies of the LEP.

The DCP incorporates those parts of Manly Council Access Policy relating to development and building. This policy applies to public car parking provision, signage, audible access, footpaths and ramps, paving and public toilet facilities.

A.3.5 Development Control Plan for Landslip and Subsidence 2001

This DCP (updated March 2003) is designed to ensure that Council and the Community is aware, and responds appropriately to all identified potential hazards as a result of landslip and subsidence. It is also intended to address the range of major risks to public safety, including risks to life, health, private and public property, the economy and the environment.

The DCP aims to provide a framework for identification, assessment, treatment and monitoring of landslip and subsidence risk and assists Council in the Development Application process. The study area contains land which fall under all four Zones A, B, C and D. Further details on each zone are provided in Table A.3.5.

Table A.3.5 Summary of Land Slip and Subsidence in the Clontarf/Bantry Bay study area

Zone	Location	Description	Slope Angle	Council requirement
A	Generally areas behind Zone B	Ridge crests, major spur slopes and dissected plateau areas.	$< 15^{o}$	Geotechnical assessment may be required
B	Generally areas	Flanking Slopes	15^{o}-25^{o}	Geotechnical assessment

Zone	Location	Description	Slope Angle	Council requirement
	behind Zone C all along the foreshore			may be required
C	All foreshores of the study area	Steeper slopes, generally near coastal or harbourside areas	> 25°	Geotechnical assessment is required
D	Sandy Bay, Fisher Bay, Clontarf & Sangrado beaches	Beach foredune and alluvial flats	< 5°	Should follow good engineering practice

A.3.6 Development Control Plan for Energy Efficient Buildings 1998

This DCP (updated March 2003) encourages the design and development of energy efficient housing and other development in the Manly Council area. It reflects Council's concern for the conservation of the environment, possible climate changes due to the Greenhouse Effect and Councils support for the ecologically sustainable development of the Sydney Metropolitan Area. The guidelines and specific controls set out in this plan apply to the assessment of residential, commercial and industrial development on Manly.

A.3.7 Development Control Plan for Waste Minimisation and Management 2000

The DCP (updated March 2003) for Waste Minimisation and Management 2000 encourages development applicants to consider waste management issues during the planning stage.

The DCP reflects Council's emphasis on the principles of ecologically sustainable development and a desire to reduce the amount of waste disposed of at landfill, in recognition of State and Federal Government targets. Waste avoidance is imperative to achieving this goal and is central to the requirements of this DCP.

Key controls in this DCP require developers lodging a development application to:

- Complete a waste management plan prior to the issuing of a construction certificate
- Include waste facilities in the development that support source separation of waste and efficient waste collection.

A.3.8 Development Control Plan for Advertising Signs 1993

This plan (updated March 2003) aims to control the use of advertising structures and signs, so as to retain the uniqueness and natural beauty, and the architectural and historic significance of the LGA environment.

A.3.9 Other Council Plans and Policies

Described in detail in Appendix D.4.

APPENDIX B: POSITION OF THE ESTUARY MANAGEMENT WORKING GROUP ON KEY ISSUES

These positions are the basis for defining objectives and options under the Estuary Management Plan

Issues Discussion: Clontarf / Bantry Bay Estuary Management Plan

Please note:

- Issues identified in the middle column of this report are a summary of community comments and personal opinions, and not necessarily the position of Council on any matter.
- the numbers in brackets after the comments indicate the number of times that comment was received
- the right hand column describes the position of the Working Group on each of the issues raised through community consultation (i.e.- the middle column)
- where no 'Position' is noted in the right hand column, the Working Group determined that no (further) action was necessary

	ISSUES	***Working Group Position***
	AQUATIC ISSUES	
Human Interaction	• *Swimming Enclosure comments*: ▪ Used extensively and important for families ▪ Maintenance requirements of nets / structures ▪ Clontarf needs to be dredged (4) ▪ Safety (e.g.- oysters) (3) ▪ Access for less mobile (2) ▪ Oysters (and pollution) in Sangrado Pool make it unusable (3) • Protect swimming and marine area, providing boundary, access • Clontarf Reserve is a long established beach bathing, picnicking and boating area which is and has been frequented by larger numbers of residents and visitors both. The present format of the of the reserve with the extremely popular children's playground, picnic areas, pool, boat launching, the kiosk and Clonnies restaurant and that section of the spit to Manly walk which sees a lot of walkers, seeming to meet a broad spectrum of users' needs. It also has easy car and kayaking access with good parking available. Hopefully, these facilities will continue to be well managed as in the past.	• Clontarf pool needs dredging to make it usable, however: ○ Wait for results of DECC surveys before any dredging takes place ○ Ensure dredging is sympathetic to children • Nets of all pools need to be cleaned for safety reasons, with the appropriate DPI (Fisheries) approvals
Aquatic Habitat & Flora	• Seagrass (2) • *Caulerpa taxifolia* (2) • No knowledge of *Caulerpa taxifolia* (3) • Threat due to beach & sand movement • Marine growth and seahorses are linked	• Work with DPI (Fisheries) to investigate seagrass issue at Castle Rock, and a potential boat exclusion zone • Use the existing Starboard Right & Green (SR&G) program to educate boat owners about seagrass protection and *Caulerpa taxifolia*
Aquatic Fauna	• Dolphins (2) • Sea turtles have been seen beyond Spit Bridge • Clear responsibility to preserve natural environment needed (2) • Bird life • No commercial fishing • Seals have been sighted in study area	

ISSUES		Working Group Position
Maritime Operations	• Interrelation between NSW Maritime control in respect of mooring numbers and types e.g. swing, trot, finger wharves / jetties, marina) and related impact on adjoining water and land. • Stop destroying marine flora with marinas / structures etc (2) • Ice cream boat should have rubbish bin on board to manage litter • Maritime rubbish boat has been seen recently by residents, reported not seen by others • Have rescued several boats which have come loose from moorings – NSW Maritime really helpful and prompt to assist (excellent) • The owner of the house boat in Fisher Bay is a good source of knowledge for activities / issues on the water	• Encourage Council Rangers to work with and contact NSW Maritime for water-based issues
Boating	• *Navigation comments*: ▪ Rowers without lights in upper Middle Harbour are a hazard ▪ Sailing in Spit channel is a big problem • *Speed limit comments*: ▪ Maintain low speed limits ▪ Boating traffic at 8 knots or less ▪ 8 knot limit at Clontarf is ok ▪ No wave zone ▪ Limit wash from Spit to Bantry Bay to reduce erosion of shore • *Safety comments*: ▪ Current safety standards seem ok ▪ Boat watch group ▪ Boats mooring close to shore and landing at Castle Rock Beach are a safety hazard for children (3) ▪ Restriction of boats mooring at eastern end of Clontarf Beach (50 – 70m from point), for safety of children (2) ▪ Residents value the ability to land on the beach ▪ I understand that boats are not supposed to anchor within a certain number of metres from shore (particularly on a swimming beach). Boats clearly trespass within this limit on a regular basis and smaller boats even anchor on the shoreline posing a very serious safety concern for small children and adults alike. ▪ Clontarf Beach is used by swimmers and recreational boating in a largely harmonious manner. There are no major issues that need to be addressed. A 'swimming only' enclosure would restrict use of kayaks, windsurfers and small boats – this is not necessary ▪ There was a proposal to close off Clontarf Beach to kayaks and boats some time ago, for alleged safety reasons. It failed for lack of resident support. We opposed that proposal then and we would do so again. ▪ On a recent paddle from Clontarf to Bantry Bay there were water jet skis going really fast and behaving in an unpredictable manner, creating noise. This can be prohibited or at least curtailed. This part of the waterway is used by all types of water craft. Number of kayaks has increased.	• NSW Maritime to continue to educate rowers • Work with NSW Maritime to investigate the need for a no wash zone • Re-align moorings at Clontarf lengthwise along beach to form a buffer & decrease beach erosion, and discourage boats from landing on beach • Install some permanent public (seagrass friendly) moorings at Clontarf Beach • Ensure any extra moorings are aligned to maintain the width of the channel • Work with NSW Maritime to investigate possibility of a small exclusion zone (marked with buoys) for swimming, while still maintaining access to part of the beach for recreational

ISSUES		Working Group Position
	• Education about boat ramp and waterway etiquette is required • Boat ballast in Harbour	activities • NSW Maritime & SR&G program to educate boat owners about waterway etiquette and boat ballast
Sediment Processes	• Sedimentation around marinas • Dredging of marina area into Sandy Bay • Beach erosion – risk to property and beach users	• DECC to undertake hydro-surveys and photogrammetric to determine sediment processes. Use results to formulate holistic management options.
INTER-TIDAL ISSUES		
Intertidal Flora	• Mangroves • As much natural foreshore as possible should be retained	• Formulate management options to maintain, and investigate possibility of enhancing, existing mangrove populations
Intertidal Fauna	• Little Penguins (2) • 2 more sightings of Penguins at Clontarf during November • Beach raking – safety requirements vs. damage to fauna in the sand / sediment	• Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour • Encourage community input to keep beach clean • Monitor best practice beach raking in other areas, for possible implementation at Clontarf • Using outcomes of DECC surveys, investigate if south-east corner of Clontarf beach may benefit from hand raking (i.e.- to reduce erosion)
Fisheries & Fishing	• *Commercial Fishing comments*: ▪ Commercial fishing closure ▪ Professional fisherman used to be a problem • More help from Fisheries to combat illegal fishing practices • People have been sighted removing fauna from foreshore (it is	• Retain commercial fishing ban • Continue to encourage DPI

	ISSUES	Working Group Position
	an Intertidal Protected Area) • Should be able to fish from seawalls • Fishers mainly chase pelagic fish	(Fisheries) to enforce illegal fishing practices • Council Rangers and SR&G Program to assist with education and enforcement of illegal fishing practices
Boating Facilities & Organizations	• *Mooring comments*: ▪ More temporary moorings in upper Middle Harbour ▪ Restrict moorings to present numbers ▪ More moorings Clontarf Beach ▪ Boats under 6 metres should be on trailers ▪ Moorings are being slowly removed from Clontarf Bay to minimise damage to seafloor. But, boats anchor and potentially damage a larger area (anchors dropped wherever boat stops rather than a fixed mooring location). Perhaps fixed moorings for temporary use could solve this issue. ▪ Concern that Maritime wants to remove boat moorings from the area and to restrict boat access to waterways. I oppose this – indeed I believe the moorings do 3 positive things: • It adds to the visual environment – pretty, interesting, colourful • Brings more people to use the area • Adds a simple buffer to the beach • *Dinghy comments*: ▪ Hazardous storage of dinghies on Sandy Bay shore ▪ Get boats and dinghies off grassed and sand areas (3) ▪ Registration plus small annual fee ▪ People with boats on moorings should store folding and inflatable at home ▪ Uncontrolled foreshore storage of moored craft – owners access dinghies in most areas ▪ Current haphazard storage of dinghies is completely appropriate. Retention of this feature is good. Racks or removal would be a retrograde step. ▪ Need dinghy and small craft access on beach i.e. leave as is but have small area for boat exclusion at end of beach only and restrict speed ▪ Need to be able to keep small tenders / kayaks on small beach at Castle Circuit, as not able to carry up and down slope to road • *Boat Ramp comments*: ▪ Boat ramp shortage in Clontarf area (3) ▪ Ramp at Roseville is good, but an extra pontoon would be useful • *Boat access comments*: ▪ Boat access from shore is terrible	(nb- covered above in 'Boating') • Install horizontal dinghy racks (preferably no higher than current situation) at Sandy Bay, with small annual fee • Speak with Seaforth Moth Sailing Club re opportunities for a formal dinghy storage system at Sangrado • Leave Gurney Crescent & Castle Circuit dinghy storage as is, but educate owners to ensure protection of trees & middens, and decrease erosion of foreshore

	ISSUES	Working Group Position
	▪ There was an old proposal for a pontoon to be attached to Clontarf pool – perhaps this proposal should be re-visited ▪ Could a landing pontoon be put in at the Spit during the bridge widening works? ▪ A wharf for boat owners to more easily access Powder Hulk Bay from Sangrado reserve, and for general recreational use • Should be equitable and not only commercial use of foreshore • Kayak hire – should it be permitted on the foreshore? • Too much focus on boat facilities generally not used. There should not be increased boat access (2) • The main issue is the increasing marine traffic which generates the most threat to environment - rubbish pollution, noise, waste etc. We should not allow any further expansion of the boat moorings, marine or wharf facilities.	• No boat ramp possible in study area • Investigate possibility of installing a public pontoon at Clontarf Pool or Clontarf Marina. • Allow kayak hire, but limit the number of operators, and investigate whether it can be done at the Marina complex
Water Cycle Management	• *Stormwater comments*: ○ Stormwater pipe draining into Clontarf Pool - risky health wise, pollutes Middle Harbour generally (5) ○ Stormwater in Clontarf / Sandy Bay area is a major problem ○ Stormwater piping is too obtrusive ○ Stormwater pollution (inc. dog faeces) needs to be managed for now and future generations (5) ○ Regular inspection of Gross Pollutant Traps ○ More stormwater traps / filters required ○ Stormwater control is a problem (2) • *Sewage comments*: ▪ Sewage pollution (3) – there are still overflows at Bantry Bay and along Manly Scenic Walkway ▪ Area is cleaner since construction of Northside Sewage tunnel • Industrial pollution • Recycling Water (2) • More regular usage of Clontarf Reserve sprinkler pumps at night from groundwater spears • Re grassed areas at Clontarf Reserve, Ellery's Punt Reserve etc, the need to mow and water grass in this time of diminishing water availability bothers me. Where areas are being watered the grass looks good; where they are not being watered, the dead grass is very unattractive. I would really like to see more use of short native grasses with paths of bark and leaf mulch that wander through the grasses. Larger areas of leaf mulch could be used in picnic table areas etc.	• Manly Council Water Cycle Management Team is providing a catchment report for the study area. Use results of the report to address water quality issues • Undertake further investigation to determine the possibility of removing the stormwater pipe draining into Clontarf Pool • Continue to work with Sydney Water to identify and remediate sewer issues • Continue to work with Clontarf Marina through the SR&G program • Continue to undertake various stormwater education initiatives through Council • Continue to investigate and implement water recycling initiatives through Councils Water Cycle Mgt

ISSUES		Working Group Position
		Program • Address through Landscape Master plan

Coastal Hazards	• Cliff instability
	• *Seawall comments:*
	  • Erosion due to unnatural characteristics
	  • Need for property protection
	  • Maintain beach sand
	  • Unauthorised construction for the purpose of alienating public land
	  • Seawall maintenance is critical
		• Commission a geotechnical study of foreshore to identify and prioritise risks, and provide management options
		• Take advice from DECC surveys, and formulate management options to maintain seawalls / beaches, to protect property and safety of beach users

Climate Change	• Rising sea levels • Risk to property • General concern but long term, large scale measures are needed • Responsibility of Federal Government (2) • Climate change is of concern, but should not be the subject of Council expenditure unless part of a national initiative	• Model sea level rise predictions for the study area and investigate necessary management options • Link with the Macquarie Uni / Sydney Coastal Councils Group project investigating Climate Change in Manly
TERRESTRIAL ISSUES		
Terrestrial Flora	• Weed infestation intrusion (2) • Phytophthora along the waterfront at Castle Rock • Native regeneration (2) • Pickering Point – bush regeneration as soon as possible • Keep as much bush as possible (2) • Grow trees that provide shade • Development should not knock down all trees, and residents should be made to replant natives • What about a community service day in bush care per year - per rate payer • Council has replanted the hillside on south side of Edgecliffe Esp with grass however, only progressed along halfway of	• Council to continue to be an active participant in the die-back working group • (Council's Bushland Management Officer to provide advice on bushland management issues and options)

ISSUES		Working Group Position
	the total area covered in noxious weeds. Is the Council going to complete the whole area or leave it as is complete? Completing the whole strip would be appropriate for the entire strip as the part not 'grassed' is the part most noticeable	
Terrestrial Fauna	• Rats, rabbits, spiders, insects (sand-fly), termites • Sea eagles at Bantry Bay • NPWS fox and feral cat control • Loss in the last few years of bandicoots, sea eagles and little birds along foreshore reserves to Seaforth Oval • Get "rid" of *Mynah* birds • Tick control • A squirrel has been sighted at Clontarf • NPWS does not bait Garigal National Park as it is a control site • Rats at Castle Rock Beach are increasing in numbers	
View Maintenance	• Maintenance of natural setting of area (3) • Plant more native trees and limit development (4) • Views are important as well as bush – maintain trees and views so there is no reason to poison (4) • Trees should not be disturbed for views • Keep foreshore under control with respect to vegetation height (2) • Manly residents pay high rates because of high valuation of homes with harbour views • Include residents in landscape decisions regarding loss of views • Pruning • Against the policy of view sharing for private rate paying citizens.	• Aim to have policy of: o Council to co-ordinate managed (limited) pruning in bushland reserves to retain views and discourage illegal pruning
Conservation Management	• Conservation is very important and management of land and waterways of this beautiful area needs to ensure that we are taking measures for future responsibility to minimise damage, loss and improve water quality	
Access	• Foreshore access • Uncontrolled access through Council reserves • Bike paths required to Clontarf Reserve • Parents with prams / bicycles • There are limited facilities for the aged / disabled • Don't really see practicality of reclaiming Seaforth Crescent for public access • More level footpaths • Beach access for disabled is limited i.e. Manly • *Foreshore access vs. private structures*: ▪ Public access to foreshore ▪ Support a balance of both public access and the concerns of owners who will lose their jetty ▪ Public access is important but needs to be balanced with rights of waterfront land owners. Access is not achievable in all areas. ▪ I personally think all citizens should have unimpeded	• Use Clontarf Landscape Master plan to increase disabled parking and access to the Reserve • Investigate options to increase disabled access to all bays / pools including purchasing a beach freewheeler (to allow disabled access onto sand) for use at Clontarf • Maintain and

	ISSUES	***Working Group Position***
	foreshore access but I equally feel that those who have purchased and maintained their waterfront properties in the same form they always have should not be adversely affected by a sudden change of circumstances. No blanket ruling should apply in such places as Powder Hulk Bay. Instead each stretch of the foreshores should be considered on its own merits and exemption to the legislation should be supported when for instance it is equally easy or sometimes much easier to walk along the road for a short length rather than scrambling over steep rocks. ▪ Existing private structures must remain	(where possible) improve access to all existing public areas, but retain existing private structures.
Manly Scenic Walkway & Foreshore Walkways	▪ Manly Scenic Walkway track maintenance & litter (2) ▪ Upgrade to MSW from Bridge to Clontarf has been done very well ▪ Access to walkway entry and exit points ▪ Council should investigate reopening the old tram track from spit bridge to Heaton Ave / Linkmead Ave and obtain a govt grant as it is a heritage item and important to maintain the vegetation currently dying and would be an addition to the current scenic walkway ▪ Extension of the Tram Track is not viable ▪ Need to improve Scenic Walkway west of where main track meets Grotto Point turn off – erosion increasing after every rainfall ▪ Due to increased numbers of 'walkers' along Monash Crescent, a pathway on ave side of the roadway is needed - at present people and children walk in the middle of the road. • *Extension of walkway comments*: ▪ Possible extensions on west side of Spit Bridge (2) ▪ Council should have a plan and program to construct a walkway from the Spit to Bantry Bay (3) ▪ Bantry Bay is one of the last untouched harbour areas. Limit development and no more walking tracks, to minimise impact ▪ The Bantry Bay environment should be kept as it is - it must retain its natural National Parks environment. I have recently heard / read that a foreshore walk either side of Pickering Point is proposed. This would allow more and better access to the public and residents -really excellent. ▪ I would very much like to see a proper waterfront / shoreline walkway to join the Spit Bridge and Bantry Bay, thus linking to other tracks. This would not require the destruction or harm to anyone's jetty, just the 'permissive' use of the right to cross individuals land. As a fire unit member, it would also allow for proper access to keep down levels of ground fuel ahead of fire seasons (the foreshore is a tinderbox waiting to go off) and would give access with the Davey pumps to water from the Harbour in emergencies. • Harbour to Hawkesbury Track - public thoroughfare between Sangrado Reserve and lower Castle Circuit closer to the foreshore. It is possible for an alternative route for the Harbour to Hawkesbury Track could be devised at Seaforth	• (Council's Bushland Management Officer to provide advice on MSW issues and management options) • Investigate opportunities for a formal track to link the Manly Scenic Walkway with Bantry Bay, incorporating as much foreshore and bushland as possible without disturbing existing structures.

ISSUES		Working Group Position
	through quieter streets and reserves closer to Pickering Pt, away from busy streets (i.e. present route uses Dalwood Ave, Acacia Rd and upper Castle Circuit, before returning to Wakehurst Parkway thence Seaforth Oval) • Natural track is better • Bushland management • Weed management	
Traffic Management	▪ No meters – will increase traffic movement ▪ Parking charge in Clontarf Park seems high - lots of people drop off then park in streets rather than pay. ▪ Traffic / parking management only required on Boxing Day and New Years Day at Clontarf. Blocking of footpaths by illegal parking of cars and trucks (generally) should be ranger enforced ▪ Metre Holmes Ave on weekends and public holidays • Traffic and parking should be better managed and pedestrian traffic from walkers who use the road • Too many cars • Widening of Spit Bridge will cause pollution of environment and impact on local community (3) • At the corner of Holmes Ave and Amiens Rd visibility of traffic is poor - trees need cutting back for safety reasons. • Need a crossing in Ethel Street – before someone is hit and hurt • An overhaul of traffic management around Ethel St – Sydney road, including pedestrian crossing in Ethel Street and policing of parking in surrounding streets i.e. parking right to edge of street corners. • Mismanagement of Castle Circuit placement of traffic lights. These should have been installed at Lister Ave intersection. This was original plan before Council changed this <u>without</u> any community consultation. • More signs indicating direction of Clontarf Beach needed. • Monash Crescent single side parking on weekend is good (2)	• Try to keep Freebie bus as a permanent service • Prune trees at Holmes Ave for safety reasons • (Crossing already planned for installation at Ethel Street in 2007) • (Overhaul of traffic to be done with Seaforth Town Centre upgrade) • (Done by RTA as part of subdivision)
Infrastructure	▪ Recreational areas of Clontarf Park are used extensively by young children. These areas are a large part of many people's day to day life. ▪ BBQ area good ▪ Clontarf Reserve needs general upgrade ▪ More care of Clontarf Reserve at BBQ area • Much of the recreational infrastructure is used by people out of the area rather than locals • Maintenance is important for appearance (3) • Taps, bubblers, shade, rain shelters, rails on steps, telephones, toilets most important, accessible toilets / showers / seating / pathways / parking / ramps / rails • Current facilities appear adequate and moderately well maintained • Continue improving parks along the shore • Infrastructure management is a primary responsibility of Council	• Prepare a Landscape Master plan for Clontarf Reserve o Investigate possibility of using soft matting under children's play equipment, for safety reasons o Potentially extend paved area around amenity blocks to decrease the mud walked into them

ISSUES		Working Group Position
Waste Management	• Waste is a problem • Rubbish floats on beaches and on shoreline (4) • It is a high traffic area so important that bins and recycling are well managed • If there are enough bins, people will be better about disposing of litter • Bin service is good • Bin at south end of Clontarf Beach is often overflowing on the weekend. It either needs two bins or more frequent emptying • Litter & broken glass on beaches in Clontarf is an issue • After peak periods bins changed and made so domestic waste cannot be dumped • All people should be stopped littering the streets. Newspapers should be inside gates, not blowing down the street. • Illegal dumping of building materials, illegal use of motor vehicles using gutters to deliver building materials.	• Request that Rangers patrol study area beaches / reserves for litter offenders after doing dog patrols at Sandy Bay As part of Landscape Master plan, increase bins and recycling stations at Clontarf Reserve, particularly at key locations
GENERAL		
User Groups	• An overview of the groups: ▪ Bushwalker groups, Harbour side restaurants, kayak users, boat and line fisherman, sailboards, water skiers, skiff club children, swimmers, children using playgrounds, navy Balmoral divers, Harbour side residents, dog owners, Mosman Rowing club, recreational picnics, Northbridge Sailing Club, school groups, seniors bus picnics, charter ferries • Importance of activities for children (playgrounds, natural areas, sailing clubs etc) • Whole area is used extensively, and is greatly appreciated by many people and families (2) • Keeping the area safe is important – it is a family orientated area • Middle Harbour Yacht Club, the Northbridge Sailing Club/Seaforth Moth Sailing Club and the 16 foot Skiff benefit greatly from the area, and are important for children • Facilities to cater for all users • Different values between user groups • A local grocery shop would be an advantage in the local area - i.e. Bantry Bay near Seaforth Oval • Area is of huge economic value to Manly residents • *Clonnies comments*: ▪ Lease arrangements for Clonnies should be enforced to meet the terms of the lease ▪ Clonnies should be a la carte, instead of function focused • Too many regulations often have a negative effect	• Continue to support and enhance activities for children and families
Land Ownership	• Establishment of land status within the area of the estuary management plan. Management responsibilities for the following areas need to be clarified as part of the plan: ▪ Water areas and lands within NSW Maritime Authority	• Through the preparation of the EMP, investigate the need for a Crown

	ISSUES	Working Group Position
	Control ▪ Crown reserves under Council management: Clontarf Res R85244, R883021, R94420, R100075- wharf ▪ Leases and licences over Crown land (including reserves) ▪ Encroachments onto Crown land ▪ Plans of management for Crown Reserves ▪ Crown waterway - land below MHWM including rock platforms and inter-tidal zone ▪ Aboriginal Land Claim 6959 and Native Title Claim NC98/10 Eora People • Sydney Water owns the land to the south of the sewer structure at Clontarf. Council therefore cannot enforce parking of oversize vehicles / trailers / boats.	Land PoM for Clontarf Reserve (which would include the lease for the marina) • Seek approval from Sydney Water for Council to police parking on the land
Air Quality & Noise	• *Noise comments*: ▪ Amplified music from vehicles to the detriment of other passive reserve users & residents (4) ▪ Noise carried across the water at night from Spit venues ▪ Jetski ban should be retained (2) ▪ Jetski, but noise pollution generally not a problem • *Motor vehicle emission comments*: ▪ Soot from Spit traffic in westerly winds ▪ Motor vehicle emissions during Spit Bridge openings • Should be an equitable balance between resident and visitor and commercial interests • Keep air pollution to a minimum	• Maintain jetski (PWC) ban
Companion Animals	• *Regulation / Education comments:* • Regulation of dogs on leads and in prohibited areas, particularly early / late hours, weekends & public holidays (8) • Pet owners should be supported / educated so they are more responsible (4) • Dogs are always seen on Castle Rock Beach, and they pose a safety risk to children. • *Comments in support of dogs / exercise areas*: • Dog off-leash areas (3) • Recommended that current unleashed dogs areas be maintained • Allow dogs on beaches (4) • Sandy Bay should be retained as an off-leash area (4) • It is great to walk dogs through park to Sandy Bay • Dogs are important companions and should be able to roam more • Dogs should be given space, segregated from families - ideally away from beach areas • Adequate supply + more locations of dog bags (4) • *Comments against dogs / exercise areas*: • Dogs should not be allowed on walkways or beaches at all • Dogs should be kept off beaches and Manly to Spit walk (still see them) • Threat to wildlife	• Increase Ranger patrols and regulation in the study area, including early, late, weekends and public holidays. Ensure Castle Rock Beach is included. • Formalise Sandy Bay as an off-leash dog area, with clear signage that includes: o Map of off-leash area o Education messages o Phone numbers for issues • Increase number of dog poo bag

ISSUES		Working Group Position
	• More bins needed for doggy bags	dispensers

Heritage	• *Aboriginal Heritage comments*:
	  • Totally ignored to date
	  • Aboriginal heritage signage increased
	  • Dilemma: should this heritage be kept a secret in order to protect it - then how would people appreciate it?
	• *European Heritage comments*:
	  Clontarf sewerage block house – terrible!!! Can it be more aesthetic?
		• (Work with Aboriginal Heritage Officers to formulate management options)
		• Heritage sign on amenities block in Clontarf reserve needs fixing

Interpretation & Signage	• Too many signs • Group signage only (2)	• Consolidate and upgrade all foreshore signs in line with other parks / reserves in the LGA

Safety & Crime Prevention	• Vandalism / theft from vehicles overnight
	• Property theft is a problem, particularly at night
	• Graffiti
	• Recommended that Council take graffiti removal more seriously. The Seaforth public toilets and Seaforth community centre are a disgrace, and the areas close to the water have been similarly afflicted.
	• *Clontarf Safety / Crime comments*:
	  ▪ Graffiti on sewer structure at Clontarf is a problem
	  ▪ Vandalism in Clontarf Park would be reduced if the gates were locked regularly (2)
	  ▪ Could CCTV cameras be put in at Clontarf Reserve, similar to Manly Corso?
	• Late night car / alcohol behaviour
	• Security patrol (2)
	• Crime is not a significant issue / not too bad now (2)
	• Vandalism to facilities is a problem
	• Neighbourhood watch combined with precinct meetings, Boat Watch at MHYC
	• More street lighting	

APPENDIX C: PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD)

DETAILED DESCRIPTIONS OF THE ESD PRINCIPLES

Precautionary Principle
The precautionary principle reinforces a 'risk averse' approach to development. Acknowledging that the predictive process of Environmental Impact Assessments is imperfect, the precautionary principle ensures that the uncertainty and the associated level of risk is considered in the decision making process by adopting a worst case scenario (DUAP, 1995). Absolute proof that environmental harm will occur should not be necessary for precautionary measured to be adopted. The onus of proof of environmental damage (or lack thereof) should be borne by the developer, rather than the public or the decision maker.

Inter-generational Equity
Social equity, incorporating inter-generational equity, embraces value concepts of justice and fairness, so that the basic needs of all sectors of society are met, and there is a fair distribution of costs and benefits. Inter-generational equity refers to the present generation ensuring that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. Intra-generational equity refers to the present generation ensuring that improved well-being and welfare are accessible to all sectors of society within Australia, and that improved welfare within Australia does not result in decreased welfare in other nations (DUAP, 1995).

Inter-generational equity is about the needs of future generations being considered in current projects, and ensuring that such projects do not limit the ability of future generations to attain quality of life at least equal to the current generation. Future generations should not be responsible for repairing environmental damage created by projects today.

Conservation of Diversity
The conservation of biological diversity and ecological integrity relates to the protection of biodiversity and the maintenance of ecological processes and systems. The loss of biodiversity is in most cases irreversible.

Biodiversity is usually considered at three levels: genetic diversity; species diversity; and ecosystem diversity. Ecological integrity is maintained when the productivity, stability and resilience of the ecosystem are sustained. Maintaining biodiversity and ecological integrity is important for both anthropocentric and ecocentric reasons. Anthropocentric justification relates to the needs of society to maintain food, medicine, building materials and other life support resources. It also provides significant cultural, economic, educational, recreational, scientific and social benefits. Ecocentric justifications relate to rights of plants, animals and the non-living elements of the planet to existence irrespective of human needs or wants (DUAP, 1995).

Improved Valuation and Pricing

Natural resources have often been misconstrued as being "free" or under priced. This has lead to their wasteful use and consequent degradation in the past. Natural resources have historically been subjected to the same monetary market place economic analysis as general commodities. Based on supply and demand, for items that are plentiful, such as air and water, the value of the resource is low. This principle is based on ensuring that there is a broader approach to valuation, including ecological function values and other environmental factors.

In essence, this principle strives for *polluter pays* schemes, whereby those who generate pollution and waste should bear the cost of containment, avoidance or abatement, and *user pays* schemes, whereby consumers should pay prices based on the full life cycle costs, including the use of natural resources and assets, and the ultimate disposal of any wastes (DUAP, 1995).

References
DUAP – Department of Urban Affairs and Planning (1995) *Principles of Ecologically Sustainable Development* Appendix Q, Standard Brief Conditions, Provision of Project Management Services

APPENDIX D: ESTUARY MANAGEMENT STATUTORY FRAMEWORK

The Clontarf/Bantry Bay Estuary Management Study has been prepared under the NSW Government's Estuary Management Program. The Program is designed to fulfil the requirements of the NSW Estuary Management Policy 1992 (see Section D.2.2) and the NSW Coastal Policy 1997 (see Section D.2.7). However, as the Clontarf/Bantry Bay estuary study area comes under the purview of Sydney harbour catchment, the most important guiding document is the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 under the Environmental Planning & Assessment Act 1979.

The following section identifies relevant commonwealth, state and regional legislation and planning frameworks and provides a brief outline of applicability of each piece of legislation.

D.1 RELEVANT COMMONWEALTH POLICIES & ACTS

D.1.1 Commonwealth Government Coastal Policy 1995

The aim of the Commonwealth Coastal Policy is to promote the ecologically sustainable use of Australia's coastal zone, which house a diverse and interacting mixture of terrestrial, estuarine and marine ecosystems. It presents the Commonwealth's vision for a co-operative, integrated approach to coastal management. While this Policy only applies to those activities for which the Commonwealth has responsibility the document provides some direction in terms of coastal management standards. The Commonwealth Government has no direct responsibility for estuary management; however, many of the best-practice principles (which are mirrored in the NSW Coastal Policy) are being incorporated into the development of the Clontarf/Bantry Bay EMP.

D.1.2 Environment Protection & Biodiversity Conservation Act 1999

Under the assessment and approval provisions of the *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, any action that is likely to have a significant impact on a matter of national environmental significance are subject to an assessment and approval process. Such actions include a project, development, activity or series of activities. The Act applies to the Clontarf/Bantry Bay study area through listed threatened species and ecological communities and potentially through listed migratory species known to inhabit the study area.

Actions that are likely to have a significant impact on the environment of Commonwealth land, and actions taken by the Commonwealth that are likely to have a significant impact on the environment may also require approval under the EPBC Act.

D.1.3 Australian Catchment, River and Estuary Assessment 2002

It is Australia's first comprehensive assessment of catchments, rivers and estuaries. The assessment:

- uses a systemic approach based on catchments to determine the aggregate impact of land use on catchments, rivers and estuaries;
- provides a method for the relative comparison of catchment condition across Australia's more intensively used river basins;
- presents an assessment of river condition using a reach framework that provides a basis for future Australia-wide river assessment;
- classifies Australia's estuaries in terms of their condition and dominant biophysical processes that govern their form, function and management needs;
- raises issues of how best to invest in catchment, river and estuary management including choices between protective management and remedial works; and
- identifies knowledge gaps and data deficiencies that need to be addressed to improve Australian catchment, river and estuary management.

Australian Catchment, River and Estuary Assessment 2002 was prepared in partnership with State, Territory and Commonwealth natural resource management agencies and organisations.

D.2 NSW STATE GOVERNMENT POLICIES & ACTS

A number of statutory controls, documents and policies have been developed by the State Government which is relevant to the scope of the Clontarf/Bantry Bay study area. These are discussed in the following section.

D.2.1 NSW State Rivers and Estuaries Policy, 1992

The NSW Government has adopted this policy to encourage sustainable development of the natural resources of the States' rivers, estuaries, wetlands and adjacent riverine plains. This is to reduce and where possible halt:

- Declining water quality;
- Loss of riparian vegetation;
- Damage to riverbanks and channels;
- Loss of biodiversity; and
- Declining natural flood mitigation.

The policy also aims to encourage projects and activities, which will restore the quality of the river and estuarine systems such as:

- Rehabilitating remnant habitats;
- Re-establishing vegetation buffer zones adjacent to streams and wetlands;
- Restoring wetland areas;
- Rehabilitation of estuarine foreshores; and
- Ensuring adequate stream flows to maintain aquatic and wetland habitats.

The NSW State Rivers and Estuaries Policy committed the NSW government to reporting on the condition of each of the State's major river and estuary systems and the actions underway to halt degradation of these systems. The Rivers and Estuary Policy is underpinned by 10 component policies, one of these, Estuary Management Policy, has direct relevance to the Clontarf/Bantry Bay Estuary Management Plan.

The **Estuary Management Program** is an implementation component of the NSW Government's Rivers and Estuaries Policy. Since its introduction in 1992, the Estuary Management Program has provided almost $30 million in grants to 570 local projects across NSW. DECC works with local councils and other bodies to protect, improve and manage our estuary resources through the development of Estuary Management Plans. The Department also conducts a long-term state-wide estuary monitoring program.

D.2.2 Estuary Management Policy 1992

The Estuary Management Policy was developed as part of the State Government's recognition of the social and economic importance of estuaries. The specified general goal of the policy is "to achieve an integrated balance responsible and ecologically sustainable use of the State estuaries which form a key component of coastal catchments".

Specific objectives of the policy are:

- Protection of estuarine habitats and ecosystems in the long-term, including maintenance in each estuary of the necessary hydraulic regime;
- Preparation and implementation of a balanced long-term management plan for the sustainable use of each estuary and its catchment, in which all values and uses are considered, and which defines management strategies for:
    - Conservation of aquatic and other wildlife habitats;
    - Conservation of the aesthetic values of estuaries and wetlands;
    - Prevention of further estuary degradation;
    - Repair of damage to the estuarine environment; and
    - Sustainable use of estuarine resources, including commercial uses and recreational uses as appropriate.

An **Estuary Management Manual** has been produced to help develop and implement soundly based Estuary Management Plans.

D.2.3 Rivers and Foreshores Improvement Act 1948

It is the legislation under which works for the improvement of rivers and foreshores, prevention of erosion of lands by tidal and non-tidal waters and removal of obstructions to flow, are approved. Under this Act, a permit is required in most cases for any activities within or along a river, such as the removal of sand or gravel from a river or 40 metres from the top of the bank, or which could affect the river flow. Permits under Part 3A regulate activities that may adversely impact on waterways (such as increased erosion or siltation of rivers or lakes, bed

lowering and bank collapse) and obstruct or detrimentally affect stream flow, leading to long term river stability problems.

Works in a waterway or on the foreshore (within 40 metres) of Sydney Harbour (including tidal tributaries), Botany Bay, Newcastle Harbour or Port Kembla Harbour which involve:
• Excavation of material;
• Removal of material; and/or
• Works which may obstruct, or detrimentally affect the flow of water,

May require a Permit to be issued by NSW Maritime under Part 3A of the Rivers and Foreshores Improvement Act 1948 before works at the site can commence.

D.2.4 Environmental Planning and Assessment Act 1979
The *Environmental Planning and Assessment Act 1979* (EP&A Act) sets out the framework for local planning in NSW. The Act, administered by the Department of Planning, establishes the framework under which development is assessed and determined by the relevant consent authority for:

- The proper management, development and conservation of natural and artificial resources;
- The planning and co-ordination of development on land and water;
- The sharing of the responsibility for environmental planning between the different levels of government in the state; and
- Achieving ecologically sustainable development on land and water, while promoting orderly and economic development and use on land and water.

Under recent planning reforms the *EP&A Act* has been amended in a number of respects, more specifically changes to Parts 3 and 4 include:
- Reduction in the number and layers of planning instruments;
- All mandatory controls being placed in the relevant Local Environment Plan (LEP);
- Standardization of LEP's;
- Rationalization and clarification of Development Control Plans (DCP's) and
- Replacing Master Plans with DCP's and staged development applications.

The *Environmental Planning and Assessment Act* provides protection by considering impacts on Aboriginal heritage in land use and planning decisions. The three main areas are:
- planning instruments allow particular uses for land and specify constraints. Aboriginal heritage is a value which should be assessed when determining land use;
- section 90 of the Act lists impacts which must be considered before development approval is granted. Aboriginal heritage is one of these possible impacts;
- State government agencies act as the determining authority on the environmental impacts of proposed activities and must consider a variety of community and cultural factors, including Aboriginal heritage, in their decisions.

There are a number of State Environmental Planning Policies (SEPPs) which operate under the EP&A Act, only a few of which are relevant to the Clontarf/Bantry Bay EMP study area. These are detailed below.

SEPP No. 4 - Development Without Consent and Miscellaneous Exempt and Complying Development
This policy is designed to permit development for a certain purpose which is of minor environmental significance, development for certain purposes by public utility undertakings and development on certain land reserved or dedicated under the *National Parks and Wildlife Act 1974* without the necessity for development consent being obtained.

SEPP No. 19 - Bushland in Urban Areas
The general aim of this Policy is to protect and preserve bushland within the Greater Sydney area. It requires that bushland not be disturbed without the consent of Council. The SEPP also provides for the preparation of management plans for SEPP 19 Bushland. This Policy is integrated into Council's Development Application process.

SEPP No. 35 – Maintenance Dredging of Tidal Waterways
This policy was developed to facilitate the maintenance dredging of tidal waterways by public authorities provided the works were carried out in a timely, cost effective and environmentally responsible way. The aim of the policy is stated as being to rationalise the planning controls applicable to the carrying out of maintenance dredging of tidal waterways. In this regard public authorities can undertake maintenance dredging without the need to obtain development consent. Maintenance dredging should not be undertaken until all environmental impacts are identified and assessed. As part of the process the public authority carrying out the works needs to consult with affected bodies including NSW Fisheries, National Parks Service and Department of Lands, and to take into account the views of those consulted.

D.2.5 NSW Local Government Act 1993

Community Land Plans of Management
Under the *NSW Local Government Act 1993,* Councils are required to prepare Plans of Management (PoM) for all community land. Community land is then required to be managed in accordance with the adopted Plan of Management applying to the land. A PoM may apply to one or more areas of community land (i.e.: a 'generic' PoM) or to just one area (i.e.: a 'specific' PoM). Councils may determine which type of PoM they prepare except in the following cases, for which 'specific' PoMs are required:

- Land declared to be "critical habitat" under the *Threatened Species Conservation Act 1995* (TSC Act) or Fisheries Management Act 1994.
- Land directly affected by a recovery plan or threat abatement plan under the TSC Act or FM Act.
- Land declared by Council to contain 'significant natural features'.
- Land declared by Council to contain an 'area of cultural significance'.

There are additional minimum requirements for 'specific' PoMs described in section 36(3A) of the LG Act.

The Coastal Policy 1997 states that where possible joint PoMs will be prepared for foreshore lands where Crown lands and community lands adjoin each other. The Estuary Management Plans include both Crown and Community Lands where appropriate.

Ecologically Sustainable Development
Under section 7 of the *NSW Local Government Act 1993* Council, Councillors and council employees are required to have regard to the principles of ecologically sustainable development in carrying out their responsibilities.

Section 8 of the LG Act 1993 defines Council as having the following charter:

> "*to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ESD.*"

The NSW LG Act states that "…ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the four principles (described in Appendix C).

The integration of ESD principles into Council's planning and activities is also required by a number of state and regional policies, strategies and plans. For example ESD is an integral part of the Sydney Regional Coastal Management Strategy, the Sydney Harbour Catchment Blueprint and is required under the NSW Coastal Policy 1997.

Council has sought to integrate ESD into the management decisions and actions identified in this Estuary Management Plan in order to meet its responsibilities under the LG Act with regards to those Plans.

D.2.6 Coastal Protection Act 1979
The NSW Coastal Protection Act 1979 (as amended, 2002) defines the State's 'Coastal Zone'. Under the *Coastal protection Amendment Act 2002*, the Clontarf/Bantry Bay EMP study area is not included in the coastal zone.

The *Coastal Protection Act 1979* (as amended, 2002) facilitates the carrying out of certain coastal protection works and makes provision to the use and occupation of the coastal zone.

The Act states that a public authority shall not, without concurrence from the relevant Minister:

- Carry out development in the coastal zone, or
- Grant any right or consent to a person:
  - to use or occupy any part of the coastal zone, or
  - to carry out any development in the coastal zone

D.2.7 NSW Coastal Policy 1997

The NSW Coastal Policy applies to the NSW Coastal Zone as defined in the *NSW Coastal Protection Act 1979*. As a result this Policy does not apply to areas of Sydney Harbour including the Clontarf/Bantry Bay EMP study area however, its principles provide for best practice in minimising the impact of natural coastal forces upon private and public assets.

The NSW Coastal Policy sets a direction for coastal zone management, planning and conservation in NSW. It provides a framework for the balanced and coordinated management of the coast's unique physical, ecological, cultural and economic attributes. The Policy draws into a single document the State's various management policies, programs, standards and plans in order to co-ordinate our approach to coastal management.

All NSW State Government agencies and local councils are obliged to take account of the 1997 Coastal Policy in the preparation of their own specific policies and programs. The Policy recommends that councils address their implementation of the Policy through the Management Plans, councils are required to prepare under the *NSW Local Government Act 1993*.

D.2.8 Crown Lands Act 1989 and Coastal Crown Lands Policy 1991

The *NSW Crown Lands Act 1989* governs the planning, management and use of Crown land, including reservation or dedication for a public purpose, and leasing and licensing.

The *Crown Lands Act 1989* provides for the reservation and dedication of Crown land for a range of public purposes. When land is reserved or dedicated, management of the reserve is mostly undertaken either by:

- The Department of Lands
- A Reserve Trust
- Local Government Councils, by devolvement under the *Local Government Act 1993*.

In the case that Council is appointed as Trustee, Council has the ongoing responsibility to provide care, control and management of Crown land in accordance with the *Crown Lands Act 1989.*

To ensure that Crown Land is managed for the benefit of the people of New South Wales, Council as trustee is required to have regard for the principles of Crown land management. Crown land must be used and managed in accordance those principles under Section 11 of the *Crown Lands Act 1989*. The principles of Crown land management include:

- 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 wherever possible,
- that public use and enjoyment of appropriate Crown land be encouraged,
- that, where appropriate, multiple use 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, licensed or otherwise dealt with in the best interests of the State consistent with the above principles.

A Plan of Management will satisfy the *Crown Lands Act 1989* if the following points are addressed:

- The Plan of Management and its outcomes must incorporate the principles for Crown land management (listed above).
- In addition to incorporating the requirements of Section 36 of *the Local Government Act, 1993* the Plan of Management must address any matters required by the Minister responsible for the *Crown Lands Act* under Section 112 of the Act.
- Any proposed uses, developments and management practices must conform to the public purpose for the reserve.
- The draft Plan of Management is referred to the Department of Lands for comment prior to the public exhibition.
- The draft Plan of Management must be publicly exhibited, including a public notice in the NSW Government Gazette.
- Public submissions regarding the draft Plan of Management are to be referred to both the Minister for Land and Water Conservation and Manly Council as Trust Manager for consideration by the Minister prior to adoption.
- Any alterations to the Plan of Management by the Minister are made.
- Adoption of the Plan of Management by the Minister for Land.
- The Trust must follow the Plan of Management, with all operations being in accordance with the plan.

Coastal Crown Lands Policy

The Coastal Crown Lands Policy issued in 1991 applies to all coastal Crown lands within 1km landward and 3 nautical miles seaward from low water mark. Objectives of the Policy are to:

- Conserve and maintain the intrinsic environmental and cultural qualities of coastal Crown land.
- Retain all coastal Crown lands of an environmentally sensitive nature and/or required for public purpose, in public ownership.
- Optimise public access and use of coastal Crown lands.
- Provide Crown lands, as appropriate, for recreation, tourism, residential and commercial coastal development with due regard to the nature and consequences of coastal processes.
- Encourage the rehabilitation of degraded coastal Crown lands.
- Continue to acquire significant coastal lands for future public use.

The Policy identifies the assessment of coastal Crown Land and the dedication of beaches for a range of public purposes as a high priority to facilitate sound land management of the coastal environment. Where estuary and coastline management plans exist they may form the basis for a land assessment waiver (by the minister or delegated authority), requiring no formal assessment under the *Crown Lands Act*.

The Policy provides support for the acquisition of unique or environmentally sensitive coastal lands by the State Government, under the Coastal Lands Protection Scheme. Crown lands are identified in the land ownership (Section A1) of this Estuary Management Study.

D.2.9 Boat Storage Policy 2004 for Sydney Harbour

The Department of Planning, together with the NSW Maritime, has prepared the Boat Storage Policy for the Sydney Harbour. The policy provides a more strategic and certain approach to regulating boat storage facilities on the harbour. It outlines the NSW Government's policy for achieving a balance between promoting a prosperous working harbour, maintaining a healthy waterway and promoting recreational uses of the foreshores and waterways.

The policy:

- permits the development of commercial marinas in appropriate locations in order to promote working harbour and recreational use of the foreshores and waterways
- supports the conversion of swing moorings to fixed berths in appropriate locations
- discourages the proliferation of private storage facilities in order to free up navigable water space and limit privatisation of the foreshore and waterway
- simplifies and improves the planning framework.

D.2.10 Fisheries Management Act 1994

The *Fisheries Management* (FM) *Act 1994* and the *Fisheries Management Amendment Acts 1997 and 2001* are developed to conserve, develop and share the fisheries resources of the state for the benefit of present and future generations.

Habitat and species conservation

The Act establishes provisions for NSW Fisheries to conserve fish habitat such as the development of Habitat Protection Plans, the designation of aquatic reserves, regulation of damage to or removal of marine vegetation and the protection of fish spawning areas. Under the FM Act approvals are required to undertake work or activities, which interfere with marine vegetation or fish.

Threatened Species

The *Fisheries Management Amendment Act 2001* includes new threatened aquatic species provisions including fish and marine vegetation. It also amends the *EP&A Act 1979* and a range of other legislation including the *Threatened Species Conservation Act 1995*.

Marine Protected Areas

The NSW Government is developing a representative system of marine protected areas for NSW Waters in collaboration with the Commonwealth Government's national representative system.

The major aim of NSW protected areas is to manage and conserve marine biodiversity on coastal, estuarine or oceanic areas. Marine protected areas generally fall into the categories of marine parks, aquatic reserves and intertidal protected areas.

The planning process for managing marine protected areas is designed to be flexible to suit local needs and conditions. NSW Fisheries prepare management plans for marine protected areas, which provide a framework for the development of work programs that meet the objectives of the marine protected area. This is undertaken in consultation with stakeholders and the community.

Aquatic Reserves

The FM Act provides for the creation and management of Aquatic Reserves in NSW Waters to conserve the biodiversity of fish and marine vegetation in the area. Any works within this area will require prior approval from NSW Department of Primary Industries (Fisheries).

Intertidal Protected Areas (IPAs)

Intertidal protected areas (IPAs) have been established in nine areas around Sydney to protect selected rocky habitats and intertidal species. The aim is to:

- protect intertidal community biodiversity and structure;
- provide biological reservoirs of breeding stock so exploited areas nearby can be recolonised or sustained; and
- help ensure harvesting of intertidal invertebrates is undertaken at sustainable levels.

All IPAs extend from the mean high water mark to 10 meters seaward from the mean low water mark. Collecting seashore animals is strictly prohibited in these closures. This includes crabs, snails, cunjevoi, octopus, sea urchins, anemones, pipis, cockles, mussels, oysters, and nippers (saltwater yabbies).

NSW Fisheries Policy & Guidelines: Aquatic Management & Fish Conservation 1998/1999

The Policy and Guidelines apply to all planning and development proposals that affect freshwater, estuarine and marine ecosystems. These documents aim to assist councils and other government agencies in their assessment of proposals and documents such as licenses, development applications and Environment Impact Statements in order to ensure that they are sensitive to, and mitigate impact on, the aquatic environment.

The Policy identifies a number of general Policies for the conservation of fish, marine vegetation and aquatic habitats, which have been considered in the preparation of this Management Plan.

Fish Habitat Protection Plans
To assist in the protection of key fish habitats, the *Fisheries Management Act 1994* enables the creation of Fish Habitat Protection Plans for the protection of any fish habitat. This document presently has two Fish Habitat Protection Plans:

Plan No 1

The Plan applies to the following habitats and features; the quantity and quality of waters, mangroves, seagrass, saltmarshes, wetlands (3), mudflats, sand and gravel substrates, rocky reefs, snags (primarily fallen trees and rocks), reed beds and other aquatic plants. This Plan also applies to the following activities: dredging and reclamation, damaging marine vegetation, de-snagging and impeding fish passage.

Plan No 2

This Plan is specific to the protection of seagrass and as a result its primary objective is to "*ensure there is no net loss of seagrass within the coastal and estuarine waters of NSW*". The Protection Plan identifies a number of broad strategies for achieving this objective.

The *Fisheries Management Act 1994* states that "*A person must not cut, remove, damage or destroy marine vegetation on public water land or an aquaculture lease, or on the foreshore of any land or lease....*" Seagrass is included in the definition of marine vegetation. Therefore penalties apply for cutting, removing, damaging or destroying seagrass.

This Plan covers all of NSW's coastal and estuarine waters. Activities to which this Plan applies include: collection or 'trimming' of live seagrass, collection of seagrass from oceanic or estuarine beaches, dredging, reclamation, construction of groynes and breakwaters, construction of jetties, wharves, bridges, ramps and pontoons, moorings, boating and anchoring, fishing, construction and operation of aquaculture facilities, bait digging and collecting and point source pollution. Guidelines for the management of each of these activities are provided in the Plan.

D.2.11 Catchment Management Authorities Act 2003
The NSW Catchment Management Authorities Act 2003 (CMA Act) provides for the establishment of statutory Catchment Management Authorities, each with a responsible and accountable board. The Act repeals the *Catchment Management Act 1989*.

Catchment Management Authorities were established in January 2004. The functions of a Catchment Management Authority include the following:

- Develop Catchment Action Plans in consultation with Councils and the catchment's communities. These plans will integrate and build on the current Catchment Blueprints.
- Implement Catchment Action Plans through Annual Implementation Programs.
- Provide loans, grants, subsidies or other financial assistance for the purposes of catchment activities and to assist implementation of Catchment Action Plans.
- Provide educational and training courses and materials on natural resource management within the catchment.

A Catchment Action Plan must have regard to the provisions of any environmental planning instrument, other existing natural resource management plans such as Catchment Blueprints, and the need to comply with and promote any State-wide natural resource management standards. These standards are to be developed by the Natural Resources Commission, established under the *Natural Resources Commission Act 2003*.

A Catchment Management Authority must 'consult widely' during the preparation of a Catchment Action Plan, including with local governments, the catchment's communities and the previous Catchment Management Boards. Public notice of the preparation of a plan must be given and the plan must be placed on public exhibition. In reviewing a draft plan for approval, the Minister must seek the advice of the Natural Resources

Commission and must take into account any such advice provided. The Minister may seek and take into account the advice of any other person or body (including Council) in reviewing a draft plan.

The Clontarf/Bantry Bay Estuary Management Area lies within the Sydney Metropolitan Catchment Area. The catchment has an area of 1860 sq.km. and involves 39 LGAs including Manly (further elaboration in D.3.4).

D.2.12 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) protects all threatened plants and animals native to NSW (with the exception of fish and marine plants, which are covered by the *Fisheries Management Act 1995*). It provides for the identification, conservation and recovery of threatened species, populations and communities. It also aims to reduce the threats faced by those species.

Recovery plans are prepared by the NSW Department of Environment & Climate Change for each threatened species, population and ecological community listed under the TSC Act. The Act specifies that Council must not undertake actions that are inconsistent with a recovery plan and must manage the threatened species, population or ecological community in accordance with the relevant recovery plan.

The TSC Act also requires government planners to take account of threatened species before they make environmental plans and policies at a state-wide, regional and local level. The TSC Act (and the EP&A Act), require that a determining authority cannot carry out or approve an activity that is likely to significantly affect threatened species, populations or ecological communities, or their habitats, unless a Species Impact Statement (SIS), or an EIS has been prepared.

D.2.13 NSW Heritage Act 1997

The NSW *Heritage Act 1977* provides for heritage management by government agencies. Section 170 of the Heritage Act outlines the special obligations of government agencies.

The *Heritage Act* protects the State's natural and cultural heritage. Aboriginal places or objects that are recognized as having high cultural value are listed on the State Heritage Register.

D.2.14 NSW National Parks and Wildlife Act 1974

The National Parks and Wildlife Service (now DEC) have drafted Heritage Impact Assessment Guidelines that must be followed by developers and consent authorities in their assessment of the impacts on Aboriginal heritage.

The *National Parks and Wildlife Act* provides statutory protection for all Aboriginal objects and places in NSW. Areas are gazetted as Aboriginal places if the Minister is satisfied that there is enough evidence to show the area is, or was, of special significance to Aboriginal culture.

D.3 REGIONAL PLANS AND POLICIES

D.3.1 Sydney Regional Environmental Plan - Sydney Harbour Catchments 2005: the Harbour REP

This is the most important planning document relevant for the Clontarf/Bantry Bay EMP study area. The plan consolidates and replaces the following instruments: - Sydney Regional Environmental Plan No. 22 - Parramatta River (SREP 22); - Sydney Regional Environmental Plan No. 23 - Sydney and Middle Harbours (SREP 23); and amends State Environmental Planning Policy No. 56 Sydney Harbour Foreshores and Tributaries (SEPP 56).

The Harbour REP covers the area of Sydney Harbour and aims to establish a balance between promoting a prosperous working Harbour, maintaining a healthy and sustainable waterway environment and promoting recreational access to the foreshore and waterways. It establishes planning principles and controls for the catchment as a whole as follows:

- All waterways are classified into one of nine zonings as a mean of identifying appropriate location for a wide variety of uses;

- The working Harbour is preserved by retaining a prosperous working waterfront and an effective transport corridor, including port and maintenance facilities, naval and aviation uses, commercial and marinas and boatsheds.
- The zoning plan aims to improve water safety and amenity by better locating and consolidating certain uses in specific locations. It identifies potential locations for marinas and limits private facilities for residential developments. With these new controls now in place, along with NSW Maritime's new *Landowners Consent Manual*, the NSW Government has lifted the four year ban on large (chiefly commercial) marinas;
- Public access to the foreshore is enhanced, providing for public boat launching ramps, recreational and club facilities and appropriate development controls.

The study area is located in five of the nine zones covered in Harbour REP. These zones are: W1 (Maritime Waters), W2 (Environment Protection), W5 (Water Recreation), W6 (Scenic Waters – Active Use) and W8 (Scenic Waters – Passive Use). Details are presented in Appendix A.2.2.

D.3.2 Sydney Harbour Foreshores and Waterways Area – Development Control Plan 2005

A Development Control Plan (DCP) has also been prepared to compliment the Harbour Regional Environmental Plan. The DCP provides detailed design guidelines for development and criteria for natural resource protection for the locations identified as Foreshores and Waterways Area. Council will need to consider the Foreshores & Waterways Area DCP in decisions for new developments proposed along the waterfront (up to one street back from the foreshore).

In this DCP, different landscape character types in and around Sydney Harbour are recognised. These landscape character types provide a statement of character and intent and sets out performance criteria that are to meet for development within each landscape character types. Four different landscape character types exist in the Clontarf/Bantry Bay EMP study area. These are Landscape Character Type 1 (Middle Harbour in general), Type 3 (residential bays such as Fisher Bay, Powder Hulk Bay), Type 4 (residential long shores such as Seaforth) and Type 6 (main beaches along Clontarf). Details are presented in Appendix A.2.2.

Further, and as part of the DCP of this Harbour REP, the Department of Environment & Climate Change has mapped Ecological Communities and Landscape Characteristics. Within the foreshores and waterways area boundary a number of aquatic and terrestrial ecological communities have been identified within the Clontarf/Bantry Bay EMP study area including seagrass beds, mixed rocky intertidal and sand, urban development with scattered trees, open forest and sandy beaches.

D.3.3 Sharing Sydney Harbour Access Program 2003

Sharing Sydney Harbour Access Program is a NSW Government initiative to improve public access to and enhance the recreational enjoyment of Sydney Harbour and its tributaries for the people of and visitors to Sydney and assists in addressing demand for improved public access to its foreshores and waterways. The Access Plan provides the framework for developing and implementing specific access improvement projects.

The Access Plan identifies opportunities to improve access to the foreshores and waterways for a range of recreational users including pedestrians, cyclists and recreational boaters. The plan has been jointly prepared by Department of Planning and NSW Maritime and provides an integrated approach to the development of a catchment-wide network of access ways.

Implementation of the Access Plan is assisted by Access Program grants, available annually until 2007/08. Each year a total of $2 million of State government funding is available for capital works projects, on a dollar-for-dollar basis. Grant funding is being provided by NSW Maritime, Sydney Harbour Foreshore Authority (SHFA) and Department of Planning.

Projects suitable for funding will accord with the principles and objectives set down in the Access Plan. Applicants eligible for grant funding are generally expected to be local government authorities and incorporated or registered recreational organisations.

D.3.4 Sydney Metropolitan Catchment Management Action Plan 2006

The Sydney Metropolitan Catchment Management Authority (SMCMA) is a NSW Government agency responsible for the coordination and management of Sydney's natural resources. In Sydney, natural resources include land, rivers, estuaries and coastal systems. The catchment has an area 1860 square sq. km. (the area extends offshore to include state waters to the three nautical mile limit) accommodating 39 Local Government Areas including Manly. The catchment is divided into eight sub-catchments including the Middle Harbour. Activities of catchment management relates to 5 themes including 'Estuarine, Coastal & Marine'.

The Estuary, Coast and Marine theme focuses on a whole of catchment approach to managing impacts on the coastal zone. The unique nature of impacts in estuarine and coastal areas necessitates that the SMCMA encourage partnerships with the community, industry and recreational users in addressing issues of concern. The SMCMA is currently (2007) working on the following projects in this theme:

- Bitou
- Boat Pump Out
- Botany Bay CCI
- Dune Restoration
- From Tide to Table
- Implementation of Estuary Management Plans
- Mapping Aquatic Vegetation
- Marine Pests
- Sydney Harbour Sea Grass and other Estuarine Vegetation (Stages 1 & 2)
- Wetland Management Program

The SCCMA has drafted a Catchment Action Plan (CAP) in August 2006. The target for the Estuary, Coast and Marine theme is 'By 2016, there is an improvement in the condition of estuaries and coastal lake ecosystems'. The theme target has further been translated into management targets as:

- By 2008, review existing Estuary Management Plans to assess key stakeholders capacity to undertake identified high priority actions.
- By 2016, promote and support the implementation of all high priority actions identified in existing and new Estuary Management Plans.

The draft CAP is being reviewed by the Natural Resources Commission (NRC). The NRC is providing further input regarding the Catchment Targets and Management Targets. The revised targets will be incorporated into the final version of the CAP.

D.3.5 Land Owners Consent Manual 1998

The bed of Sydney Harbour and its tributaries is publicly owned land. Due to the significance of Sydney Harbour its ongoing management is governed by clear policies set out within this document.

The governing body which owns the Harbour bed, or more specifically land below Mean High Water Mark (M.H.W.M), in addition to parcels of reclaimed land, is the Marine Ministerial Holding Corporation (MMHC). It lies within the portfolio of the Minister for Ports.

The MMHC has the responsibility of protecting major asset and preserving the natural features of the tidal foreshore. Its guiding philosophy is that private development of submerged land adjoining the foreshore properties around Sydney Harbour and its tributaries is not a right conferred by ownership of riparian land but a privilege which may or may not be granted according to the circumstances of individual proposals.

Administration of proposals for development upon submerged land owned by the MMHC is, in general undertaken in three step process:

- Land owner's consent - as required under the *EP&A Act 1979*. For submerged land NSW Maritime has delegation to give land owners consent for the development of small private access facilities on behalf of the MMHC.

- Development consent - the consent authority is usually either the Office of Marine Administration (as delegate of the Minister for Ports) or Council depending on the type of development proposed.

- Construction approval - this involves detailed engineering assessment of proposed structure their stability and safety

The Land Owner's Consent Manual is related to the first step. It sets out the criteria which are used to assess whether or not a development proposal for submerged Sydney Harbour lands will be granted land owner's consent.

D.3.6 Sydney Regional Coastal Management Strategy 1998
This strategy was prepared by the Sydney Coastal Councils Group, represented by 15 Local Councils including Manly, to coordinate and integrate relevant coastal planning and management activities, and the responsible organisations, to improve coastal management in Sydney. This strategy applies to the coastal areas between Pittwater local government area and Sutherland local government area, including all areas that were previously excluded from the NSW Coastal Zone.

The primary aim of the present strategy is "to protect and conserve terrestrial and marine ecosystems in the study zone, and to manage the social and economic conditions to achieve this, through the implementation of identified, sustainable coastal planning and management practices."

At present, the Group is guided by a three-year 'Strategic Plan 2005-2008'.

D.3.7 Sydney Metropolitan Strategy 2005
The Metropolitan Strategy is a broad framework to secure Sydney's place in the global economy by promoting and managing growth. It is a strategic document that outlines a vision for Sydney over the next 25 years. It is also the start of a process to bring the State Government, local government, stakeholders and the community together to discuss, review and then make decisions to guide the future of Sydney's economy, environment and communities. More detailed planning follows via regional strategies and subregional strategies.

There will be 10 sub-regional plans, to support Sydney Metropolitan Strategy. The LGAs of Manly Council, along with Pittwater and Waringah constitute under North East Sub-region. SHOROC (the Shore Regional Organisation of Councils) is a cooperative group of councils on Sydney's Northern Beaches representing Manly, Mosman, Pittwater and Warringah, provides input to this sub-regional strategy.

A key objective of the Metropolitan Strategy is to protect Sydney's natural environment from the impacts of growth for dual benefit: our waterways, biodiversity, clean air and heritage are protected; and development processes are streamlined with greater certainty.

This Strategy will contribute to the many initiatives underway to improve the health of Sydney's waterways, by ensuring new development is located and designed to meet the community's aspirations for our rivers, coasts and estuaries.

D.4 MANLY COUNCIL PLANS & POLICIES

Council is responsible for the overall management of the Local Government Area (LGA) and enforcing the requirements of the *NSW Local Government Act 1993*, *Environmental Planning and Assessment Act 1979* and the *Crown Lands Act 1989* (where Council has care and control). The NSW Local Government Act 1993 requires that Council follows the principles of Ecologically Sustainable Development (ESD) in carrying out its responsibilities. Council is responsible for the preparation and implementation of Plans of Management for community lands (under the *Local Government Act 1993*). Council plays a role in controlling development within the Local Government Area boundary under the *Environmental Planning and Assessment Act 1979*. Council is the consent authority for most land-based developments and activities.

D.4.1 Manly Local Environment Plan 1988
The Manly Local Environment Plan (LEP) establishes Council as the consent authority for all purposes of the LEP and is the main statutory control on development within Manly Local Government Area.

The LEP details the zoning of land within the Manly Council area. It enables Council to make particular Development Control Plans regulating development in any zone and to make provisions for exempt and complying development within Manly (further details in A.3.1).

The LEP also identifies Items of Environmental Heritage, Environmentally Sensitive Areas, Foreshore Scenic Protection Areas and Potential Acid Sulphate Soils and provides planning controls for the ongoing appropriate management of each of these items and areas.

This LEP is now being reviewed and updated in accordance with the NSW Planning Reforms and amended Planning legislation.

D.4.2 Plan of Management for Community Land 1996
Under Part 2, Division 2 of the *Local Government Act 1993* as amended; Council is required to prepare Plans of Management for Community Land.

Council has adopted an overarching Plan of Management for Community Lands (1996). The document sets out objectives under four areas.

Natural Environment
- Manage our open spaces on a sustainable basis by addressing ecological systems and biodiversity in conjunction with user needs and demands.
- Integrate local drainage needs into park design and bushland management.

Cultural Environment
- Include heritage conservation and cultural identity matters in design criteria when designing and maintaining our reserves.

Recreation
- Manage all open space land in a flexible manner, and ensure that local needs are met.
- Provide a major open space connection between harbour and ocean foreshores, creek and lagoon edges, and the National Parks.
- Maintain our active sporting areas and manage them to maximize choice.

Open Spaces
- Recognise the role of each open space within the wider community and in relation to other objectives.
- Encourage local participation in design, development and management.
- Provide for user health, safety and enjoyment.
- Retain opportunities to use open space land for special events or projects and for future activities or structures if need becomes apparent.
- Improve management of open space in Manly in order to achieve the objectives of this plan.

D.4.3 Manly Social Plan 2004-2009
The Manly Social Plan 2004-2009 was adopted by Council in November 2004. The Social Plan was developed on the basis of consultation with the community and service providers, to identify issues affecting the wellbeing of the people in Manly. Needs assessments were conducted targeting women, men, older people, youth, people with a disability, children and families, gay and lesbian communities, culturally and linguistically diverse people and precincts. This consultation generated of a series of priority issues. Action plans to address the priority issues are being implemented as ongoing across Manly Council divisions and in collaboration with external agencies such as the Manly Community Centre, and state level government.

The core objectives of the Manly Social Plan are to assist Council, community groups and health and community service agencies to:

- Understand the local community and the needs of individuals and groups within the community;
- Identify gaps in current service provision;
- Plan for current and future needs;
- Allocate resources in the most effective and equitable way;
- Address the needs of social and cultural diversity in Manly;
- Take a leadership role in community development and the provision of services;
- Establish a framework and process to engage with special needs groups, the wider community and other agencies; and,
- Integrate social and environmental sustainability considerations.

Manly Council's strategic directions, including a focus on social and environmental sustainability provide the context for the Manly Social Plan. The Clontarf/Bantry Bay Estuary Management Plan considers issues and actions addressed in the plan

D.4.4 Surfing the Future 2006
It is a 'Vision document' for the Manly Local Government Area for 2025. Surfing the Future is a 'road map' for a journey from 2005 to 2025. The six opportunities and challenges to achieve this vision are:

- A Living Manly– inclusive society and culture
- An Affordable Manly – accommodation for our future
- A Well Governed Manly – the role of local government
- A Natural Manly – a sustainable environment
- A Visitor Friendly Manly – a place to stop and stay awhile
- A Moving Manly – transport, access and getting around

D.4.5 Manly Sustainability Strategy 2006
The Manly Sustainability Strategy (MSS) 2006 is a living and evolving document and builds on MSS 2002. It is a 10 year plan with the following priorities:

- Contributing to the global climate change response
- Securing Manly's waterways and water use
- Reducing our waste
- Maintaining and improving wellbeing and quality of life in Manly
- Protecting and restoring the diversity of species and their habitats in Manly Council

The strategy addresses the vision through the six principles and 10 broad programmes.

The Clontarf/Bantry Bay Estuary Management Plan contributes to the MSS program: Coastline and Estuary Management Program to achieve the principle C: A Natural and Sustainable Manly'. The objective of the Coastline and Estuary Management Program is to manage the terrestrial and marine environment interface to balance environmental conservation and the enjoyment of the areas by user groups and ensure that Manly's coastlines are recognised for their important natural and cultural heritage.

D.4.6 Manly Plan 2007-2010
The Manly Plan 2007-2010, is the key planning document driving the operations of the Council. It is a rolling three year plan that identifies a range of objectives and strategies that Council will implement in providing programs, services and facilities to the community made up of those who live, work and visit Manly.

D.4.7 Manly's Sustainable Heritage Conservation Plan
(under preparation)
Manly Council is currently undertaking a comprehensive heritage review for the local government area. This review will include the assessment of approximately 200 potential additional heritage items of the built and natural environment for possible listing on the Manly LEP. The study involves a review of Council's strategic policy-making and management for Manly's heritage through a three-staged public consultation process.

APPENDIX E: INSTITUTIONAL STAKEHOLDERS

E.1 MANLY COUNCIL

Manly Council was incorporated as a local government body on 6th January, 1877. Manly Council is a statutory body deriving authority from the Local Government Act 1993 and other Acts enacted by the Parliament of New South Wales. The Council does not have the power to make decisions outside the legislation by which it derives its authority.

Council is responsible for the overall management of the Local Government Area (LGA) and enforcing the requirements of the *NSW Local Government Act 1993*, *Environmental Planning and Assessment Act 1979* and the *Crown Lands Act 1989* (where Council has care and control).

Manly Council is run by 12-member elected Councillors headed by the Mayor. The Council is supported by the executive General Manager and staff. Councillors are elected to Council at local government elections, which are held every four years. In the Manly local government area, there are no wards, and each councilor represents the entire Council area. The Mayor is also directly elected by the Community for a term of 4 years. The role of the Councilors is, as a member of the governing body of the Council to:

- direct and control the affairs of the Council in accordance with the Local Government Act
- participate in the optimum allocation of the Council's resources for the benefit of the area
- play a key role in the creation and review of the Council's policies and objectives and criteria relating to the exercise of the Council's regulatory functions
- review the performance of the Council and its delivery of services, and the management plans and revenue policies of the Council.

The role of Councilors is, as an elected person to:

- represent the interests of the residents and ratepayers
- provide leadership and guidance to the community
- facilitate communication between the community and the Council.

The Ordinary meetings of Council and meetings of the principal committees are held on a four (4) weekly cycle on a Monday evenings. Agendas & minutes may be access via the Business Paper Viewing System, or are available for perusal at the Manly Library on the Friday prior to the meetings. Extracts of the agendas and minutes are available from the Customer Service Centre at the Council Offices.

In all Committee and Council meetings, any member of the public can apply to address Council through the Public Address provision. At Ordinary Meetings, any member of the public can address Council on any matter NOT on the agenda through the Public Forum.

Manly Council is further committed to community consultation, a key component of which is the committee-based **Precinct Community Forums** system. The forum approach was introduced in 1990 to extend the involvement of the community through coordinated consultation and participation. The aim is to involve all property owners, residents and workers in the decisions which affect their local area. Precinct Community Forums are groups of people who live, work or own property in a Precinct area. There are 12 Precinct Community Forums in the Manly Council area and Precinct meetings are held monthly. The meetings discuss matters referred by Council for community consultation, and matters of local importance and interest to the community. The decisions of the Precincts are advisory. Their comments are responded to and considered by Council in its statutory decision making role. The Community Forums are organised by the residents. They play a vital role in ensuring that future changes in the local area are taken into account, and are sympathetic to the amenity of the local residents.

Another operational arm of the Council is various issue or topic based Committees and Working Group. They meet as and when needed or at various frequencies. Manly Council resolved at its Planning & Strategy Committee meeting on Monday 8 May 2006 to establish the Clontarf / Bantry Bay Estuary Management Committee, as a sub-committee of the existing Harbour Foreshores Committee. This committee has been renamed as the 'Clontarf / Bantry Bay Estuary Management Working Group' with involvement of representatives from the community, Precincts, Aboriginal Heritage Office, Council's Scientific Advisory Panel,

Council staff and relevant state government agencies, including NSW Maritime, Department of Lands, NSW Department of Primary Industries (Fisheries) and Department of Environment & Climate Change. Mayor chairs the Working group.

Among many various roles, Manly Council is responsible for:

Estuary Management Plan
Council is also responsible for preparing Estuary Management Plans under the Catchment Act 1989, Estuary Management policy 1992 and the Estuary Management Manual 1992 (soon to be amended).

Community Land Management
Council is responsible for the preparation and implementation of Plans of Management for community lands (under the *Local Government Act 1993*).

Development Consent
Council plays a role in controlling development within the Local Government Area boundary under the *Environmental Planning and Assessment Act 1979*. Council is the consent authority for most land-based developments and activities.

E.2 DEPARTMENT OF ENVIRONMENT & CLIMATE CHANGE (DECC)

In April 2007, the Department of Environment and Conservation took on a range of important new responsibilities and changed its name to the Department of Environment and Climate Change (DECC). The NSW Government's aim was to build a broader organisation able to respond to the challenges presented by climate change and further progress reforms in the sustainable management of our land and water resources.

DECC is building on the strengths and cultures of its constituent agencies by combining knowledge, innovation, regulatory and field experience to tackle priority environmental, climate change, natural resource and cultural heritage issues for NSW. In doing so, DECC contributes towards achieving its corporate vision through:

- working towards a healthy environment cared for and enjoyed by the whole NSW community
- managing the state's natural resources, including biodiversity, soils and natural vegetation
- managing natural and cultural heritage across the state's land and waters
- acting to minimise the impacts of climate change
- promoting sustainable consumption, resource use and waste management
- regulating activities to protect the environment
- conducting biodiversity, plant, environmental and cultural heritage research to improve decision-making.

DECC serves a number of key functions within NSW, including areas within the Clontarf/Bantry Bay study area including:

- The management of natural and cultural heritage;
- Promotion of sustainable consumption, resource use and waste management;
- Regulation of activities to protect the environment; and
- The undertaking of biodiversity, plant, environmental and cultural heritage research to improve decision making.

DECC provides financial and technical assistance to councils to help develop and implement sustainable estuary management plans through the Estuary Management Program. The Program was commenced in 1992 to assist local government to better manage estuaries through a strategic process outlined in the NSW Estuary Management Manual.

The NSW National Parks and Wildlife Service (NPWS), which forms part of the NSW Department of Environment & Climate Change, is responsible for protecting the State's flora and fauna, and for managing and maintaining National Parks and Nature Reserves. The NPWS is also responsible for Aboriginal Heritage and sites.

DECC has responsibilities and powers under many NSW environmental legislation. Only relevant ones are mentioned here:

- Soil Conservation Act 1938
- National Parks and Wildlife Act 1974
- Coastal Protection Act 1979
- Fisheries Management Act 1994
  Note: DECC only administers Part 7 Division 2 of this Act and s227 so far as it relates to that Division and ss 243 & 245 so far as is required in relation to this Division.
- National Environment Protection Council (New South Wales) Act 1995
- Threatened Species Conservation Act 1995
- Contaminated Land Management Act 1997
- Marine Parks Act 1997
- Environmental Trust Act 1998
- Forestry and National Park Estate Act 1998
- Nature Conservation Trust Act 2001
- Catchment Management Authorities Act 2003

E.3 DEPARTMENT OF LANDS

The New South Wales Department of Lands (Lands) is the primary Government agency responsible for managing state-owned land. It is the guardians of all land information in NSW. It operates through a number of Divisions, only relevant ones are described below:

- Services of the Land and Property Information (LPI) Division include land title registration, property information, valuation, surveying and mapping.
- Crown Lands Division practices sustainable management of state-owned lands for the benefit of the people of NSW managing a total area of approximately 12.7 million hectares. In a number of cases however, Council manages Crown Land in accordance with the *Crown Lands Act 1989*
- Soil Conservation Service is established as the authority in planning, design and construction of soil conservation earthworks, rehabilitation and revegetation, and training in conservation earthmoving, urban erosion and sediment control.

Department of Lands has responsibilities and powers under much NSW environmental legislation. Only relevant ones are mentioned here:

- Valuation of Land Act 1916 No 2
- Transfer of Records Act 1923 No 14
- Land Sales Act 1964 No 12
- Crown Lands (Validation of Revocations) Act 1983 No 55
- Community Land Development Act 1989 No 201
- Crown Lands Act 1989 No 6 (except parts, Minister for the Environment)
- Crown Lands (Continued Tenures) Act 1989 No 7
- Roads Act 1993 No 33, (part)
- Surveying Act 2002 No 83

E.4 NSW DEPARTMENT OF PRIMARY INDUSTRIES

NSW Department of Primary Industries acts to foster profitable and sustainable development of primary industries in New South Wales. The department was formed in July 2004 with the amalgamation of Mineral Resources NSW, NSW Agriculture, NSW Fisheries and State Forests NSW. One of the seven Divisions, Agriculture and Fisheries Division, promotes industry and export development by working with industry to

improve the sustainability and profitability of the agriculture and fisheries sectors. Manages the sustainability of the state's fisheries resources and conserves aquatic biodiversity.

The Division has jurisdiction over all fish and marine vegetation in all waters of the state (including all private and public waters and permanent and intermittent waters) extending to 3 nautical miles offshore (and to 80Nm offshore in those fisheries for which it has jurisdiction under the Offshore Constitutional Settlement). This means that it has management responsibility for all aquatic animals (with the exception of aquatic mammals, reptiles, amphibians and birds, which are managed by the NSW Department of Environment & Climate Change) and responsibility for all marine vegetation and key aquatic habitats including seagrass, mangroves, gravel beds and snags. It has also management and research responsibilities related to threatened fish species, populations and ecological communities.

While DPI (Fisheries) is responsible for the management of all aquatic animals, the department is a state government authority with limited on-the-ground staff to effectively regulate the management of aquatic environments. As a result Manly Council's rangers are presently licensed as DPI (Fisheries) officers to assist Fisheries with some of their on-the-ground 'localised' regulation functions.

Relevant to estuary management, the Department of Primary Industries administers the following acts:

- Fisheries Act 1935
- Noxious Weeds Act 1993
- Fisheries Management Act 1994
  Except Part 7 (Divisions 1 and 2) and Part 7A, jointly the Minister for Climate Change, Environment and Water and the Minister Assisting the Minister for Climate Change, Environment and Water (Water).

E.5 NSW MARITIME

NSW Maritime (formerly Waterways Authority) is a statutory State Government body classified by NSW Treasury as a non-budget dependent general government agency. NSW Maritime is a self-funding entity.

NSW Maritime is responsible for the on-water management of all NSW navigable waters, including coastal areas, estuaries, rivers, lakes and dams to three nautical miles offshore. On-water management responsibilities include the management of safety, the protection of the marine environment from degradation by vessels, the provision of waterways infrastructure for vessels, the licensing of vessel operators, commercial vessels, on-water events, and mooring management.

NSW Maritime the government body which owns the seabed of Sydney Harbour, North Harbour and Middle Harbour and all related tidal bays, rivers and their tributaries. Under the *Ports Corporatisation and Waterways Management Act 1995* (PC&WM Act 1995) the Waterways Authority is the landowner of Sydney Harbour and its tributaries and therefore controls Sydney Harbour.

NSW Maritime is therefore responsible for management of waterways and the sea bed from mean high water mark (MHWM) seaward. As owner of the bed of Sydney Harbour, Waterways is the consent and determining authority for a variety of water-based developments and activities. Waterways are now also responsible for the investigation of on-water pollution incidents and issuing clean-up and prevention notices in relation to vessels (in navigable waters that are not required to have a pilot).

NSW Maritime is the State's maritime regulator and administers a number of Acts of Parliament and the Regulations made there under. Only relevant ones are mentioned here:

- *Navigation Act 1901*
- *Maritime Services Act 1935*
- *Rivers and Foreshores Improvement Act 1948*
- *Marine Pollution Act 1987*
- *Ports and Maritime Administration Act 1995*
- *Marine Safety Act 1998*

NSW Maritime also has responsibilities relating to the marine environment under:

- *Environmental Planning and Assessment Act 1979*
- *Protection of the Environment Operations Act 1997*

E.6 DEPARTMENT OF PLANNING

The Department of Planning was established in August 2005, following the de-amalgamation of the former Department of Infrastructure, Planning and Natural Resources. In March 2006, the NSW Heritage Office was incorporated into the department. The functionality of the Department is run through the following 7 divisions:

- Cities and Centers
- Corporate Governance and Support Services
- Heritage Office
- Major Project Assessments
- Metropolitan Planning
- Rural and Regional Planning
- Strategic Sites and Urban Renewals.

In developing its roles and responsibilities, the Department identifies the following five major goals:

1. Sustainable growth in the right locations
2. Improved investor and community confidence
3. Effective management of natural, environmental and cultural resources and values
4. Diverse, equitable and pleasant neighbourhoods which reflect community needs and aspirations
5. Integrated delivery of regional infrastructure and government activities

Planning and development is carried out under:

- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- Coastal Protection Act 1979 (as amended 2002).

Environmental planning instruments (State environmental planning policies, regional environmental plans and local environmental plans) are legal documents that regulate land use and development. Local environmental plans prepared by councils guide planning decisions for local government areas. Through zoning and development controls, they allow councils to supervise the ways in which land is used. Development control plans, prepared in accordance with the Environmental Planning and Assessment Act, are also used to help achieve the objectives of the local plan by providing specific, comprehensive requirements for certain types of development or locations e.g. for urban design, and heritage precincts and properties.

Planning and development within the NSW Coastal Zone (as declared under the Coastal Protection Act 1979) is now subject to a Ministerial direction for coastal protection, NSW Coastal Policy, SEPP 71 - Coastal Protection, and the Major Projects SEPP (which identifies coastal development that will need the approval of the Minister for Planning).The NSW Government in June 2001 announced its $11.7 million Coastal Protection Package to protect the State's beaches, headlands and other coastal features for generations to come.

E.7 DEPARTMENT OF WATER & ENERGY

On Friday April 27 2007, the Department of Water and Energy (DWE) was created, which incorporates most of the functions of the former Department of Energy, Utilities and Sustainability (DEUS) and the water-related functions of the former Department of Natural Resources as well as the Metropolitan Water Directorate from the former NSW Cabinet Office.

Some of the functions of the former DEUS, such as the Energy and Water Savings Funds and Action Plans have been transferred to the new Department of Environment and Climate Change. The Accredited Service Provider program was also transferred to the Office of Fair Trading.

E.8 SYDNEY WATER

Sydney Water, a statutory State owned corporation, wholly owned by the New South Wales Government has three equal, principal objectives:

- to protect public health
- to protect the environment
- to be a successful business.

Sydney Water provides drinking water, recycled water, wastewater services and some stormwater services to more than four million people in Sydney, Illawarra and the Blue Mountains. Drinking water is sourced from a network of dams managed by the Sydney Catchment Authority, then treated and delivered to customers' homes and businesses by Sydney Water. Sydney Water is governed, among others, by

- Sydney Water Act 1994
- Sydney Water Regulation 2006

Sydney Water has Memoranda of understanding with

- Memorandum of Understanding with the Department of Environment and Climate Change
- Memorandum of Understanding with NSW Health

There exists a Sydney Water & Manly Council partnership arrangement

E.9 NATURAL RESOURCES COMMISSION

The Natural Resources Commission (NRC) was created by the Natural Resources Commission Act 2003. The Government has adopted the NRC recommended Standard for Quality Natural Resource Management and state-wide targets for NRM. The targets now form priority E4 of the NSW Government's State Plan.

The standard and targets provide a quality assurance framework and clear goals to ensure that the investments of the NSW and Australian Governments and others in the activities of catchment management authorities are cost effective, protect and improve high value natural resource assets, and maximise integrated NRM outcomes from the property scale to the state scale. The standard and targets support flexible and innovative regional planning, investment and decision-making while ensuring consistency, rigour and accountability for NRM in NSW.

E.10 SYDNEY METROPOLITAN CATCHMENT MANAGEMENT AUTHORITY

The Sydney Metropolitan Catchment Management Authority (SMCMA) is a NSW Government agency responsible for the coordination and management of Sydney's natural resources. In Sydney, natural resources include land, rivers, estuaries and coastal systems. The SMCMA was established under the Catchment Management Authorities Act 2003. The SMCMA partners with 39 local councils in the metropolitan catchment as well as State and Federal Government departments.

E.11 SYDNEY COASTAL COUNCIL GROUP

The Sydney Coastal Councils Group was established in 1989 to promote co-ordination between member councils on environmental and natural resource management issues relating to the sustainable management of the urban coastal environment.

The Group consists of 15 councils adjacent to Sydney marine and estuarine environments and associated waterways (Botany Bay, Hornsby, Leichhardt, Manly, Mosman, North Sydney, Pittwater, Randwick, Rockdale,

Sutherland, City of Sydney, Warringah, Waverley, Willoughby and Woollahra). The Group represents over 1.3 million Sydneysiders. This area encompasses the waterways of Broken Bay; Pittwater; Port Jackson, the lower Lane Cove River, Middle and North Harbour; Botany Bay, the Lower Georges and Cooks River; and Port Hacking.

The Sydney Coastal Councils Group provides leadership and encourages a focused and coordinated approach to sustainable coastal management undertaken by and in partnership with the member councils to protect and conserve terrestrial and marine ecosystems, and to manage social and economic conditions to achieve this. The Group facilitates outcomes concerning coastal issues, exceptional to those the member councils could achieve individually.

The Sydney Coastal Councils Group is a Regional Organisation of Councils that provides project facilitation and coordination on environmental and natural resource management issues that relate to the sustainable management of the coastal urban environment. The Group provides strong advocacy and support for its 15 member councils on coastal and NRM issues. Being a member council also allows council elected and professional staff the opportunity to exchange ideas at a regional level through SCCG forums, presentations, meetings and conferences.

E.12 ABORIGINAL HERITAGE OFFICE

The Aboriginal Heritage Office is a joint initiative by Lane Cove, North Sydney, Manly, Warringah, Willoughby, Ku-ring-gai and Pittwater councils, in a progressive move to protect Aboriginal Heritage in these areas. Part of the work of the Aboriginal Heritage office is to monitor Aboriginal Sites on a day to day basis and long term management reports are developed to ensure their preservation and protection.

Another key role of the Aboriginal Heritage office is to give the Aboriginal people and non-aboriginal people involved with these council areas an avenue of approach to discuss issues or concerns they may have. The office is in direct contact with the Metropolitan Local Aboriginal Land Council and its many resources.

An important part of the role is to communicate with school and other groups and teach children an ethos of understanding to appreciate the unique culture of the Aboriginal people. In association with the local councils, talks, walks and activities are planned to enhance appreciation of Aboriginal culture in the wider community. A selection of information leaflets on various Aboriginal Heritage topics are available to download.

E.13 STATE EMERGENCY SERVICE (SES)

The State Emergency Service is an emergency and rescue service dedicated to assisting the community. It is made up almost entirely of volunteers, with 232 Units located throughout New South Wales. The Units comprise of more than 10,000 volunteer members, who are easily identified by their distinctive orange overalls.

While our major responsibilities are for flood and storm operations, the SES also provides the majority of general rescue effort in the rural parts of the state. This includes road accident rescue, vertical rescue, bush search and rescue, evidence searches (both metropolitan and rural) and other forms of specialist rescue that may be required due to local threats. The Service's trained rescuers also support the full-time emergency services during major disasters.

The SES also assists other emergency services when they are performing major operations. These services include the NSW Police Service, the NSW Rural Fire Service, the NSW Fire Brigade and the Ambulance Service of NSW.

APPENDIX F: CROSS REFERENCES OF MANAGEMENT OPTIONS TO OBJECTIVES

Table F1 : Cross Reference of Management Options to Objectives

Management Options	Objectives	Effectiveness
1.1.1. Formulate comprehensive Stormwater Management Plan for the Manly LGA encompassing the study area.	**1.1 ,** 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 3.2, 6.1, 10.2, 10.4	High
1.1.2. Continue maintaining existing gross pollutant traps (GPTs) in the Clontarf catchment.	**1.1,** 1.3, 6.1	Medium
1.1.3. Install new Stormwater Quality Improvement Devices (SQIDs) at priority locations taking into account current best practice technologies.	**1.1 ,** 3.2, 6.1	Medium
1.1.4. Review current practices of street sweeping and target priority areas generating key pollutants.	**1.1,** 1.3, 6.1	Medium
1.2.1. Confirm, with Sydney Water, the presence of all sewerage overflow points within the Clontarf / Bantry Bay study area including the five known ones.	1.1, **1.2,** 1.4, 3.2, 8.4	High
1.3.1. Carry out a Litter Survey to assess litter levels transported into the Middle Harbour Estuary from surrounding catchments and identify litter hotspots.	1.1, **1.3,** 1.8, 6.1	Medium
1.3.2. Install pit inserts in litter hotspots throughout the study area.	1.1, **1.3**	Low
1.4.1. Work with relevant agencies to manage *faecal coliforms* and *enterococci* levels at all three public swimming enclosures.	**1.4 ,** 6.1, 8.4, 10.1, 10.2, 10.3	High
1.4.2. Investigate possible sources of high faecal coliforms and enterococci levels in Sangrado swimming enclosure.	**1.4 ,** 6.1, 8.4	Medium
1.5.1. Make rainwater tank and associated infrastructure purchases by residents more attractive and thereby facilitating reduced storm water generation.	1.1, 1.3, **1.5,** 1.7, 1.8	High
1.6.1. Undertake a comprehensive study on Clontarf aquifer addressing present extraction rate, recharge and other relevant issues.	**1.6 ,** 5.1	Low
1.6.2. Monitor extracted groundwater for salinity and other parameters for early sign of contamination.	**1.6,** 10.1	Low
1.7.1. Assess extent of scour caused by outfall pipes on sandy beaches and take remedial measures.	**1.7,** 4.1, 4.2	Medium
1.8.1. Introduce Manly Council's Seachange program in the study area to educate sustainable stormwater management	1.1, **1.8**	Low
1.8.2 Work with residents to implement best practices in storm water management at residential scale.	1.1, 1.3, 1.5, **1.8**	Medium
2.1.1. Encourage DPI (Fisheries) to prepare periodic up-to-date seagrass distribution map and NSW Maritime and Manly Council to use for decision making and education.	**2.1,** 2.4, 2.6	Medium
2.1.2. Work with DPI (Fisheries) and NSW Maritime to investigate seagrass issue at Castle Rock, including water quality and a potential boat exclusion zone	1.1, 1.2, **2.1,** 2.5, 8.1	High
2.1.3. Lobby NSW Maritime and DPI (Fisheries) to increase the enforcement of boating restrictions over seagrass beds. Develop interpretative signage to notify seagrass beds as protected areas.	**2.1,** 2.4, 2.5, 6.2	Medium
2.2.1. DPI (Fisheries) to keep NSW Maritime, Manly Council and community informed of the updated information on distribution of *Caulerpa taxifolia*.	**2.2**	Low
2.2.2. Encourage DPI (Fisheries) to implement programmes as elaborated in 'Control Plan for *Caulerpa taxifolia* in NSW'.	**2.2,** 2.6	Low
2.3.1. Undertake mangrove maintenance and regeneration activities at existing sites.	**2.3,** 2.4, 6.4	Medium
2.3.2. Design and implement, with support from the DPI (Fisheries), Fisher Bay Mangrove Restoration/Expansion program.	**2.3,** 6.4	Low
2.4.1. Lobby DECC and DPI (Fisheries) to enforce declared protected areas of ecological significance through various means of legal to voluntary measures.	2.1, 2.3, **2.4,** 2.6, 5.2, 10.1	High
2.4.2. Encourage DECC to undertake a study of possible penguin nest sites in Middle Harbour and community to report penguin sightings	**2.4**	Low

Management Options	Objectives	Effectiveness
2.4.3. Create 'Marine Care Volunteer' groups to facilitate conservation and protection efforts and link it with 'Fish Care' programme of the DPI (Fisheries).	**2.4,** 2.6, 6.1	Medium
2.5.1. Continue to collate and analyse recent knowledge on factors affecting degeneration of ecologically important/critical habitats. Identify site specific key factors.	2.4, **2.5**	Low
2.5.2 Initiate studies and surveys to fill data gaps through collaboration MEC and/or Universities.	**2.5**	Low
2.5.3. Investigate best practice beach raking in other Councils and incorporate that knowledge for possible implementation at Clontarf. Improve staff knowledge of the Council regarding eco sensitivities in beach raking and other services.	2.4, **2.5**	Low
2.5.4. Ensure new upgrading or building seawalls incorporate recent knowledge on seawall restorations supporting ecological habitat	2.4, **2.5**	Low
2.6.1. Work with DPI (Fisheries) to formulate an information brochure outlining the importance of aquatic habitats and the penalties involved in harming them.	2.4, **2.6,** 6.1	Medium
3.1.1. Prepare a comprehensive bushland management plan and develop a staged implementation programme.	1.1, 2.4, **3.1**, 3.2, 3.3, 3.5, 3.6, 6.1, 6.4, 7.2	High
3.1.2. Prepare management plans for the six identified SEPP 19 bushlands, to fulfill statutory requirement.	**3.1**	Low
3.1.3. Identify adhoc track from private properties entering bushlands and approach property owners to ensure their safety and continued maintenance at an appropriate and specified standard.	**3.1,** 7.1, 7.2	Medium
3.1.4. Council to continue to be an active participant in the Die-Back Working Group	**3.1**	Low
3.2.1. Review recommended measures (Skelton et al. 2002 report) and modify priority rankings and recommendations based on current conditions.	**3.2**	Low
3.2.2. Investigate sources of rich nutrient load at the outlets and implement appropriate control measures at sources.	1.1, **3.2**	Low
3.3.1. Investigate possibility of establishing corridors linking different bushlands and assess their ecological significance.	2.4, **3.3**	Low
3.4.1. Continue and reassess Council's Street Tree Planting Programme within the study area.	2.4, **3.4**	Low
3.5.1. Continue Community Bush Care Volunteers programme in the study area.	2.6, **3.5,** 10.3	Medium
3.5.2. Continue publication of 'Bushland News' and circulate widely in the community	2.6, **3.5**	Low
3.5.3. Continue annual 'Native Plant Giveaway' programme to support residents in maintaining native vegetations on private properties.	2.4, **3.5**	Low
3.6.1. Involve Precincts to discuss the issue of view maintenance with property owners.	3.5, **3.6**	Low
4.1.1. Carry out a comprehensive study on estuarine sediment transport patterns	2.1, **4.1**	Low
4.2.1. Define and implement mitigation measures for erosion prone sites.	**4.2,** 6.1	Low
4.2.2 Define and evaluate possible mitigation measures to make the Clontarf swimming enclosure usable and implement.	**4.2,** 6.1, 8.4	Medium
4.2.3 Investigate the problem of maintaining navigable depth at Clontarf Marina and implement mitigation measures including dredging.	**4.2,** 6.1, 6.2	Medium
5.1.1. Commission a geotechnical study for specific sections of foreshore areas to identify and prioritise risks, and establish risk based management options.	4.1, **5.1,** 6.1	Medium
5.1.2. Control new development on foreshores subject to potential hazards including climate change over a suitable planning time frame (30-50 years) by revising Council's DCPs.	4.2, **5.1,** 6.1	Medium
5.1.3. Undertake regular inspections to assess stability of seawalls protecting public lands. If upgrading is required, promote eco- friendly sea walls.	4.3, **5.1,** 6.1	Medium
5.1.4. Work with SES and other agencies to continuously update Emergency Action	**5.1,** 5.2, 5.3, 7.1	Medium

Management Options	Objectives	Effectiveness
Plan including evacuation procedures in the event of storm surges and tsunami.		
5.2.1. Assess impact of climate change on areas of ecological significance and devise adaptive measures	2.4, 2.5, **5.1,** 5.2, 5.3	High
5.2.2. Work with Sydney Coastal Councils Group to develop regional/ local level climate change model considering protection provided by existing seawalls and rocky foreshores.	**5.2**	Low
5.2.3. Collaborate with the Sydney Coastal Councils Group/ Macquarie Uni /CSIRO project investigating climate change adaptations in Manly.	**5.2**	Low
5.3.1. Prepare Council's policy and strategy documents incorporating the 4th IPCC and other regional and national projections	**5.2,** 5.3	Low
6.1.1. Continue to undertake regular maintenance and safety checks on facilities established at public places including swimming enclosures.	5.1, **6.1**, 7.1, 8.5	Medium
6.1.2. Install adequate garbage and waste recycling stations in public places.	1.1, 1.3, **6.1**	Medium
6.1.3. Liaise with relevant state authorities regarding the replacement of existing signage with signage more sympathetic to the area.	1.8, 2.6, **6.1,** 6.5, 9.3	High
6.1.4. Promote natural features of 'Clontarf – Sandy Bay – Fisher Bay – Ellery's Punt Reserve' of the study area.	2.3, 2.4, **6.4,** 10.2	Medium
6.2.1. Facilitate and encourage non-motorised boating activities (kayaking, wind surfing etc) in the waterways.	**6.2**	Low
6.2.2. Encourage NSW Maritime to enforce current speed limits and mooring restrictions by increased patrolling.	6.1, **6.2**	Low
6.2.3. Encourage NSW Maritime to consider a corridor for boats and kayaks to reach shores and thereby protecting safety of swimmers.	6.1, **6.2**	Low
6.2.4. Maintain jetski (PWC) ban.	6.1, **6.2**	Low
6.2.5. Continue program, with NSW Maritime & Council's Starboard Right & Green (SR&G) program, to educate boat owners about waterway etiquettes and possible impact on marine environment.	**6.2,** 6.5	Low
6.3.1. Support continuation of ban on commercial fishing.	2.4, 6.1, **6.3**	Medium
6.3.2. Encourage DPI (Fisheries) & NSW Health to monitor Dioxin levels in Sydney waters.	2.5, 6.1, **6.3**	Medium
6.3.3. Facilitate recreational fishing and educate community about rules and regulations applying to recreational fisher (bag limits, size limits and species types) through NSW Fishcare Program	2.6, 6.1, **6.3**	Medium
6.4.1. Promote community events and education program to achieve sustainable use of the estuary.	1.8, 2.6, 3.5, 4.1, 6.4, **6.5**	High
7.1.1. Assess and improve safety condition and maintain natural vegetation along access paths.	2.4, 6.1, **7.1**, 10.2	Medium
7.2.1. Enhance maintenance schedule and retain and enhance the native vegetation along the Manly Scenic Walkway.	6.1, **7.1,** 7.2	Medium
7.2.2. Install boardwalk type structures where MSW bisects Aboriginal midden at Sandy Bay.	**7.2,** 9.1	Low
7.2.3. Assess ways to improve use value of the MSW and implement.	6.1, 6.4, **7.2,** 10.2	Medium
7.3.1. Audit disability access of all parks and bays within the study area.	7.1, **7.3**	Low
7.4.1. Assess, in consultation with nearby residents, possibility of declaring Sandy Bay tidal flat as off-leash dog area.	6.1, 6.5, **7.4**	Medium
7.4.2. Incorporate installation of adequate dog faeces bins and bag dispensers.	6.1, **7.4,** 8.5	Medium
8.1.1. Work with DPI Fisheries and NSW Maritime to assist boats to avoid sea grass beds.	2.1, 2.2, 2.4, 6.1, **8.1**	High
8.1.2. Work with NSW Maritime to introduce seagrass friendly moorings	2.1, **8.1**	Low

Management Options	Objectives	Effectiveness
8.1.3 Work with NSW Maritime to realign and maintain the same number of permanent moorings in front of Clontarf beach to work as buffer to prevent erosion/siltation.	6.1, **8.1**	Low
8.2.1. Encourage NSW Maritime to make an overall assessment for boat landing facilities within the study area and specify alternative locations	6.1, 7.1, **8.2**	Medium
8.3.1. Install horizontal dinghy & kayak storage racks at Sandy Bay in consultation with nearby residents and dinghy owners.	6.2, **8.3**	Low
8.3.2. Install rods/poles at Gurney Crescent & Castle Circuit to tie dinghies & kayaks and educate owners regarding protection of trees & middens, and decrease erosion of foreshore	6.2, **8.3**	Low
8.4.1. Assess and implement options to restore collapsed Sangrado swimming enclosure.	6.1, **8.4**	Low
8.5.1 Enhance general amenities such as public toilets, telephone booths and street lights at convenient locations	6.1, 7.3, **8.5**	Medium
8.5.2 Improve and facilitate traffic management around public reserves and beaches	6.1, 7.1, **8.5**	Medium
8.5.3 Ensure safety and crime prevention in public areas	6.1, 7.1, **8.5**	Medium
9.1.1 Review Aboriginal Site Management Report for Manly Council (2006) and associated reports to prioritize management needs and develop a plan of implementation.	**9.1**	Low
9.1.2. Prevent further damage to Aboriginal middens in critical condition.	**9.1**	Low
9.1.3. Locate a number of sites where the public can see Aboriginal sites to learn more about the area's rich Aboriginal heritage and history.	6.4, **9.1,** 9.3	Medium
9.1.4. Develop management guidelines for sites that are located within private properties.	**9.1,** 9.3	Low
9.2.1. Review list of 'Items of Environmental Heritage' of the Manly LEP to include new items periodically.	**9.2**	Low
9.2.2. Assess heritage status of 'Laura Street Wharf' and propose its inclusion in the heritage list.	**9.2**	Low
9.2.3. Ensure physical protection and maintenance of all heritage listed items.	**9.2**	Low
9.2.4. Explore feasibility of restoring a small part of old tram line near the Spit Bridge to signify historical past.	6.4, **9.2,** 9.3	Medium
9.3.1. Organise awareness campaign to highlight heritage conservation including heritage talk to school children	**9.3**	Low
9.3.2. Place appropriate interpretative signage on key Aboriginal heritage sites.	**9.3**	Low
10.1.1. Develop a comprehensive monitoring programme including key indicators and mechanisms of monitoring in consultation with relevant organisations.	**10.1,** 10.2, 10.3	Medium
10.1.2. Monitor the environmental health of the estuary, including water quality, erosion/accretion, bush lands, ecological diversity and abundance.	1.1, 1.2, 1.3, 1.4, 1.5, 2.4, 3.2, 4.2, 5.2, **10.1**	High
10.2.1. Monitor use of the Manly Scenic Walkway.	7.2, **10.2**	Low
10.2.2. Monitor use of waterways at different points of the estuary.	6.2, 6.3, 8.2, 8.3, **10.2**	High
10.2.3. Monitor use of public reserves and dog exercise areas'.	3.1, 6.4, **10.2**	Medium
10.3.1. Establish participatory monitoring and encourage community participation.	1.8, 2.8, 3.5, 9.3, **10.3**	High
10.4.1. Review monitoring results and revise/update management options.	10.1, 10.2, **10.4**	Medium