

Final Lake Macquarie  
Coastal Zone  
Management Plan  
Part D – Four Year  
Action Plan 2015–2019





# Mayor's foreword

It really is no wonder the City of Lake Macquarie is such a highly sought after place to settle, work and play. It has access to the beach, the lake, the bush and the mountains. Our residents and visitors can enjoy surfing, boating, fishing, walking or just enjoy the City's natural beauty.

Council's Coastal Zone Management Plan 2015-2023 aims to preserve and enhance the environmental value of the coastline, estuary and channel amid increased visitation and pressure from urban development across the City.

The Coastal Zone Management Plan (CZMP) has been prepared in collaboration with the NSW Office of Environment and Heritage, as well as other agency and community stakeholders. This Four Year Action Plan puts forward priority coastal zone actions to be implemented for our coastline (Part A), our estuary (Part B) and the Swansea Channel (Part C).

Many of the actions within this Four Year Action Plan are the responsibility of Lake Macquarie City Council. However, a healthy coastal zone in a growing and

active urban community is not achieved by the work of local government alone. The Framework highlights collaborative governance arrangements with state agencies, businesses and residents as key contributors to the ongoing success of coastal zone management within the City.

Other land managers and public authorities, including NSW Trade and Investment (Crown Lands Division), Department of Primary Industries (Fisheries Division), Office of Environment and Heritage, Hunter Water Corporation, Roads and Maritime Services, Local Land Services, and other coastal land managers such as Belmont Wetlands State Park Trust and Belmont Golf Club have an important role to play in delivering the actions outlined in this Plan.

I encourage all stakeholders in the coastal zone to engage with the actions outlined in this Framework that aim to secure the lifestyle of the community and visitors of the Lake Macquarie coastal zone, and build upon the significant improvements in ecosystem health achieved over the last 10 years.

# Lake Macquarie Coastal Zone Management Plan Part D – Four Year Action Plan 2015–2019



## Background




The City of Lake Macquarie is located in the Hunter region of New South Wales, approximately 120 km north of Sydney. The defining feature of the City is Lake Macquarie, which is one of the largest coastal estuary in eastern Australia. The lake is connected to the ocean and open coast via Swansea Channel. The lake catchment includes residential, industrial, rural and natural areas, and is entirely located within the coastal zone.

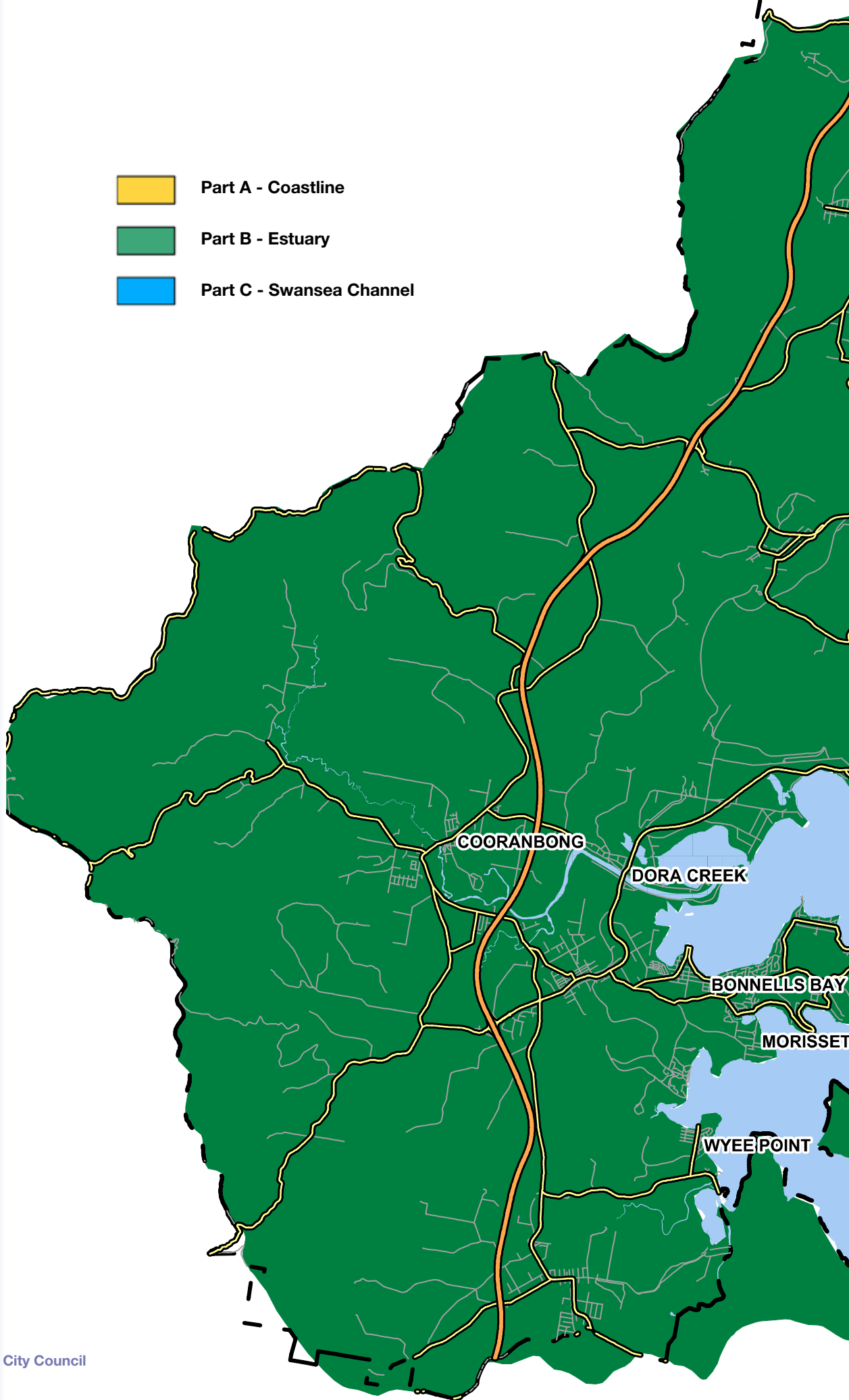
The Lake Macquarie coastal zone is ecologically rich, physically dynamic and an attractive place to visit and settle. The natural environment includes the lake itself as well as beaches and open ocean to the east, and

the Watagan mountain range to the west. These natural assets provide a quality lifestyle that is highly valued by the Lake Macquarie community.

To maintain and improve the condition of the coastal zone, and manage the risk of coastal hazards to the people of the City, Lake Macquarie City Council resolved to prepare an integrated CZMP for the open coast, the lake estuary and its tributaries, and the Swansea Channel (Figure 1) overleaf.



-  Part A - Coastline
-  Part B - Estuary
-  Part C - Swansea Channel



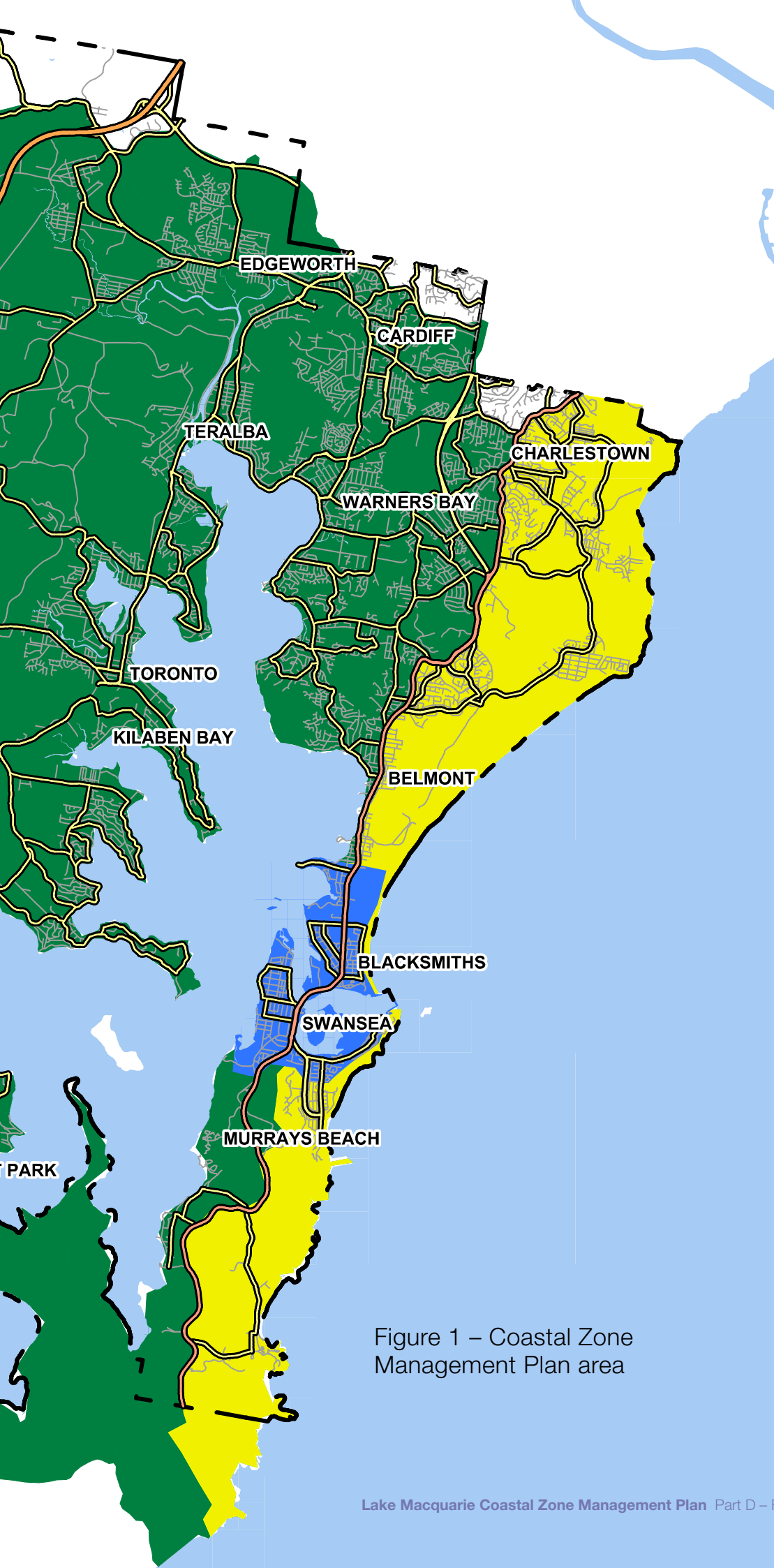


Figure 1 – Coastal Zone Management Plan area

The vision for this CZMP, which reflects the community's aspirations described in the *City of Lake Macquarie Community Plan 2014-2023*, is:

**'A resilient living coast and estuary provides for a liveable city and quality lifestyle. Caring for the environment equates to caring for our community'**

The primary goal of the Lake Macquarie CZMP is to develop:

**'Resilient coastal landscapes and communities.'**

The term 'resilience' describes the capacity of systems (ecological or human) to absorb or adapt to change, such as external shocks and internal pressures, but retain fundamental functions and relationships.

The CZMP comprises:

- Part A - for the Coastline
- Part B - for the Estuary
- Part C – for Swansea Channel
- Part D – Four Year Action Plan (this document)

The four-part CZMP is supported by the:

- Coastline Options Assessment
- Coastline Hazard and Risk Assessment
- Lake Waterway Flood Study
- Lake Waterway Floodplain Risk Management Study and Plan
- Swansea Channel Hazard and Risk Assessment; and
- Community Consultation Report.

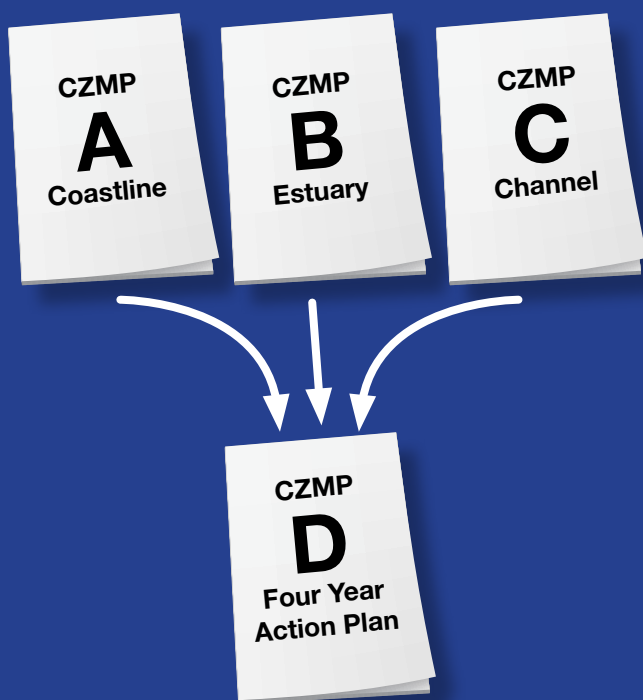
The Four Year Action Plan is a snapshot of the issues and priority actions for the next four years. The role of the CZMP Framework for Implementation is to facilitate integrated management of the coastal zone within the City of Lake Macquarie and to:

- allow for all stakeholders to achieve the best outcomes for a healthy coastal zone in an established and growing urban and recreational context.
- build a management bridge between coastline, lake and foreshore policies and local people, so that looking after the coast (a nationally significant natural and social asset) is central to everyone's lives.
- identify collaborative partnerships (across levels of government, between local Councils and with private sector and community organisations) to streamline and align implementation of coastal management actions.
- provide a clear pathway for the delivery of coastal management actions, monitoring and review of performance.
- create the conditions that support resilient natural systems and a resilient coastal community.

Part D is supported by Parts A, B and C of the CZMP (see Figure 1 for the area covered by each part), which describe management issues, management objectives, performance targets and key principles for each landscape over a ten-year planning horizon. They also describe the history, context, natural and cultural significance, and the condition and utilisation of the particular landscape.

The CZMP replaces the *Lake Macquarie Estuary Management Plan 1997* and the *Lake Macquarie Coastline Management Plan 1999*.

Figure 1.2



## Project Area

The Lake Macquarie CZMP covers the coastal zone, which includes the open coast (beaches, dunes, rock platforms and headlands); the lake estuary and its tributaries, (Cockle Creek, LT Creek, Stony Creek, Dora Creek, Wyee Creek and North Creek); Swansea Channel and the lake catchment.

## Timeframe

Parts A, B and C of the CZMP are designed to be updated every ten years. The Four Year Action Plan will be updated every four years and is designed to be flexible, with the ability to incorporate emerging information.

## Landscape Context

The Lake Macquarie beaches and lake estuary are part of the coastal zone. The lake lies between the open coast and the catchments of tributary creeks. Estuary systems and estuary health are strongly influenced by catchment inputs, but also influenced by tidal exchange with the ocean through Swansea Channel.

## Landscape Relationships

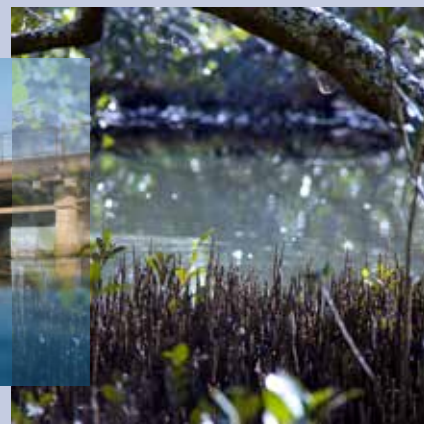
### Lake Macquarie Coastal Zone Management Plan (CZMP)



**PART A**  
Open Coast



**PART C**  
Swansea Channel



**PART B**  
Estuary



# Key responsibilities

The CZMP sets out actions to maintain and improve the health of the Lake Macquarie coastal zone while maintaining community access and enjoyment in an urban coastal context. Most actions are for Council to implement, but long term environmental health and community wellbeing and enjoyment also require contributions from State agencies, particularly NSW Trade and Investment (Crown Lands Division), businesses and the community. The southern part of the Lake Macquarie catchment is located in Wyong Shire, so a healthy lake also depends on the actions of Wyong Shire Council.

## Statutory Framework for Coastal Zone Management Plans

The *NSW Coastal Protection Act 1979* provides the statutory framework for coastal zone management. All coastal zone management plans prepared in NSW are required to demonstrate that they give effect to the objects of the Act. The objects provide for both current conditions and the needs of future generations. Table 1 outlines the objects of the Act.

As an environment with high natural values, degraded ecological systems that are being restored and enhanced, a strong economy in part dependent on the health of the natural systems, and very high recreational, aesthetic and cultural values, the objects of the Act are particularly relevant to the management issues in the Lake Macquarie coastal zone.



Table 1 – Objects of the Coastal Protection Act

Objects	Description
Protect enhance, maintain and restore biodiversity	To protect, maintain and restore the environment of the coastal region and its associated ecosystems, ecological processes, biological diversity and water.
Secure and orderly use of resources	To encourage, promote and secure the orderly and balanced utilisation and conservation of the coastal region and its natural and man-made resources, having regard to the principles of ecologically sustainable development.
Account for social and economic benefits	To recognise and foster the significant social and economic benefits to the State that result from a sustainable coastal environment, including: <ul style="list-style-type: none"> <li>• benefits to the environment</li> <li>• benefits to culture and heritage</li> <li>• benefits to Aboriginal people in relation to their spiritual, social, customary and economic use of land and water</li> <li>• benefits to urban communities, fisheries, industry and recreation.</li> </ul>
Public access, on foot	To promote public pedestrian access to the coastal region and recognise the public's right to access.
Appropriate land tenure	To provide for the acquisition of land in the coastal region to promote the protection, enhancement, maintenance and restoration of the environment of the coastal region.
Involve community	To recognise the role of the community as a partner with government, in resolving issues relating to the coastal environment.
Policy and program alignment across agencies	To ensure co-ordination of the policies and activities of the government and public authorities relating to the coastal region and facilitate the proper integration of their management activities.
Prepare for climate change	To encourage and promote plans and strategies for adaptation in response to coastal climate change impacts, including projected sea level rise.
Beach amenity	To promote beach amenity.

The *NSW Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2010) identify 10 principles that should be given effect in a CZMP:

- Principle 1** Consider the objects of the *Coastal Protection Act 1979* and relevant NSW government policies.
- Principle 2** Optimise links between plans relating to the management of the coastal zone.
- Principle 3** Involve the community in decision-making and make coastal information publicly available.
- Principle 4** Base decisions on the best available information and reasonable practice. Acknowledge relationships between catchment, estuary and open coast.
- Principle 5** The priority for public expenditure is public benefit; it should achieve cost effective, practical, long term outcomes.
- Principle 6** Adopt a risk management approach to managing risks to public safety and assets; use a risk management hierarchy and adopt interim risk reduction measures.
- Principle 7** Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty.
- Principle 8** Maintain the value of high value coastal ecosystems.
- Principle 9** Maintain and improve safe public access to beaches and headlands, consistent with the NSW Coastal Policy.
- Principle 10** Support recreational activities consistent with the NSW Coastal Policy.

The *Coastal Protection Act 1979* provides for certification of CZMPs that have been prepared by a local Council. A certified CZMP provides protection for Council in relation to certain decisions, and also facilitates access to funding for coastal protection works or other community infrastructure. A schematic of the process for CZMP preparation and certification is shown in Figure 2.

The CZMP is complementary to planning instruments and environmental management strategies and initiatives being applied by Council and other stakeholders. Strategies include Council's Local Environmental Plan and Development Control Plan. The relationship between the Lake Macquarie CZMP and other planning instruments, strategies and plans is shown in Figure 3.

Once certified, the CZMP will be considered during all future reviews of strategic planning documents and place-based plans across the coastal zone. It will also be considered in determining development applications under Section 79C of the *Environmental Planning and Assessment Act 1979* that may potentially have an impact on the coastline, the channel, the lake estuary, or its catchment.



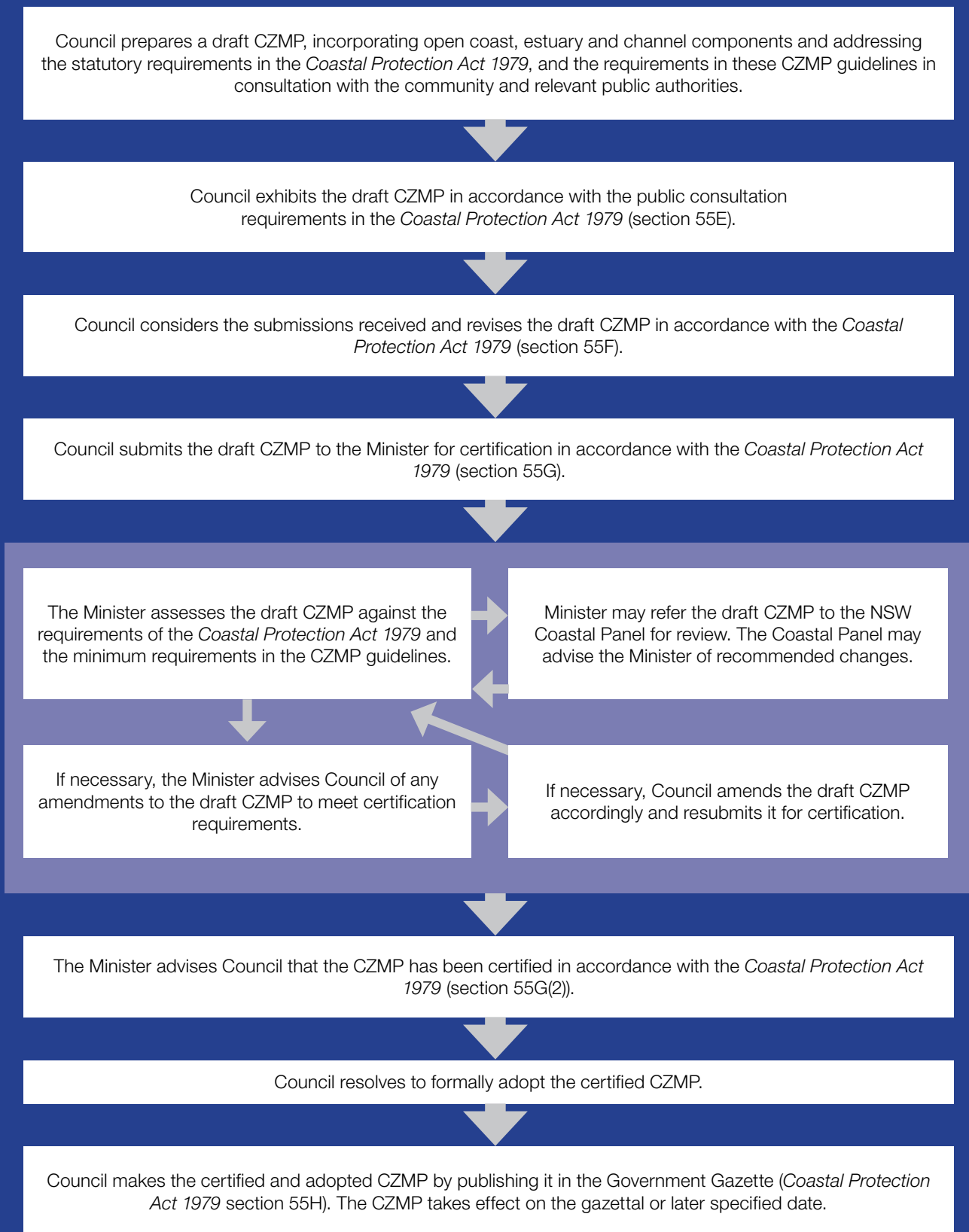


Figure 2 – CZMP Preparation and Certification Process



Figure 3 – Relationship between the Lake Macquarie Coastal Zone Management Plan and other plans and strategies









# Snapshot

## of the Coastline (CZMP - Part A)

### **About Lake Macquarie coastline coastal processes and scale**

*The Lake Macquarie coastline has:*

- a diverse coastal landscape with high sandstone and conglomerate cliffs; sea caves; shore platforms; long barrier beaches (up to 13km); pocket beaches and coastal dune systems of Holocene and late Pleistocene age.
- a predominantly high energy coast, with highest waves associated with east coast low events.
- active frontal dune processes during storm events, but relatively low risk due to the set-back of development from the beach. Historical records indicate a stable sandy coastline with periodic erosion and accretion, and slight rotation on longer beaches.
- a key coastal risk area at Blacksmiths, where there is potential for interaction of coastal erosion/recession and lake inundation over the next century.
- an entrance to Lake Macquarie with control structures (training walls) that have been affected by coastal processes since late 19th century.
- potential for block failure on coastal cliffs.

### **About Lake Macquarie coastline land uses and recreational values**

*The Lake Macquarie coastline has:*

- historical mineral sand, construction sand, rock quarrying and coal mining that have contributed to coastal form, coastal access and the heritage value of the landscape.
- four main surf clubs with patrolled beaches. There is a focus on recreational use by families and visitors and a strong surf lifesaving culture which has a strong competitive record.
- a coast with a significant local recreation focus which remains uncrowded compared with metropolitan beaches. The coastline is undeveloped in terms of access facilities (compared with neighbouring Newcastle), which creates a more natural recreational experience.
- parts of Nine Mile Beach which are open to off-road vehicles that are used for beach fishing and other activities.
- a significant influx of summer visitors staying in caravan parks and holiday homes. Lake Macquarie coast is within an easy travel distance from northern and western Sydney.





### **About community and stakeholder attitudes to change along the Lake Macquarie coastline**

*The coastline of Lake Macquarie has:*

- strong community involvement in Dunecare and Landcare over the last two decades, with evidence of significant improvement in dune condition at key sites.
- to consider the management of safe and appropriate beach access by off-road vehicles by landowners and managers.
- to manage community resistance to urbanisation of the coastline; attachment to a natural coastal landscape.

### **About the institutional track record and commitment to the Lake Macquarie coastline**

*The coastline of Lake Macquarie has:*

- had many actions implemented from the *Coastline Management Plan 1999*.
- a strong reputation for lake focused coastal zone natural resource management achievements.

- limited resources available for managing significant natural resource issues and landscape remediation in the Belmont Wetlands State Park.
- had relatively recent transfers of private land to National Park south of Caves Beach, with on-going investment needed to enhance the ecological condition.
- the potential for stronger partnerships between Council, Hunter Water Corporation, Golf Club, Land Councils, Surf Clubs and Crown Lands.
- begun to develop coordinated management of ocean frontage land.
- yet to develop clear scenario testing and asset management plans for the future. For example, lake entrance training walls, waste water treatment and discharge infrastructure; coast and beach access; and surf clubs.





# Snapshot

## of the Estuary (CZMP - Part B)

### **About Lake Macquarie estuary processes and scale**

*The Lake Macquarie estuary has:*

- a large estuarine lagoon and complex estuary hydrodynamic processes and responses. The lake has a mix of shallow sand near shore areas, deeper rocky foreshores and shorelines thinly mantled with muddy sands. Each area responds differently to the inflows of stormwater from development in the immediate catchment. In addition, long reaches of poorly flushed estuarine creeks, which are the initial receiving waters for catchment runoff, are affected by both sediment load and impacts of development on riparian vegetation.
- a strong influence from its catchment on the health of the estuary. Controls on catchment yields of sediment, nutrients and organics are key strategies for managing the ecological health of Lake Macquarie.

### **About Lake Macquarie estuary land uses and recreational values**

*The Lake Macquarie estuary has:*

- extensive urban and industrial development, and particularly low-lying development. Lake Macquarie has approximately 70 km of absolute waterfront residential development, much of it less than 2 metres above mean sea level, and has been identified as one of the highest risk areas in Australia for inundation of property and infrastructure assets as sea level rises.
- continuing population growth in the local area and the region, increasing pressure for residential redevelopment of foreshores, and for structures and facilities to protect private property.
- increasing demand for land and water based recreational opportunities around the lake, providing for local residents and also for visitors from elsewhere in the Hunter, Central Coast regions and Sydney. Lake Macquarie is a high significant recreational waterway in NSW.





## About community and stakeholder attitudes to change in the Lake Macquarie estuary

*The estuary of Lake Macquarie has:*

- a community that can be resistant to change regarding traditional waterway uses and access. The Lake Macquarie foreshore is a highly valued cultural landscape with locally and regionally significant recreational heritage values.
- a community that has expressed concern about potential change to the physical environment of the estuary.
- been subject to a continuing evolution of the NSW Government policy context for the coastal zone, including policies relating to sea level rise, protection of foreshores, and planning responses.
- a community that is concerned about the differences in the approach of Lake Macquarie City Council and neighbouring Councils regarding adaptation to extreme events (very large storm events that can happen now) and longer-term climate change. Some alignment of regional approaches to the coastal zone has been achieved through projects sponsored by Hunter Councils.

## About institutional track record and commitment to the Lake Macquarie estuary

*The estuary of Lake Macquarie has:*

- a strong and high profile management history, particularly as a result of the achievements of the 10-year inter-government approach administered by the Office of Lake Macquarie and Catchment Coordinator.
- a strong commitment from Council to its management, including a track record of investment priority for projects to protect or restore estuary health and the provision of quality foreshore access facilities for a growing local and regional community. The extent of previous work in the Lake Macquarie estuary is both a benefit and a challenge to future management.
- a large body of scientific and management knowledge accumulated, but to make best use of this knowledge, enhanced capacity to review, analyse and integrate different strands of technical, management and community knowledge is essential.





# Snapshot

## of Swansea Channel (CZMP - Part C)

### About Swansea Channel coastal processes and scale

*Swansea Channel has:*

- a dynamic sedimentary environment. Active sedimentary processes in the Channel are linked to mobilisation of the Channel bed and bank deposits. The depth of the Channel at the ocean entrance is limited by a coal seam/rock bar.
- a highly modified entrance. Training walls were constructed at the entrance in the 1890s. The channel form is continuing to adjust to the increased hydraulic capacity driven by these controls, as well as to increased wave penetration into the outer channel. The channel has progressively deepened and widened, including shoreline erosion of more than 400 metres over 70 years at Salts Bay. There is also increased velocities and scour upstream of the channel. Rapid shoaling occurs upstream (toward the lake) of the entrance to Swan Bay near the 'drop-over'.
- other structures, such as Swansea Bridge, bank protection works, dredge spoil islands and extensive works at the entrance to Swan Bay, that have contributed to modified hydrodynamic conditions and morphology of the Channel.
- important shallow sea grass habitats for fish breeding and for migratory birds, particularly from Belmont through to Swansea Flats.
- a variable tidal range, decreasing from 1.7 metres at the entrance, 1.3 metres at the Swansea bridge, and less than 0.2 metres at the western end of the Channel.

### About Swansea Channel land uses and recreational values

*Swansea Channel has:*

- the marine gateway to Lake Macquarie, which is regarded as an outstanding recreational waterway by local and regional boating enthusiasts. There are currently some 18,000 recreational vessels using Lake Macquarie, including approximately 1,500 yachts drawing more than 2 metres, and a further 500 yachts drawing more than 2.5 metres. While many of these are entirely lake based, both local vessels and visitors from Sydney and other coastal ports use Swansea Channel for safe ocean access or a safe haven when racing and cruising. In peak periods, up to 750 vessels per month require a bridge opening to pass through the Channel.
- a W1 (Natural Waterways) land use zone in the Lake Macquarie Local Environmental Plan 2014.
- sandy beaches, sand islands and shoals near Swansea Bridge which are highly valued for swimming and picnics during low tide.
- a well-regarded diving site and is very popular for recreational fishing and prawning. There is no commercial fishing in Lake Macquarie, but to access ocean fisheries, there are a number of commercial fishing vessels moored on the eastern side of Swansea Bridge.
- a foreshore that combines open space (foreshore reserve), maritime services (e.g. Marine Rescue and RMS water base), urban development and conservation values.



## About community and stakeholder attitudes to change in Swansea Channel

*Swansea Channel has:*

- community and agency acknowledgement that the form of the Channel has changed significantly over the last century. There is, however less clarity about the value of the continuing dynamic nature of channel processes, the appropriate long-term form to meet functional and recreational needs. There is also less clarity about how hydrodynamic processes can be effectively managed to achieve appropriate long-term function.
- strong views among the yachting and cruising community that the unpredictable depth of Swansea Channel has been a major constraint to yacht access. Channel depth is therefore thought to be a constraint to the boating recreation sector and to the lake's reputation as a tourism destination.
- continuing hydrodynamic adjustment due to projected sea level rise, but the scale of this impact is much less than the effects of the training walls. However, some of the most vulnerable communities to sea level rise are located along the Channel. Issues in these areas include inflows of lake water to the sewerage system, tidal backup into stormwater drains, and inundation of private property, as well as impacts on saltmarsh and seagrass habitats. These communities are a priority in Council's climate change adaptation planning.

## About the institutional track record and commitment to Swansea Channel

*Swansea Channel has:*

- had more than 600,000m<sup>3</sup> of sand dredged since 1970. Funding for this activity, primarily conducted to maintain a channel form suitable for deep keel navigability, has been primarily provided by the NSW Government. Approximately \$6.5 million has been invested in Swansea Channel projects since 2000. The local yachting community has expressed a strong view that this effort has not been adequate to meet their needs.
- had a multi-agency and Council collaborative effort to understand and address erosion, sedimentation and recreational issues. In 2013, Crown Lands completed a strategic review of navigability requirements in the Channel, management approaches and funding opportunities. This led to a commitment from the NSW Government to fund a one-off major dredging program, with the intent of facilitating a more stable hydrodynamic and morphological condition.
- differing objectives among Council and agencies regarding the use, funding and ecological health for Swansea Channel. There are also differing priorities within the lake and between estuaries along the NSW coast. There is general agreement that Lake Macquarie is a waterway of State significance (ecologically and recreationally), but less agreement about the level of service or investment in the Channel that would be appropriate and achievable to protect these values.





# Aboriginal Cultural Heritage

Lake Macquarie, the coast and the catchment extending to the Watagan Ranges are part of the traditional country of the Awabakal people. Awabakal people have lived around Lake Macquarie and utilised its aquatic resources since the early Holocene period, over 8,000 years ago, when sea level was much lower than now.

Awabakal ancestors were custodians of the landscape and this tradition has passed on to Awabakal people today. Physical evidence of past Awabakal life around the coastal zone includes grinding groove sites, middens, campsites, scar trees and rock shelters. These sites are vulnerable to disturbance by all forms of development and recreation. The vegetation and fauna of the lake and its foreshores and catchment are also highly valued by Awabakal people, as these are the resources of which they are custodians.

Sensitive Aboriginal Cultural Landscapes mapped include the lake shore; ocean shore; terraces, deltas and riparian footslopes along creek corridors and upper catchments and escarpments of Watagan and Sugarloaf Ranges.

Threats identified to these landscapes include:-

- Historical use of the lake foreshore and lower reaches of estuarine creeks and wetlands for rail, power generation, sewerage and other infrastructure has destroyed middens and open campsites.
- Filling and formalisation of lake shorelines with sea walls, construction of slip ways, boat sheds and residences. All these activities have transformed the lake shore landscape, as well as damaging middens close to the lake shore. Some archaeological material remains in less formal foreshore reserves and where old houses or boat sheds are on piers rather than slab foundations.
- Foreshore and nearshore reserve management, including filling of low lying areas, mowing, installation of playing fields and parkland equipment has destroyed middens and open campsites. Scarred trees have also been lost from foreshore locations. Lower reaches of major creeks and their catchments – such as Dora Creek and Cockle Creek





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- Land clearing for agricultural, industrial and urban uses has removed scarred trees and disturbed the structure and context of open sites. Stone arrangements have also been damaged or destroyed by land clearing activities.
- Land management within urban subdivisions has changed flows in creeks, increased erosion or sedimentation and encouraged invasion of culturally valued vegetation communities by weeds. Transport, water, sewerage and power infrastructure to support urban development can cause significant disturbance of long corridors across the landscape.
- Poor control of access within lake shore and bushland reserves (Crown Land, Community land and private land) has contributed to erosion, rubbish dumping and damage to vegetation associated with illegal four wheel drive and trail bike activity.
- Industrial development along major tributary creeks (for instance in the lower freshwater and estuarine reaches of Cockle Creek) has removed or damaged surfaces which would once have been associated with diverse Aboriginal community resources and archaeological evidence of past occupation.
- Mining (sand mining as well as both open cut and underground coal mining) has contributed to the loss of Aboriginal sites and changes to cultural landscapes, either directly through extraction or indirectly due to subsidence impacts.

It is evident that many of the threats to these landscapes are similar to those that impact ecological features of the coast zone and therefore coastal management actions are likely to enhance both natural and cultural values.



# Hazards and risks in the coastal zone

Coastal risks involve the likelihood and consequence of particular coastal hazards that can be faced by the local community and the environment. Natural and built assets potentially at risk within the coastal zone have a wide range of environmental, social and economic values, and include private and public lands and infrastructure (e.g. roads, services, facilities). The objective for coastal risk management is to reduce risks derived from coastal-related hazards by reducing exposure to such hazards and/or increasing resilience of assets to hazard impacts. Hazards considered

in development of CZMP risk management actions include extreme storm flooding, permanent inundation, coastal erosion and recession. For the Channel and estuary, the hazard envelope is driven by the extreme storm flood hazard. For the open coast, the hazard envelope is driven by coastal erosion and recession. The maximum extent of the 1 in 100 year hazard envelope with 0.9 metres of projected sea level rise is shown in Figure 4.



Elevations below 2.32m AHD. This land may be flooded in a 1:100 year flood if average lake levels rise by 0.9metres. These levels are projected to be reached by approximately 2100.

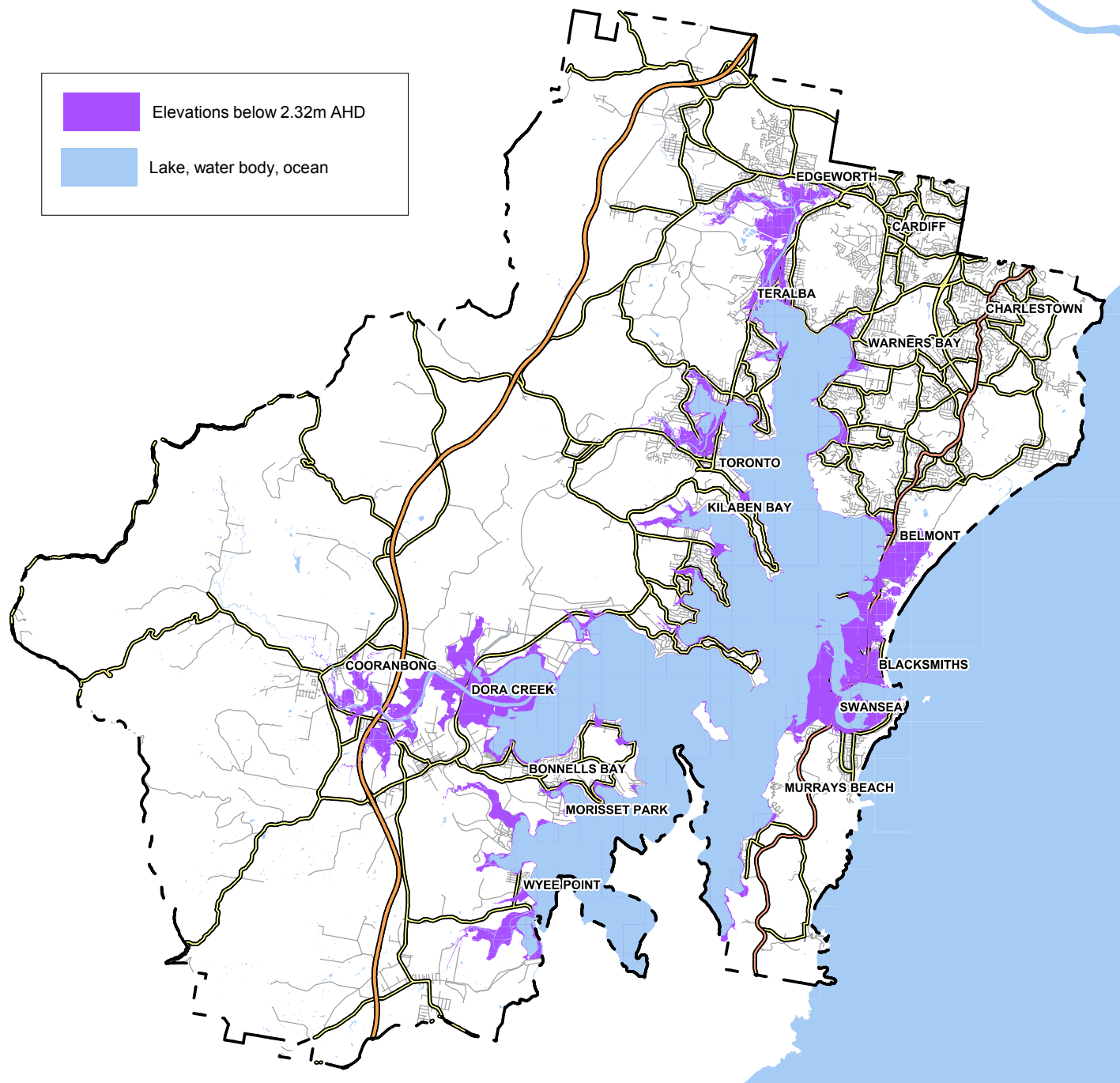


Fig 4 – Combined 2100 estuary and coastline hazard envelope





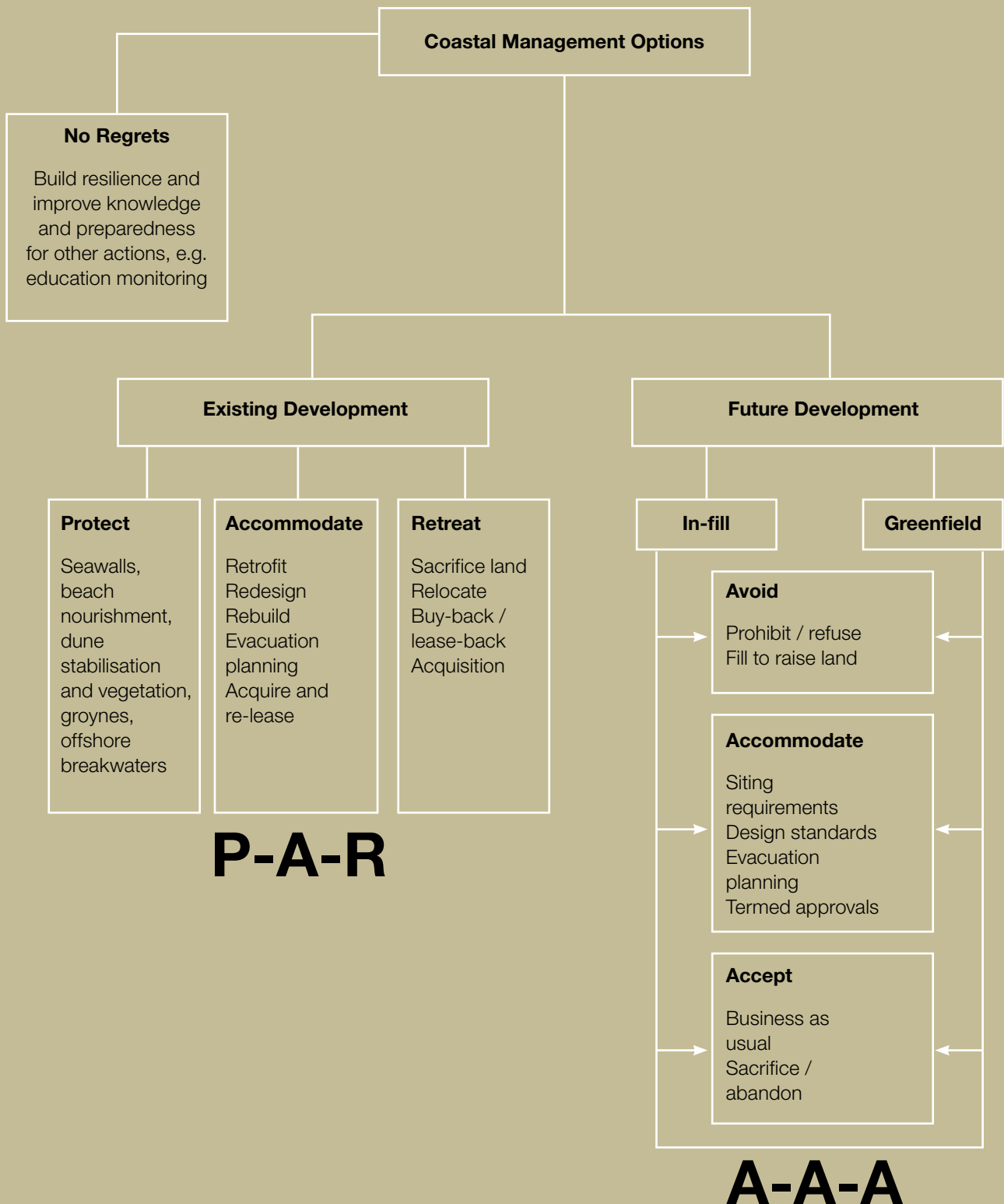


Figure 5 – Coastal Risk Management Approach for Existing and Future Development Adopted for the Lake Macquarie Coastal Zone Management Plan



# Stakeholder input

## to the CZMP and its priority actions

Community and agency consultation to develop this CZMP commenced in March 2012. Consultation was designed to collect information on the communities values relating to the coastline and coastal access, as well as community experiences and concerns about coastal recession and potential coastal management measures. The consultation involved an information flyer that was distributed to residents which also promoted stakeholder meetings, an online survey and drop-in days. Consultation for Parts B and C of the Plan involved consultation with appropriate agency stakeholders (detailed in the list below). The Lake Macquarie Estuary and Coastal Management Committee was consulted throughout the entire process to develop the CZMP.

Consultation included:

- members of the Lake Macquarie Estuary and Coastal Management Committee;
- residents of the project study area;
- Council's Development Assessment and Compliance, Communications, Integrated Planning, Asset Management, Community Planning, Leisure Services, Waste Environment and Rangers, and Sustainability departments;

- NSW Government agencies including Office of Environment and Heritage, Hunter Water Corporation, Office of Water, Fisheries, and Roads and Maritime Services;
- other land and asset managers including the Crown Lands Division within NSW Trade and Investment, Belmont Wetlands State Park Trust, Belmont Golf Club, Origin Energy; and
- community groups including boat owners, recreational anglers, surfers, 4WD clubs and user, residents involved in passive recreation of the coast.

Summaries of the consultation process conducted for each part of the CZMP are provided in Parts A–C.





# Public exhibition and consultation activities

The draft CZMP was placed on public exhibition from 28 October 2014 through to 31 January 2015. The objective of the public exhibition period was to give all Lake Macquarie City residents a chance to understand and provide feedback on the actions proposed in the draft CZMP or to suggest new actions.

Community workshops, online engagement and 'pop-up' information booths were used to give the public information about the contents of the draft CZMP and to get community input to the proposed actions and ensure that the challenges and opportunities from the perspective of the community were identified.

Workshops were at the following locations and times:

Swansea Channel - Swansea Centre, Swansea on 17 November - 5.30-8.30pm

Coastline - Blacksmiths Surf Club, Blacksmiths on 19 November - 5.30-8.30pm

Estuary – Morisset Multi-purpose Centre, Morisset on 20 November - 6.30-9.30pm

Council's Have Your Say website also hosted a project page [www.haveyoursaylakemac.com.au/coastal-zone-management-plan](http://www.haveyoursaylakemac.com.au/coastal-zone-management-plan) where participants could rank the actions within one or more of the areas (coastline, Swansea channel and estuary) by indicating if the action is least important, relatively important or most important. Document downloads, quick polls and the ability to ask the project team a question were also activated on the project website. Advertisements, posters and social media were used to promote the

website and encourage participation and attendance at the workshops.

Pop-up information booths were another means to actively engage the public in their local environments to be sure that they were aware of the draft CZMP. A series of 6 'pop-up information' booths were set up to run in conjunction with summer holiday activities run by Council.

## Stakeholder engagement

Targeted engagement was also conducted with government agencies and other stakeholders with feedback sought from agencies, private landholders, community groups and business chambers.

## Outcomes from the community consultation

The three workshops were attended by 54 participants, who assisted Council by prioritising action and suggesting new actions (8 new action suggested for the coastline, 12 for the estuary and 3 for Swansea Channel).

At the conclusion of the online consultation period, there were 23 participants who registered and contributed, 564 people who are more informed and have taken some actions to learn more about the project by downloading more information or visiting related pages and a total of 1539 who have visited the CZMP Have Your Say website. A total of 717 documents were downloaded from the site.

Pop-up booths were held to coincide with local events in the Lake Macquarie area over the summer period (January 2015).

The pop-up booths provided Council the opportunity to expose the draft CZMP to more people and discuss its contents one-on-one with interested community members, answering any questions or issues they have regarding the themes and actions of the plan.

The graph below shows a total number of responses during the online consultation and highlights the theme areas of importance to the community being:

1. Theme 3 Actions for sustainable community access, use and value
2. Theme 2 Actions for a healthy coastal zone, protecting the natural environment

The consultation report prepared by PlanCom provides a summary of all the community feedback on the draft CZMP.

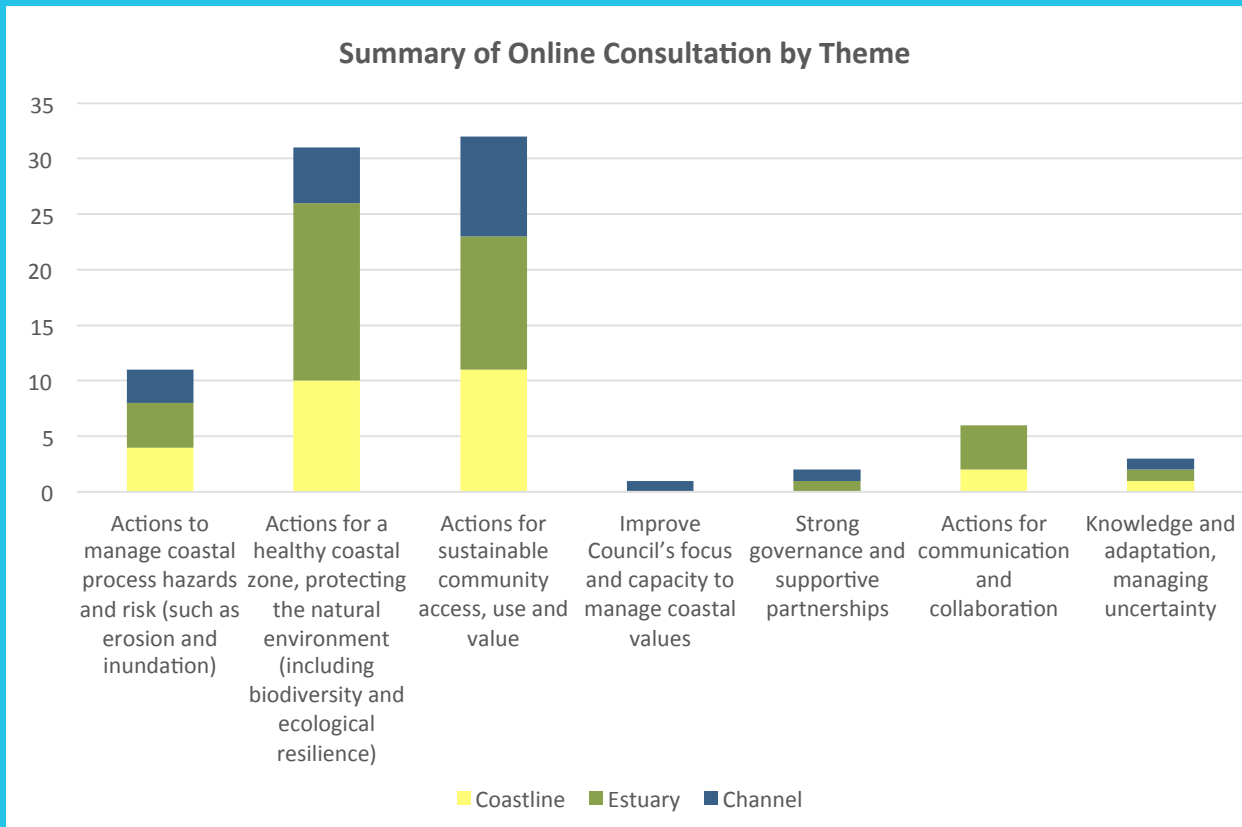


Figure 6: Total number of responses during the online consultation by strategy theme

### Outcomes from agency consultation

Sixteen agencies with responsibilities under the draft CZMP were consulted over the period from November 2014 to March 2015.

The outcomes of this consultation provided general support for the draft CZMP, with a number of minor amendments were made to actions. Some changes were also made to the content of the CZMP, including changes to the wording and listed responsibilities for

some actions, and the deletion of 1 action (action ID 4.5 in Part A of draft CZMP – protection of Hunter Water Corporation Assets at the Belmont Waste Water Treatment Plant).





# Delivering the Four Year Action Plan

There are a range of asset owners with management responsibilities under the CZMP (Table 2). This Four Year Action Plan outlines priority actions for these natural and built assets over the next four years.

The actions identified for implementation have been planned in consultation with community and agency stakeholders, and consider coastal hazards, social wellbeing and ecological health, compatible with preserving the highly valued lifestyle of the people of Lake Macquarie. These actions are arranged into seven key themes (Figure 7). Council recognises that a suite of actions is more likely to solve a problem than reliance on only one action, and that different policy mechanisms are complementary when aligned.

Important types of mechanisms employed within Part D include:

- Planning controls contained in the LEP and DCP and other regulatory or policy mechanisms such as plans of management for specific areas of public or private land;
- Service delivery, such as public works programs, public land management, training and awareness programs;
- Economic and financial mechanisms such as special rates and 'environmental levies';

- Incentive programs, with links to development controls;
- Collaborative programs with other agencies;
- Community partnerships;
- Declaration of reserves and aquatic protected areas and voluntary conservation agreements;
- Public acquisition of foreshore, high-hazard or sensitive land;
- Risk reduction programs;
- Protection, restoration, and environmental improvement works;
- Collaborative agreements and memoranda of understanding;
- Staff training and capacity building programs;
- Monitoring and reporting programs; and
- Community education and awareness programs.

Additional details on these actions are provided in parts A, B and C of the CZMP.

Table 2 - Ownership of Priority Assets

Asset Category	Highest Priority Asset at Risk	Asset owner
Lake Foreshore Structures	Jetties and wharfs	Private, LMCC
	Boat ramps	LMCC
	Swimming enclosures	LMCC
Channel Foreshore Structures	Blacksmiths breakwater and northern training wall	Crown Lands
	Eastern and middle groynes in Salts Bay	LMCC, Crown Lands
	Black Neds Bay entrance training wall	LMCC, Crown Lands (tbc)
	Jetties and wharfs at Swansea	LMCC, Private
	Swansea Bridge and approaches	Roads and Maritime Services
	Groyne field at Pelican, Naru Point and Swan Bay southern entrance	LMCC, Crown Land (tbc)
	Pelican boat ramp, jetty and facilities	LMCC
	Naru Point boat ramp	LMCC
Land development and community assets	Residential lots	Private
	Foreshore reserves and sports fields	LMCC
	Belmont airport site	Private
	Cycling and walking infrastructure	LMCC, Crown Lands
	Pelican marina	Private, Crown Lands
	Formalised beach and foreshore access tracks	LMCC, Crown Lands
	Marinas	Private, Crown Lands
	Yacht clubs	Private, Crown Lands
	Commercial and industrial areas	Private
	Holiday parks	Private, Crown Lands, LMCC
Environmental Asset	Habitats and ecosystem communities (including mangroves, saltmarsh, swamp oaks and swamp mahogany complexes).	LMCC, Crown Lands, NPWS
	Salts Bay beach and Mats Point to Black Neds Bay beach	LMCC, Crown Lands
	Spoil Island	Crown Lands
	Dudley beach	NPWS
	Redhead, Blacksmiths, Crabs, Frenchmans, Caves, Spoon Rocks, Middle Camp, Catherine Hill Bay, Moonee beaches	LMCC, Crown Lands, NPWS
	Nine Mile beach	LMCC, Crown Lands, Belmont Wetlands State Park Trust, Hunter Water Corporation, Belmont Golf Club
Roads and Transport Assets	State roads, including the Pacific Highway	Roads and Maritime Services
	Local roads	LMCC
Gas, Electricity and Telecommunication assets	Gas supply system	Jemena
	Electricity supply system	Ausgrid, Transgrid
	Electricity generation system	Origin Energy
	Telecommunications system	Telstra, NBN Co
Stormwater, Water Supply and Sewerage Assets	Stormwater system, including stormwater quality improvement devices	LMCC
	Water supply system	Hunter Water Corporation
	Sewerage system	Hunter Water Corporation



## Living Lake Macquarie - Coastal Zone



Figure 7 – Actions for coastal zone management are grouped under these seven themes





# Theme 1

## Actions to manage coastal process hazards and risk

### Objectives for Theme 1:

- To reduce high and extreme risks to acceptable levels
- To prevent risk escalation
- To align adaptive management with actual coastal change
- To reinforce Council's current approach to the effective management of hazards, including flood and inundation hazards to property and infrastructure (public and private)
- To support effective stabilisation of estuary foreshore and stream bank erosion and recession hazards (including recession hazards associated with sea level rise)

### Acronyms in the tables

CLD – NSW Trade and Investment Crown Lands  
LMCC – Lake Macquarie City Council  
OEH – NSW Office of Environment and Heritage  
DPI Fisheries – NSW Department of Primary Industries - Fisheries  
WSC – Wyong Shire Council  
LLS – Local Land Services

BWSPT – Belmont Wetlands State Park Trust  
EPA – Environment Protection Authority  
LALC – Local Aboriginal Land Council  
RMS – NSW Roads and Maritime Services  
HWC – Hunter Water Corporation  
NPWS – NSW National Parks and Wildlife Service





## Theme 1: Options to Manage Coastal Process Hazards and Risk

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Risk assessment	Coastline – Part A	Conduct an audit of the foundations of all surf clubs, as well as the Redhead SLSC seawall when conditions allow	Catherine Hill Bay, Caves Beach, Blacksmiths and Redhead SLSCs	LMCC
Risk assessment	Coastline – Part A	Conduct further analysis of the interactions of lake sourced inundation, coastal recession and marine inundation from overtopping, to clarify likely constraints to land use and potential for retreat	Whole of coast, but priority for Swansea/ Blacksmiths and Pelican area	LMCC
Risk assessment	Coastline – Part A	Conduct detailed cliff line stability study to confirm hazard and planning lines for headland areas	Coastal Headlands including Dudley, Redhead, Swansea and Caves beach to Catherine Hill Bay	LMCC
Planning and development controls	Coastline – Part A	Incorporate preparation for coastal recession into local community adaptation plans developed with the community at Blacksmiths Beach, Redhead Beach and Catherine Hill Bay Beach	All suburbs linked to beaches and likely to be affected by coastal process/ risks	LMCC
On-ground works	Coastline – Part A	Conduct beach management works such as beach scraping to reshape dunes and increase dune volume/recovery after storms if necessary	Blacksmiths Beach, Redhead Beach, Caves Beach, Near Belmont WWTP & Golf Course	LMCC <a href="#">OEH</a> <a href="#">CLD</a>
On-ground works	Coastline – Part A	Re-instate city wide beach maintenance program and continue dune rehabilitation works. This includes dune fencing, access controls, invasive species control and replanting native colonising species. Provides stronger in house support and direction for Landcare volunteers	Whole of coastline	LMCC
Monitoring	Coastline – Part A	Establish a beach monitoring program, with cross section sites at each of the main recreational beaches. These sections would be monitored monthly to quarterly	Catherine Hill Bay, Caves Beach, Blacksmiths Beach and Redhead beach	LMCC



Cost Estimate Funding Source/Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
\$50,000 plus \$40,000 for Redhead seawall for coastal engineering and geotechnical review and advice <a href="#">Council's routine asset maintenance and works program. 1:1 funding under NSW Government Coastal Management Program</a>	Audit conducted and report developed	T16.2 4.1 – 4.2	1, 4	M
\$150,000 for coastal engineering advice and modeling <a href="#">Council's routine monitoring and works program. 1:1 funding under NSW Government Coastal Management Program</a>	Coastal hazard interaction report completed	T16.2 – 6.1	4	M
\$50,000 for geotechnical engineering advice and modeling. <a href="#">1:1 funding under NSW Government Coastal Management Program</a>	Geotechnical assessment completed and planning lines developed	T16.2 – 1.2	4	N/A
Staff time	Coastal recession information incorporated into relevant adaptation plans	T16.2 – 5.2	1, 4	H
Advice from NSW Government Coastal Management Program (in kind), and \$30,000 for coastal engineering advice regarding beach scraping or re-nourishment <a href="#">State and Federal Government Grants (especially climate change adaptation and resilience building funds)</a> Council may have to contribute to cost of external agency works if sand is acquired for beach nourishment	Works conducted	T16.2 - 3.2	4	H
<a href="#">Council's routine asset maintenance and works program. Allocation from Council general rate</a>	Beach maintenance program re-instated	T16.2 3.1	N/A	H
\$25,000 for establishment; sites installed by Council staff; some on ground monitoring could be done by volunteers <a href="#">Council's routine monitoring and works program</a>	Link also to Community Biodiversity monitoring program	T16.2 1.1	4	H

## Theme 1: Options to Manage Coastal Process Hazards and Risk

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Risk assessment	Estuary – Part B	Identify actively eroding creek bank sites on public land	Whole of catchment	LMCC WSC LLS OEH
Planning and development controls	Estuary – Part B	Prepare flood risk management studies and plans to enhance understanding of risks and provide for consistent management of floodplains in the Lake Macquarie catchment	Major estuarine Creeks	LMCC CLD OEH NSW Office of Water
Planning and development controls	Estuary – Part B	Develop a Foreshore Development Guideline that includes integration of environmentally friendly foreshore stabilisation techniques	DCP Guidelines	LMCC WSC
Planning and development controls	Estuary – Part B	Review Council's creek bank stabilisation guidelines and incorporate recommendations relating to predicted climate change impacts	DCP Guidelines	LMCC
On-ground works	Estuary – Part B	Continue Council's foreshore stabilisation program	Priority sites displaying active erosion; Previously rehabilitated sites requiring maintenance	LMCC OEH CLD
On-ground works	Estuary – Part B	Continue Council's streambank stabilisation program	Tributaries in catchments with highly erodible soils; priority sites displaying active erosion	LMCC OEH CLD NSW Office of Water
Monitoring	Estuary – Part B	Review a sample of creek bank stabilisation works undertaken by Council to identify any potential design improvements required for future works	Sites previously subject to rehabilitation works	LMCC OEH CLD NSW Office of Water
Monitoring	Estuary – Part B	Conduct an condition assessment of existing lake foreshore erosion treatment sites (on public land) to determine their current condition and performance	Public foreshores subject to high wave energy, primarily southern facing shorelines	LMCC OEH Trade and Investment Crown Lands



Cost Estimate Funding Source/Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Staff time Council's routine asset maintenance and works program	Ongoing records of condition and suitability of bank protection structures in tributary creeks	T13 1/4	4	H
\$250,000 per annum 1:2 funding under NSW Government Flood Management Program	Development of Flood Risk Management Plans Incorporation of recommendations into local planning instruments	T13 1/8	4	M
\$15,000 1:1 funding under NSW Government Estuary Management Program	Guideline developed	T13 1/3	4	M
\$15,000 1:1 funding under NSW Government Estuary Management Program	Climate change DCP	T13 1/6	4	M
\$100,000 per annum 1:1 funding under NSW Government Estuary Management Program	Maintain ongoing records of changes in the condition of these treatments and their effectiveness	T13 1/2	4	H
\$250,000 per annum 1:1 funding under NSW Government Estuary Management Program	Construction of streambank stabilisation projects Reduced bank erosion at work sites	T13 1/5	4	H
Current staff resources	Develop performance and condition criteria Identify sites requiring maintenance works Identify design modifications to improve longevity and effectiveness of works	T13 1/7	4	M
Council's routine asset maintenance and works program	Maintain ongoing records of changes in the condition of these treatments and their effectiveness	T13 1/1	4	H

## Theme 1: Options to Manage Coastal Process Hazards and Risk

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Risk assessment	Channel – Part C	Maintain the entrance breakwaters in accordance with defined asset management framework to provide for continued navigability, recreational and public safety. Conduct a detailed risk assessment of the breakwaters at the entrance to Lake Macquarie Maintain the entrance training walls to continue functionality. and strengthening in the context of sea level rise and climate change.	Northern and southern breakwaters of Swansea Channel	CLD
Risk assessment	Channel – Part C	Conduct audit (dilapidation survey) of existing structures and revetments, to determine their ownership, current condition, effectiveness, expected functional life, and future potential to mitigate storm erosion and wave overtopping under higher sea levels. The audit should be used to guide subsequent decisions including future replacement/retrofit or “manage to fail” (planned retreat) options	Swansea Channel, revetments	LMCC CLD
Risk assessment	Channel – Part C	Implement new infrastructure design process that addresses both existing and future hazards. Development of a holistic long term strategy for the assets located in the channel.	Swansea Channel, western revetment, upstream from bridge to Wallarah Street (approx. length is 1650 metres)	LMCC CLD
Risk assessment	Channel – Part C	Investigate new protective works or other strategies to manage eroding foreshores and retrofit or replace existing protective structures to manage existing and future hazards. Actions would include maintenance of small groynes and beach nourishment as required	Pelican foreshore 2 -north from Soldiers Road to Swan Bay entrance (approx. length 240 metres)	LMCC CLD Private landowner
Planning and development controls	Channel – Part C	Investigate and prepare new design criteria to account for changing channel conditions (notably depths). Progress implementation of the “Towards a Sustainable Framework for Navigation in Swansea Channel” Such design criteria would be required for any new revetments or upgrades to existing foreshore protection structures which are likely to be required to mitigate against existing and future coastal hazards, particularly rising sea levels.	Swansea Channel foreshore	LMCC CLD



Cost Estimate Funding Source/Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Staff time only, or minor consultancy to undertake risk assessment. Maintenance and construction of new design options (if required) will be expensive	Risk assessment completed. Maintenance work conducted. Long-term plan for adapting to sea level rise completed	T 3-1 P10	1 to 4	M
Condition assessment approximately \$60,000 1:1 funding under NSW Government Coastal Management Program for any LMCC component	Audit completed	T 3-1, W2	1 to 4	M
Approximate cost for technical investigation is \$25,000 1:1 funding under NSW Government Coastal Management Program for any LMCC component	Revised design completed and implemented	T 3-1, W2	1	H
Total approximate cost to replace the entire revetment is \$1.2M to \$1.5M. Estimated cost for new protective works at airport is \$800K	Works completed	T 3-1, W4	4	M
Staff time only	Revised design process documented	T 3-1, P9	1 to 4	M

## Theme 1: Options to Manage Coastal Process Hazards and Risk

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
On-ground works	Channel – Part C	Construct/retrofit new revetment for segment of foreshore following detailed design and development approval	Swansea Channel, western revetment, upstream from bridge to Wallarah Street (approx. length is 1650 metres)	LMCC <a href="#">CLD</a>
On-ground works	Channel – Part C	Investigate options to manage existing and future hazards. The same steps for implementation described in Action W.2 would be appropriate. Retrofit may involve just 'topping up' groyne structure providing top width is sufficient to accommodate additional material	Pelican foreshore 1 – reserve south from Soldiers Road (approx. length 300 metres)	LMCC <a href="#">CLD</a>
Planning and development controls	Channel – Part C	Review Development Controls to address extreme storm flooding and increased tidal lake levels in these areas. Review and updating Councils existing flood policy as required. The controls should be applicable to the type of development (e.g. high density residential, alterations/additions, public facilities) and level of risk (extreme, high, medium, low)	Blacksmiths, Marks Point, Pelican, Swansea	LMCC
Planning and development controls	Channel – Part C	Progress with existing asset management planning and the incorporation of revised design requirements for any new infrastructure. Work with infrastructure providers and owners to ensure existing infrastructure continues to function and provide services safely and for as long as practical	Swansea Channel foreshore and adjoining suburbs	LMCC <a href="#">Hunter Water Jemena</a> <a href="#">Telstra Ausgrid</a>
On-ground works	Channel – Part C	Consider measures such as tidal flaps on drains to manage increasing tidal inundation of low lying areas exposed to ocean tides	Swansea urban area, Black Neds Bay, Blacksmiths behind northern revetment	LMCC
Monitoring	Channel – Part C	Investigate triggers for the replacement/retrofit needs to happen. This would be reliant on the outcomes of the condition assessment and the value of land and assets in proximity to the revetment	Swansea Channel, western revetment, upstream from bridge to Wallarah Street (approx. length is 1650 metres)	LMCC <a href="#">CLD</a>



Cost Estimate Funding Source/Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Approximate cost for technical investigation / approvals and detailed design \$1 million 1:1 funding under NSW Government Coastal Management Program for any LMCC component	Design completed and approvals issued	T 3-1, W2	4	H
Approximate design cost for construction of new foreshore revetment is \$25,000.	Design completed. Review of beach nourishment completed	T 3-1, W3	4	M
Staff time. Minor consultancy if required \$25,000 - \$50,000 1:2 funding under NSW Government Flood Management Program	Development controls updated	T 3-1, P1	1 to 4	M
Staff time only	Revised design process documented	T 3-1, P8	4	M
Staff time and external expertise	Review of efficacy of tidal flaps completed	T 3-1, P6	4	M
\$20,000 for consultant 1:1 funding under NSW Government Coastal Management Program for any LMCC component	Triggers documented	T 3-1, W2	1 to 4	M

## Theme 1: Options to Manage Coastal Process Hazards and Risk

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Planning and development controls	Coastal Zone	Use clauses in the DCP to require new development in relevant coastal risk planning areas to incorporate design features to accommodate coastal risks. These include pierced foundations (to a stable foundation depth), floor levels to prevent marine inundation, and light weight or modular structures for relocation	All areas within 2100 coastal risk planning areas	LMCC
Planning and development controls	Coastal Zone	Use clauses in the LEP and other planning instruments to link new development types to coastal risk planning zones, based on lifespan and sensitivity of the development	All areas within 2100 coastal risk planning areas	LMCC
Planning and development controls	Coastal Zone	Investigate use of DCP clauses to establish trigger-based consents for new development in coastal risk planning areas	All areas within 2100 coastal risk planning areas	LMCC
Monitoring	Coastal Zone	Participate in a regional scale coastal zone monitoring program, using LiDAR and other high resolution spatial data	Whole of coastal zone	LMCC <a href="#">OEH DPI</a>
Engagement	Coastal Zone	Conduct coast information and action days with local communities, to include beach monitoring, ecological monitoring and presentations on adaptive management of coastal risks	Whole of coastal zone	LMCC
Engagement	Coastal Zone	Develop signage to inform the community about coastal processes and coastal change	Whole of coastal zone	LMCC

THEME 1 - APPROXIMATE TOTAL ESTIMATED COST \$4.7 Million + internal resourcing costs



Cost Estimate Funding Source/Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Staff time/consultant 1:1 funding under NSW Government Coastal Management Program	Coastal hazard and health integrated into Council's planning instruments	N/A	1, 4	H
Staff time/ consultant 1:1 funding under NSW Government Coastal Management Program	Coastal hazard and health integrated into Council's planning instruments	N/A	1, 4	M
Staff time/ consultant 1:1 funding under NSW Government Coastal Management Program	Coastal hazard and health integrated into Council's planning instruments	N/A	1, 4	H
Existing staff resources	Monitoring program developed and regional partnerships formed	N/A	1, 4	H
\$30,000. Internal staff, Hunter Local Land Services Sponsorship, volunteers, Coastal Environment Network	Action days conducted	N/A	1	M
Internal resourcing for concept and wording. \$100,000 for initial installation Environmental Trust	Signage installed	N/A	4	M



# Theme 2

## Actions for a healthy coastal zone - protecting biodiversity and ecological resilience

### Objectives for Theme 2:

- Maintain or enhance the condition of coastal and estuarine ecological communities in the context of sea level rise
- Maintain or enhance the connectivity of coastal habitats
- Reduce threats from invasive species, pollution and rubbish dumping
- Control catchment inputs to sensitive receiving waters, including stormwater runoff and licensed discharges
- Manage creek bank (riparian) and foreshore vegetation
- Protect sea grass beds
- Protect wetlands

### Acronyms in the tables

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LMCC – Lake Macquarie City Council  
OEH – NSW Office of Environment and Heritage  
DPI Fisheries – NSW Department of Primary Industries - Fisheries  
WSC – Wyong Shire Council  
LLS – Local Land Services

BWSPT – Belmont Wetlands State Park Trust  
EPA – Environment Protection Authority  
LALC – Local Aboriginal Land Council  
RMS – NSW Roads and Maritime Services  
HWC – Hunter Water Corporation  
NPWS – NSW National Parks and Wildlife Service







## Theme 2: Options for a healthy coastal zone - Protecting Biodiversity and Ecological Resilience

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Coastline – Part A	Use a 'coastal landuse zone' should it become available in the LEP standard template environment protection zoning (E2) or E3) for all public land along the Lake Macquarie coastline, as far landward as the extent of coastal recession Planning Line by 2100, plus a buffer. Wherever possible on coastal dunes, maintain a buffer, zoned environment protection (beyond 2100), to allow for ecological transition as dunes roll landward.	Whole coast - public land	LMCC
Planning and development controls	Coastline – Part A	Ensure planting provides a suitable mix of native species selected from the coastal planting guide and that are relevant to site conditions. Optimise natural assets by selecting plants that provide higher biodiversity value above low maintenance plants such as Lomandra and Casuarina species	Whole coast - public land	LMCC
On-ground works	Coastline – Part A	Focus on control of Bitou bush by eliminating new colonisation on dunes, headlands and around wetlands, as a priority. This may require revisiting 'cleaned up' sites to remove new seedlings	Whole coast - public land	LMCC, BWSP, HWC, CLD, Belmont Golf Course
On-ground works	Coastline – Part A	Protect little tern and pied oystercatcher breeding areas on beaches and dunes by seasonal exclusion of off-road vehicles and dogs	Nine Mile beach	LMCC Bahtabah ALC
Monitoring	Coastline – Part A	Support the use of remote sensing tools with targeted field survey of biodiversity and condition: themeda grasslands on headlands; coastal wetlands; and a selection of barrier beach and pocket beach locations	Whole coast - public land	LMCC OEH
Monitoring	Coastline – Part A	Encourage further research on the behaviour of coastal dunes in pocket and long barrier coastal sediment compartments, as climate changes and sea level rises. Incorporate the results of these studies into future revisions of coastal risk and ecological resilience management	Whole of coast	LMCC OEH Newcastle University
Engagement	Coastline – Part A	Conduct awareness raising activities for bag limits for the collection of rock platform species and enforce bag limits	Swansea Heads, Redhead to Dudley rock platforms	LMCC DPI Fisheries

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Internal resources	Hazard and health information incorporated into planning instruments	T16.2 - 8.1	1, 4	M
Internal resources	Planting guide revised	T16.2 - 10.2	4	N/A
Internal resources	Lifeguard team or equivalent committed to follow up bitou bush eradication	T16.2 - 10.2	1, 4	H
\$5000 per annum 1:1 funding under NSW Government Coastal Management Program	Exclusion fences installed during endangered shorebird breeding season	T16.2 - 10.3	1, 4	H
Staff training and support for use of techniques 1:1 funding under NSW Government Coastal Management Program	On-ground condition monitoring	T16.2 – 11.2	4	H
\$50,000 1:1 funding under NSW Government Coastal Management Program	Research projects undertaken	T16.2 11.5	4	M
Internal resourcing	Activities undertaken	T16.2 – 10.5	1, 4	M

## Theme 2: Options for a healthy coastal zone - Protecting Biodiversity and Ecological Resilience

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Estuary – Part B	Continue compliance activities relating to erosion and sediment controls	Greenfield development sites; development sites in close proximity to the lake and tributaries	LMCC WSC EPA
Planning and development controls	Estuary – Part B	Apply WSUD to all new developments to ensure treatment of 50-80% of stormwater from each subcatchment in new subdivisions	Generation hotspots within urban sub-catchments	LMCC OEH
Planning and development controls	Estuary – Part B	Review and apply Council's DCP controls and Water Cycle Management Guidelines for all new development	Whole of catchment	LMCC WSC
Planning and development controls	Estuary – Part B	Develop a riparian guideline that outlines develop requirements and restoration solutions	Whole of catchment	DPI Infrastructure providers NSW Office of Water Land development industry
Planning and development controls	Estuary – Part B	Develop a foreshore development guideline that includes low impact methods for recreational structures and foreshore stabilisation treatments	Development Control Plan; Absolute waterfront private property	LMCC CLD NSW Fisheries OEH
Planning and development controls	Estuary – Part B	Review DCP guidelines on best practice jetty designs suitable for installation in Lake Macquarie. Update as necessary to meet ecological and recreational objectives	DCP	LMCC CLD NSW Fisheries OEH
Planning and development controls	Estuary – Part B	Prioritise estuarine and floodplain wetland areas for protection and management	Areas sensitive to climate change impacts	LMCC OEH CLD DPI Fisheries
Planning and development controls	Estuary – Part B	Prepare management guidelines for Posidonia in Lake Macquarie, consistent with the types of information that Council provides on other threatened species	DCP	LMCC OEH DPI Fisheries
Planning and development controls	Estuary – Part B	Investigate the feasibility of a catchment based project to improve water quality and ecological condition in LT Creek and Fennell Bay	LT Creek and Fennell Bay	LMCC



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Internal resourcing	Water quality consistent with required targets downstream from new development sites Site monitoring undertaken at greenfield developments and sensitive locations	T13 2/1	1, 4	H
Time to train staff	Update LMCC Water Cycle Management Guidelines to incorporate objective	T13 2/3	1, 4	H
Time for staff training (development assessment planners and compliance officers). Within staff roles and responsibilities	Water quality objectives within the LMCC Water Cycle Management Guidelines applied to all new development Water quality consistent with required targets downstream from new development sites	T13 2/5	1, 4	M
\$15,000 Internally resourced	Guideline developed Recommendations incorporated into DCP	T13 2/8	4	M
As per action 1/3	Guideline developed Recommendations incorporated into DCP	T13 2/16	4	M
As part of Action 1/3	Guideline developed Recommendations incorporated into DCP	T13 2/11	4	M
\$80,000 for externally resourced component 1:1 funding under NSW Government Estuary Management Program	Develop assessment criteria Identify priority sites for rehabilitation works	T13 2/14	1, 4	H
\$10,000 1:1 funding under NSW Government Estuary Management Program	Guideline developed Recommendations incorporated into DCP	T13 2/12	1, 4	M
Staff resources	Investigation undertaken	T13 2/38	4	N/A

## Theme 2: Options for a healthy coastal zone - Protecting Biodiversity and Ecological Resilience

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Estuary – Part B	Identify and prioritise wetlands (all types of estuary wetlands) where protected buffer areas can be established to facilitate retreat	Land zoning and identification of rehabilitation works sites	LMCC OEH
On-ground works	Estuary – Part B	Monitor vegetated SQID performance in relation to maintenance practice	Whole of catchment	LMCC OEH
On-ground works	Estuary – Part B	Continue to implement the current riparian corridor rehabilitation program	Priority estuarine creek systems such as LT Creek, Mannering Creek, and Wye Creek	LMCC OEH NSW Office of Water
On-ground works	Estuary – Part B	Retrofit existing stormwater quality improvement devices.	Whole of catchment	LMCC
On-ground works	Estuary – Part B	Install and maintain WSUD devices to reduce sediment and nutrient load	Whole of catchment	LMCC
Monitoring	Estuary – Part B	Continue sea grass mapping and health monitoring, and investigate partnership opportunities with other organisations required to monitor seagrass	Partnerships; Consistent monitoring methodology	DPI Fisheries LMCC WSC Licensed industry power stations and coal mines
Monitoring	Estuary – Part B	Continue the lake health monitoring program (water quality and ecological indicators), consistent with NSW State-wide MER (Monitoring, Evaluation and Review) program	Ongoing data collection at existing monitoring sites	LMCC OEH EPA DPI - Fisheries
Engagement	Estuary – Part B	Establish a mooring working group, to make recommendations on reducing mooring impacts on sensitive seagrass beds	Moorings over Posidonia australis beds	LMCC RMS, LLS, WSC OEH DPI Fisheries Boat Owners Association and Yacht Clubs
Engagement	Estuary – Part B	Hold a forum to discuss options for boat moorings in Lake Macquarie to minimise impacts on sensitive sea grass beds and to provide practical designs	Moorings over Posidonia australis beds; Mooring areas subject to high wave energy or currents	LMCC/ RMS All stakeholders
Engagement	Estuary – Part B	Continue education programs for construction industry and residential property owners to promote best practice stormwater management	Catchment-wide	LMCC EPA

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
\$60,000 1:1 funding under NSW Government Estuary Management Program	Report completed identifying priority wetlands	T13 2/15	1	H
As part of Action 2/2 1:1 funding under NSW Government Estuary Management Program	Development of SQID Maintenance Guideline	T13 2/6	4	M
As part of Action 1/5	Improvement in extent and condition of riparian vegetation Bush regeneration projects completed	T13 2/7	1, 4	M
\$200,000 per annum 1:1 funding under NSW Government Coastal Management Program	On-ground works complete	T13 2/20	4	H
\$200,000 per annum 1:1 funding under NSW Government Coastal Management Program	On-ground works complete	T13 2/21	4	H
Mapping and monitoring cost \$65,000 per annum Licensed industry power stations and coal mines - required to conduct monitoring of sea grass health	2. Seagrass monitoring and mapping undertaken (as per NSW Fisheries methodology) on a regular basis Funding partnerships established with private organisations (mine and electricity generation)	T13 2/13	4	H
\$85,000 per annum	Lake Health Annual Report	T13 2/2	1	H
Staff resources Seek funding via RMS Boating Infrastructure Partnership Program	Working group established including Terms of Reference	T13 2/9	1, 4	M
Staff resources Seek funding via RMS Boating Infrastructure Partnership Program	Public forum completed	T13 2/10	1, 4	H
Existing staff resources; \$15,000 for resource production	Guideline developed Recommendations incorporated into DCP	T13 2/17	1, 4	H



## Theme 2: Options for a healthy coastal zone - Protecting Biodiversity and Ecological Resilience

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Channel – Part C	Use planning controls and design guidelines to minimise the use of foreshore structures that restrict ecological transition. Planning controls would seek to remove existing barriers to wetland migration wherever possible, and provide clear guidance to waterfront land owners and managers about how to design and install waterfront structures so that ecological impacts are minimised	Foreshore areas	LMCC
On-ground works	Channel – Part C	Implement dredging and sand placement in accordance with the Sustainable Framework for Navigation in Swansea Channel. Smaller episodes of navigational dredging may be required at other locations, such as the entrances to Swan Bay or Black Neds Bay, which could supply sand for local nourishment	Salts Bay Black Neds Bay foreshore Pelican foreshore Sand islands	CLD LMCC
On-ground works	Channel – Part C	Maintain a sufficient amount of sand on the Salts Bay foreshore between the groynes. This would involve placement of additional sand (i.e. nourishment), on a one off basis to rebuild a frontal dune along Salts Bay as the foreshore slowly erodes. Any sand placement areas should be planted with Spinifex runners to help stabilise the sand dune	Salts Bay	LMCC CLD
On-ground works	Channel – Part C	Undertake beach scraping, re-contouring, sand transfer, and dune revegetation to increase sand volumes and height of frontal dunes	Salts Bay Black Neds Bay barrier dunes	LMCC CLD
On-ground works	Channel – Part C	Work with existing or establish a formal dune care program, to undertake dune rehabilitation in priority locations, which shall also incorporate weed and pest management. Note: This action would complement beach nourishment episodes to reduce loss of sand by wind. The dune care programs should be accompanied by community education regarding the role of dunes and dune vegetation to provide a buffer to storms, in addition to ecological benefits. Dune rehabilitation also helps manage sand drift.	Salts Bay Black Neds Bay barrier dunes Sand islands Pelican Wetland	LMCC CLD

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Staff time to update planning controls and guidelines. Expect some community resistance to increased development/ construction costs. <a href="#">State and Federal Government Grants (especially climate change adaptation and resilience building funds)</a>	Revised planning controls documented	T 3-1, P5	1, 4	H
Staff time. <a href="#">Additional cost for placement at Salts Bay 1:1 funding under NSW Government Coastal/Estuary Management Program.</a>	Navigation dredging conducted and sand placed	T 3-1, B1	4	M
Nourished sands typically \$25/m <sup>3</sup> (with volumes required to be determined through further investigation). Estimate \$75,000. <a href="#">1:1 funding under NSW Government Coastal Management Program</a>	Monitoring conducted. Sand placed	T 3-1, B2	1, 4	H
\$10,000 per episode <a href="#">1:1 funding under NSW Government Coastal Management Program</a>	Beach stabilisation and rehabilitation conducted	T 3-1, B3	4	H
\$2,000 per episode for materials/ resources in addition to voluntary labour <a href="#">Allocation from Council general rate. 1:1 funding under NSW Government Coastal Management Program</a>	Dunecare activity conducted Education activity conducted	T 3-1, B4	1, 4	H

## Theme 2: Options for a healthy coastal zone - Protecting Biodiversity and Ecological Resilience

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
On-ground works	Channel – Part C	Investigate long term options for managing the risk of sea level rise to the transformation of existing estuarine wetlands at Black Neds Bay and Pelican. Planned retreat is likely to be the only practical option available if future inundation hazards are realised. The effect of long-term wetland retreat on surrounding settlements will need to be investigated and the risks managed. The investigation shall include consultation with the various asset owners affected by the option. Wetland management should focus on allowing for migration of habitats up-slope wherever possible, although this will be constrained by surrounding settlements	Black Neds Bay Wetland, Pelican Wetland, Coon Island Wetland	LMCC CLD
On-ground works	Channel – Part C	Undertake pilot projects for re-establishing estuarine wetland communities, such as saltmarsh and sea grass, which will be affected by higher lake levels. This action will provide knowledge for application later as the need becomes more urgent	Within relevant sections of Swansea Chanel such as Black Neds Bay Wetland, Pelican Wetland and Coon Island Wetland	LMCC
Monitoring	Channel – Part C	Monitor wetlands to evaluate the performance of protection activities and/or pilot projects for re-establishing estuarine wetland communities. Wetland monitoring, evaluation and reporting should include both desktop and field based investigations to: <ul style="list-style-type: none"> <li>• assess vegetation condition and change;</li> <li>• inundation depth and extent; and</li> <li>• wetland health using macroinvertebrate indices</li> </ul>	Black Neds Bay Wetland Pelican Wetland Coon Island Wetland	LMCC

THEME 2 - APPROXIMATE TOTAL ESTIMATED COST \$700,000 + internal resourcing costs



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Staff time only External consultancy costs of up to \$100,000 for full investigation and monitoring.	Investigation complete	T 3-1, B5	4	H
\$5,000 - \$10,000 per episode 1:1 funding under NSW Government Estuary Management Program	Pilot project completed and evaluated	T 3-1, B6	4	H
Staff time. Minor consultancy up to \$25,000 per monitoring episode. 1:1 funding under NSW Government Estuary Management Program	Monitoring complete	T 3-1, M2	1, 4	H



# Theme 3

Actions for sustainable community access, use and value

## Objectives for Theme 3:

- To build the resilience of the coastal landscape by managing lands sustainably
- To provide a safe, functional and attractive network of coastal pathways
- To provide for ongoing safe recreational use of Lake Macquarie beaches
- To maintain the community benefits of surf club assets along the coast, particularly surf club buildings
- An active and healthy community that enjoys access to the lake and its foreshores
- Cost effective, well designed foreshore and recreation infrastructure
- An adaptive foreshore management mind-set across the community
- Community involvement in planning for recreational facilities
- Community-wide understanding of the economic value of lake based tourism and consensus about appropriate growth in lake based tourism
- Acceptance amongst lake users that protecting the natural and cultural values of some locations constrains use

## Acronyms in the tables

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DPI Fisheries – NSW Department of Primary Industries - Fisheries  
WSC – Wyong Shire Council  
LLS – Local Land Services

BWSPT – Belmont Wetlands State Park Trust  
EPA – Environment Protection Authority  
LALC – Local Aboriginal Land Council  
RMS – NSW Roads and Maritime Services  
HWC – Hunter Water Corporation  
NPWS – NSW National Parks and Wildlife Service







### Theme 3: Options for Sustainable Community Access, Use and Value

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Risk assessment	Coastline – Part A	Formalise cliff top lookouts, install safety fencing more formal stairs and rails on access tracks down the cliff or bluff to rock platform fishing sites, and also to provide emergency exit points for people on rock platforms in popular locations	Redhead to Dudley, Swansea Heads, south of Caves Beach and south of Catherine Hill Bay	LMCC,
Risk assessment	Coastline – Part A	Conduct a safety audit of Redhead, above the surf club and beach, to clarify the risk of rock fall risks to beach users	Coastal cliffs, headlands and rocky sea boarders	LMCC
Planning and development controls	Coastline – Part A	Regulate off-road vehicle driving on Lake Macquarie beaches and coastal headlands, other than in a specified section of Nine Mile Beach and where specifically approved by OEH	Whole of coast	LMCC, BWSPT HWC, CLD
Planning and development controls	Coastline – Part A	Update Plan of Management for Swansea Heads Reserve to better manage the Aboriginal values of the reserve and tell the story of the Awabakal people	Swansea Heads Reserve	LMCC Traditional Owner Descendants LALC
Planning and development controls	Coastline – Part A	Review essential uses for frontal dunes and in consultation with Surf Clubs (and SLSA) determine agreed trigger points for commencing detailed planning for protecting or relocating surf club buildings	All Surf Clubs	LMCC
On-ground works	Coastline – Part A	Prepare a multi stakeholder strategy through the Coastal Managers working group to provide controlled and managed off road vehicle access to Nine Mile Beach. Identify locations for access ways, design safe and environmentally appropriate access structures. Close and rehabilitate other access ways, and formalise the main one(s)	Nine Mile Beach	LMCC Belmont Golf Club BWSPT HWC
Engagement	Coastline – Part A	Involve off-road vehicle users in Clean Up Australia events in the BWSP and along Nine Mile Beach, similar to the Stockton Bight Clean Up Day	Whole of Coast	LMCC
Planning and development controls	Estuary – Part B	Update the Mooring Management Plan for Lake Macquarie	Mooring areas over seagrass beds	RMS LMCC DPI Fisheries CLD Yacht clubs and boat owners

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
\$25,000 - Internally resourced 1:1 funding under NSW Government Coastal Management Program	Audit conducted	T16.2 - 13.3	1, 4	L
\$25,000 - Internally resourced 1:1 funding under NSW Government Coastal Management Program	Audit conducted	T16.2	1, 4	M
Internally resourced	Coastal patrols by LMCC rangers conducted	T16.2 - 12.1/17.4	4	H
Internally resourced	Plan of Management up-dated to include indigenous content	T16.2 – 14.5	4	L
Internally resourced	Essential uses and triggers documented	T16.2 – 15.6	4	M
\$30 per linear meter Budget estimate \$50,000 per annum External partner contributions. 1:1 funding under NSW Government Coastal Management Program	Working group established and strategy developed	T16.2 – 12.2	1, 4	H
Internally resourced	Numbers involved in Clean Up	T16.2 – 12.18	1, 4	H
\$100,000, plus ongoing implementation costs Roads and Maritime Services via baoting infrastructure Partnership program	Mooring Management Plan updated and approved by CLD and LMCC	T13 3/1	1, 4 & ongoing	M

**Theme 3: Options for Sustainable Community Access, Use and Value**

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Estuary – Part B	Prepare public wharf, jetty and boat ramp strategies for Lake Macquarie	Long term recreational use	LMCC RMS Transport NSW
On-ground works	Estuary – Part B	Introduce dinghy storage racks as a trial at selected high profile/high risk locations (e.g. Valentine, Marmong Point). Publicise and report on the trial	Public foreshores adjoining mooring areas	LMCC RMS Transport NSW
Monitoring	Estuary – Part B	Continue to report on boat usage statistics for Lake Macquarie, including vessel size, numbers and locations of swing moorings, numbers of vessels berthed in marinas, and any incidents associated with mooring location, function or interaction with jetties	Data collection	RMS Yacht clubs and boat owners Association Marina operators
Engagement	Estuary – Part B	Establish an inter-council working group to provide consistent policy and strategy around access infrastructure for Lake Macquarie	Lake-wide	LMCC WSC CLD





Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
\$60,000 <a href="#">Seek funding via RMS Boating Infrastructure Partnership Program</a>	Undertake recreational capacity survey Develop aquatic public infrastructure strategy	T13 3/5	4	M
\$180,000 <a href="#">Seek funding via RMS Boating Infrastructure Partnership Program</a>	Trial storage racks installed Monitoring of trial sites and subsequent report Public consultation sessions	T13 3/4	4	H
Internally resourced	Annual Report	T13 3/3	1, 4	M
Existing staff resources <a href="#">Council's parks and reserves maintenance and works program</a>	Working group established and terms of reference developed	T13 3/2	4	H



**Theme 3: Options for Sustainable Community Access, Use and Value**

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Risk assessment	Channel – Part C	Work with affected communities, infrastructure providers, and other stakeholders to develop Local Adaptation Plans (LAPs) to identify strategic pathways for adaptation to changing levels of hazard and risk as a result of rising sea levels. LAPs will include many of the management options recommended elsewhere in the Plan, but will apply them to the specific conditions of each locality, and link them into an integrated plan	Blacksmiths Pelican Marks Point Swansea	LMCC
On-ground works	Channel – Part C	Restore the recreational amenity of Grannies Pool by removing accumulated sand build-up. Sand could be removed using land based equipment and transported to nearby Blacksmiths Beach for beach nourishment or similar. As part of this action, upgrade and improve maintenance of existing access and public facilities and adjacent reserve areas to improve aesthetics and provide a safe swimming enclosure	Grannies Pool, Swansea Channel Northern Breakwater and adjacent reserve areas	CLD LMCC

**THEME 3 - APPROXIMATE TOTAL ESTIMATED COST \$500,000 + internal resourcing costs**





Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Staff time <a href="#">\$60,000 for external consultancies per Plan</a>	Local Adaptation Plans completed	T 3-1, P2	4	H
Depending on scope of works. Estimated \$0.25M including design and approvals plus on-going maintenance costs (est. \$70,000/five years in Masterplan) <a href="#">Trade and Investment Crown Lands, 1:1 funding under NSW Government Coastal Management Program</a>	Sand removed from Grannies Pool Public facilities upgraded	T 3-1, W7	1, 4	M







# Theme 4 Improve Council's focus and capacity to manage coastal values

## Objectives for Theme 4:

- To align Council internal structure, resources and investment with the current and future challenges and opportunities that are offered by coastline and estuarine issues

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WSC – Wyong Shire Council  
LLS – Local Land Services

BWSPT – Belmont Wetlands State Park Trust  
EPA – Environment Protection Authority  
LALC – Local Aboriginal Land Council  
RMS – NSW Roads and Maritime Services  
HWC – Hunter Water Corporation  
NPWS – NSW National Parks and Wildlife Service



#### Theme 4: Improve Council's focus and capacity to manage coastal values

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Coastline – Part A	Review staff responsibilities and identify a 'coastal zone champion' to promote open coast values and highlight coastal zone threats and risks. This role would coordinate the implementation of the CZMP, including cross council facilitation and budget planning; outcome tracking etc	Whole of coast and estuary	LMCC
Planning and development controls	Coastline – Part A	Revisit the balance of investment in lake shore reserves and open coast reserves, with an increase in investment in coastal areas	Coastal zone	LMCC
Engagement	Coastline – Part A	Form a small working group with representatives across relevant Council divisions to facilitate delivery of the plan and schedule and oversee implementation. Separate from the Estuary and Coastal Committee	Whole coast Note this is an internal Council working group, separate to the Estuary and Coastal Management Committee	LMCC
Planning and development controls	Estuary - Part B	Develop an integrated coastal zone management implementation strategy and funding plan for the open coast and estuarine parts of the Lake Macquarie coastal zone	Funding plan	LMCC <a href="#">OEH</a>
Planning and development controls	Estuary – Part B	Investigate and utilise all relevant and cost effective external funding avenues, to facilitate implementation	Grant identification	LMCC <a href="#">State and Federal Government agencies</a>
Planning and development controls	Channel – Part C	Update internal checklists, procedures, guidelines and policies to facilitate the consideration of coastal hazard zones. and timeframes by Council in the preparation or revision of: <ul style="list-style-type: none"> <li>• Community &amp; Crown Land Plans of Management</li> <li>• Masterplans</li> <li>• Review of Environmental Factors (REF) for works not requiring development consent</li> <li>• Planning new infrastructure and conducting strategic planning (e.g. designing new road networks, sewer networks etc) (i.e. prior to preparation of development applications), and</li> <li>• Any other works not requiring development consent or assessment</li> </ul>	Foreshore and coastal areas	LMCC <a href="#">CLD NSW Planning</a>



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
\$100,000 if new position established, or else alteration to a current Council staff member <a href="#">Allocation from Council general rate</a>	Person employed to deliver the CZMP	T16.2 – 16.1	1	L
Existing staff resources	Allocation of resources revised to reflect appropriate balance of investment in reserves around the lake and along the coastline	T16.2 – 16.2	1, 4	L
Internally resourced	Working group established	T16.2 – 16.3	4	L
Existing staff resources	Funding plan developed and reviewed by relevant Committees of Council	T13 4/1	1	L
Existing staff resources	Identification of grant opportunities	T13 4/2	1, 4	L
Staff time only	Checklists, procedures and guidelines documented	T 3-1, P3	1, 4	M

**Theme 4: Improve Council's focus and capacity to manage coastal values**

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting partners
Planning and development controls	Coastal Zone	Investigate, document and utilise all relevant and cost effective external funding avenues, to facilitate implementation	Whole of coast	LMCC
Monitoring	Coastal Zone	Establish monitoring programs (Monitoring Framework) to track the condition of the coast and the outcomes of management actions	Whole of coast	LMCC Community OEH Local Land Services
Monitoring	Coastal Zone	Establish monitoring programs (Monitoring Framework) to track the condition of the coast and the outcomes of management actions	Whole of coast	LMCC Community OEH Local Land Services
Engagement	Coastal Zone	Review the membership of the Estuary and Coastline Management committee and reform as a Coastal Zone Management Committee, with representatives of key stakeholder groups for both the estuary and open coast. To ensure the membership is more representative of open coastal stakeholders as well as the lake. Expand agenda to include environmental considerations	Whole of coast	LMCC Stakeholder Partners
Engagement	Coastal Zone	Review membership of the Aquatic Services Committee Expand agenda to include environmental considerations	Committee	LMCC Stakeholder Partners

**THEME 4 - APPROXIMATE TOTAL ESTIMATED COST \$100,000 + internal resourcing costs**

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Internally resourced	Documentation of relevant funding sources, partnership opportunities and resource support to implement actions in the CZMP	N/A	1, 4	H
Internally resourced <a href="#">Hunter Local Land Services, community assisted programs</a>	Actions integrated into Council's existing reporting frameworks and management plans	N/A	1, 4	
Internally resourced <a href="#">Hunter Local Land Services, community assisted programs</a>	Actions integrated into Council's existing reporting frameworks and management plans	N/A	1, 4	
Internally resourced	Review Terms of Reference for Committees in light of priority actions for the CZMP	4-Mar	1	M
Internally resourced	Membership Reviewed	4-Mar	1	M





# Theme 5

## Strong governance and supportive partnerships

### Objectives for Theme 5:

- To enhance alignment of objectives and management strategies across land tenures
- To improve the efficiency or resource use
- To share information and encourage collaboration for a healthy and accessible coast
- To raise community awareness of coastal zone management issues and the rationale for adaptive responses
- To build community skills and capacity in managing the coastal zone
- To provide a clear management framework for community projects
- Have clear definitions of responsibility and accountability so Council, agencies and community can work collaboratively.

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HWC – Hunter Water Corporation  
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## Theme 5: Strong governance and supportive partnerships

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Planning and development controls	Coastline – Part A	Adopt a policy to encourage transfer of private land along the coast from MHW to the landward edge of the 2100 coastal hazard zone, plus a buffer) to public tenure, as opportunity arises. Investigate land swap options as necessary	All private land within coastal risk planning area	LMCC NPWS
Planning and development controls	Coastline – Part A	Review and improve alignment of objectives of Plans of Management and other Plans (such as LEP and Master Plans) prepared by Council, DPI Catchments & Lands and NPWS. Note that DPI Catchments & Lands Plans of Management can no longer override the LEP	Council managed coastal lands, Belmont Wetlands State Park, National Parks, Conservation areas and Nature Reserves	LMCC
Engagement	Coastline – Part A	Investigate the potential for Surf Life Saving Clubs to be involved in coastal rehabilitation activities during the off- season	Patrolled beaches	LMCC Hunter Surf Lifesaving Ass.
Engagement	Coastline – Part A	Promote the economic opportunities that the coast brings to the city, such as national surf carnivals, conferences etc. Additional information on the economic value of the coast will also inform decisions about priorities for investment in coastal recreational spaces and land management	Marketing	LMCC
Planning and development controls	Estuary – Part B	Allocate resources to carefully monitor opportunities under all grant programs and to ensure grant applications are best positioned to deliver funding for CZMP projects	Grant Funding	LMCC
Partnerships	Estuary – Part B	Maintain close liaison with State and Commonwealth agencies about Lake Macquarie issues and initiatives, to lay groundwork for investment in innovative management, planning, monitoring and reporting processes	Partnerships	LMCC OEH EPA RMS DPI Fisheries Transport NSW
Partnerships	Estuary – Part B	Advocate for a NSW Container Deposit System	Advocacy	LMCC
Partnerships	Estuary – Part B	Request Lake Macquarie participation in DPI trials to reduce fishing impacts on turtles	Partnerships	LMCC, DPI Fisheries



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Internally resourced. Investigate land swaps to maintain cost neutral position	Procedure for land transfer developed and put forward as a policy	T16.2 – 20.1	4	L
Internally resourced with <a href="#">OEH 1:1 funding</a>	Coastal hazard and health integrated into Councils' planning instruments	T16.2 – 17.1	1, 4	L
Internally resourced	Number of Surf Life Saving Clubs involved in rehabilitation on the coast	T16.2 – 19.5	4	L
Internally resourced	Data on the economic value of the coastline sought and incorporated into public articles	T16.2 – 21.7	4	L
Existing staff resources	Grant applications prepared in line with CZMP priority actions	T13 5/1	1, 4	M
Existing staff resources	Agencies represented on the Estuary and Coastal Zone Management Committee	T13 5/2	1, 4	M
Existing staff resources	Advocacy activities undertaken	T13 2/39	4	M
Existing staff resources	Trial undertaken in Lake Macquarie	T13 3/36	4	N/A

### Theme 5: Strong governance and supportive partnerships

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Partnerships	Channel – Part C	The ownership and responsibility for most assets in the Channel or along the foreshore falls to either Crown Lands or LMCC. However, ownership of and responsibility for some assets in Swansea Channel is uncertain and requires clarification Crown Lands and LMCC are in the process of clarifying and formalising ownership of and responsibility for public assets in Swansea Channel if it is in doubt, especially protective works such as revetments and groynes. LMCC and Crown Lands should agree on a process to ensure ownership and responsibility of new structures is formally recorded at the time of construction, and this is reflected in the respective assets registers of the two organisations	Specifically foreshore revetments, and groynes located along the eastern and western banks of Swansea Channel upstream of Swansea Bridge	CLD
Partnerships,	Channel – Part C	Establish a protocol with Crown Lands about how and when sand dredged from Swansea Channel to maintain navigation could be used for beach nourishment and placed for future use for beach protection works at Salts Bay or elsewhere as required Sand could be stored in dunes constructed landward of the existing frontal dune system	Swansea Navigation Channel Salts Bay	CLD/LMCC
Planning and development controls	Coastal Zone	Liaise with Wyong Shire Council and The City of Newcastle to provide consistent biodiversity resilience strategies where coastal ecological communities cross Council boundaries Link to Catchment Action Plan and Regional Biodiversity Strategy	Council managed coastal lands, Belmont Wetlands State Park, National Parks, Conservation areas and Nature Reserves	LMCC/WSC/OEH/The City of Newcastle
Partnerships, Protocols	Coastal Zone	Develop opportunities for local businesses to sponsor community projects on the coast	Sponsorship	LMCC
Partnerships,	Coastal Zone	Build capacity for community volunteers to citizen science level ecological monitoring techniques (eg, community participation in environmental monitoring programs)	Focus on sites already in place and additional sites suggested in Parts A, B and or C of the CZMP	LMCC Local communities

**THEME 5 - APPROXIMATE TOTAL ESTIMATED COST \$80,000 + internal resourcing costs**

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Internally resourced	Ownership of assets agreed and documented	T 3-1, W1	1	H
Staff time In the longer term, significant cost savings and project efficiencies are expected if a reliable source of sand can be obtained for beach nourishment purposes	Protocols documented	T 3-1, P4	1	H
\$80,000 for consultant	Number of biodiversity initiatives undertaken in partnership with adjacent councils	N/A	4	
Internally resourced	Sponsorship prospectus developed	N/A	4	M
Internally resourced	Community monitoring program resourced	N/A	4	M





# Theme 6

## Actions for Communication and Collaboration

### Objectives for Theme 6:

- Raise the profile of the coastal zone and communicate its history and value
- For all decision makers to have appropriate knowledge to balance ecological and community values
- For residents, ratepayers and waterway users to demonstrate behaviours consistent with stewardship of healthy coastal systems
- To have healthy estuarine systems and functions is a design criterion for all new development and infrastructure
- For residents, ratepayers and waterway users to have access to information that meets their needs, so they can make informed decisions about aspects of their lifestyle that have the potential to affect the health of the coastal zone
- For Councillors to own solutions that are good for the coastal environment and good for the community
- For residents, ratepayers and visitors to have access to places and information which showcase the Awabakal and historic heritage values of the Lake Macquarie Coastal landscape
- To have a transparent and accessible process for ratepayers and residents to contribute to objectives and decisions about the future of the lake.

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LALC – Local Aboriginal Land Council  
RMS – NSW Roads and Maritime Services  
HWC – Hunter Water Corporation  
NPWS – NSW National Parks and Wildlife Service





## Theme 6: Options for Communication and Collaboration

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Engagement	Coastline - Part A	Update and enhance Council's web site with information about coastal processes and hazards, management approach and achievements. Provide more information about coastal values and activities	Coastal hazards	LMCC
Engagement	Estuary - Part B	Continue adaptation conversations and planning with affected communities	Urban areas most affected by sea level rise	LMCC <a href="#">OEH Local residents and businesses</a> <a href="#">Utility providers such as HWC, Ausgrid, Jemena, Transgrid</a> <a href="#">OEH Transport NSW</a>
Engagement	Estuary – Part B	Regularly use electronic surveys and feedback opportunities on lake management issues, via Council's web site	Community consultation	LMCC
Partnerships	Estuary – Part B	Collaborate with University of Newcastle and other tertiary institutions to bring new research results into the community	Community engagement; research opportunities	LMCC <a href="#">University of Newcastle Tertiary Institutions</a>
Partnerships	Estuary – Part B	Use local media to promote estuary management activities or works	Community engagement	LMCC <a href="#">OEH RMS EPA</a>
Engagement	Channel – Part C	Conduct community engagement programs focussing on Swansea Channel and coastal processes	Community engagement	LMCC
Engagement	Channel – Part C	Consult with Awabakal Traditional Owner and other relevant aboriginal groups when undertaking works or engagement activities relating to the indigenous heritage issues associated with Swansea Channel	Community engagement	LMCC, <a href="#">Traditional Owners Groups, Bahtabah LALC</a>
Engagement	Coastal Zone	Conduct community forums based on collaborative engagement processes when decisions about major coastal management issues are being made	Community engagement and consultation	LMCC All Stakeholders Government agencies relevant to the management issue
Engagement	Coastal Zone	Regularly use electronic surveys and feedback opportunities on coastal management issues, via Council's web site	Community engagement	LMCC
Engagement	Coastal Zone	Prepare and deliver a coastal communications strategy. Research and collate information that is part of the story of the Lake Macquarie coastline and lake. Increase appreciation for and attract more visitors to the coast through an enhanced experience	Whole of coast	LMCC/ Lake Macquarie Tourism LALCs



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Existing staff time	Web page up-dated	T16.2 – 21.8	1	M
Internally resourced	Adaptation Planning Workshops and ongoing consultation with affected communities	T13 6/1	1	H
Internally resourced	Annual lake survey. Public exhibition of relevant documents related to estuary management	T13 6/2	1	H
Existing staff resources	Continue research grant program Continue tertiary education representation on the Estuary and Coastal Zone Management Committee	T13 6/3	1	H
Existing staff resources	Quarterly media release	T13 6/4	1	M
Existing staff resources	Community engagement programs implemented	C1	4	M
Existing staff resources	Consultation undertaken	C2	4	
Existing staff resources	Development of a communication plan for CZMP implementation	N/A	1, 4	H
Internally resourced	Timing of surveys. Report results that are relevant to the Coastal Zone and Aquatic Services Committees on a regular basis	N/A	4	H
Internally resourced	Communication strategy completed	N/A	4	H

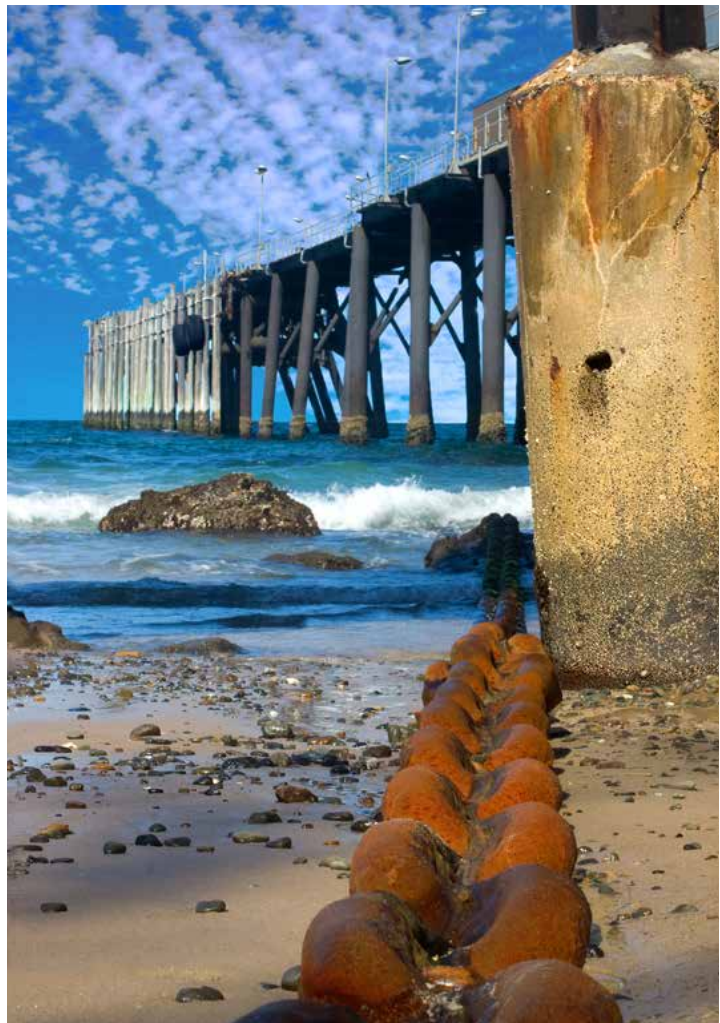
**Theme 6: Options for Communication and Collaboration**

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Engagement	Coastal Zone	Update tourist information about Lake Macquarie with coastal tourism and recreation opportunities	Whole of coast	Lake Macquarie Tourism
Engagement	Coastal Zone	Update and enhance Council's web site with information about coastal processes and hazards, Council's management approach and achievements. Provide more information about coastal values and activities. Intention would be to have communications of a scale similar to that used for the OLMCC project	Whole of coast	LMCC
Engagement	Coastal Zone	Investigate options for major community events on the coast e.g. surf fest in Newcastle (not directly surf club related) Promote the economic opportunities that the coast brings to the city, such as national surf carnivals, conferences etc. Attain additional information on the economic value of the coast	Whole of coast	LMCC

**THEME 6 - APPROXIMATE TOTAL ESTIMATED COST Internal resourcing costs**



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Internally resourced	Information updated	N/A	1	H
Existing staff time	Website updated	N/A	1	M
Internally resourced	Number of events conducted in the coastal zone area	N/A	4	H







# Theme 7

## Knowledge and adaptation, managing uncertainty

### Objectives for Theme 7:

- Establish a flexible adaptive management framework
- To have ongoing collaborative collection and publication of information about the condition and use of the Lake Macquarie coast, lake and Swansea Channel.

### Acronyms in the tables

CLD – NSW Trade and Investment Crown Lands  
LMCC – Lake Macquarie City Council  
OEH – NSW Office of Environment and Heritage  
DPI Fisheries – NSW Department of Primary Industries - Fisheries  
WSC – Wyong Shire Council  
LLS – Local Land Services

BWSPT – Belmont Wetlands State Park Trust  
EPA – Environment Protection Authority  
LALC – Local Aboriginal Land Council  
RMS – NSW Roads and Maritime Services  
HWC – Hunter Water Corporation  
NPWS – NSW National Parks and Wildlife Service



## Theme 7: Knowledge and adaptation, managing uncertainty

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Engagement	Coastline – Part A	Confirm coastal zone monitoring program relevant to natural resource management targets. Establish systems and train staff and community monitoring personnel	Personnel	LMCC HWC Belmont Golf Club BWSPT Community (Citizen Science programs)
Monitoring	Estuary – Part B	Implement a comprehensive estuary health and community use monitoring program, consistent with the NSW State-wide MER strategy but also tailored to provide appropriate management information for LMCC and its community Report results annually	Monitoring; Community engagement; audit	LMCC OEH, HWC Centennial Coal Origin Energy Community (Citizen Science programs)
Monitoring	Estuary – Part B	Conduct an annual review audit of actions implemented from the estuary CZMP to inform progress and facilitate adjustments as necessary	Monitoring; Adaptive management	LMCC All agencies having responsibilities under this plan
Risk assessment	Channel – Part C	Re-run risk assessment based monitoring results and revise management response if risk level changes (i.e. increase or decrease in level of risk)	Part C Study Area	LMCC
Risk assessment	Channel – Part C	Develop a tsunami emergency response plan for evacuation of susceptible areas within Swansea and Blacksmiths and implement plan as triggered by advice from Bureau of Meteorology and Pacific Tsunami Warning Centre	Swansea Blacksmiths	SES LMCC
Planning and development controls	Channel – Part C	Investigate and implement strategic planning to prevent and remove barriers to the planned retreat of low-lying public lands. Investigate and implement strategic planning to allow for the future (>50years) planned retreat of low-lying private lands if other measures such as foreshore protection and development controls prove insufficient to manage the increased risk	Swansea – lake side Land behind Swansea revetment foreshore Land behind Pelican foreshore Blacksmiths – behind northern revetment.	LMCC



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Bi-annual beach survey \$10,000	Coastal zone management targets documented and made available to partners for actioning	T15.2 22.2	1, 4	M
As part of Action 2/2	Lake Health Annual report	T13 7/1	1, 4	H
Existing staff time	Actions reviewed and progress documented in State of Environment Report	T13 7/3	1	H
Staff time only, or minor sub-consultancy (up to \$25,000)	Risk assessment documented	T 3-1, M5	4	M
Internal resources shared between agencies	Response plan agreed and documented	T 3-1, M7	4	L
Existing staff time	Investigation documented	T 3-1, P7	1, 4	L

## Theme 7: Knowledge and adaptation, managing uncertainty

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Monitoring	Channel – Part C	Survey the beach in cross section at regular profiles along the beach. Survey profiles should be established at 50 to 100 metre intervals along the beach. Preferably, the beach profiles should align with any existing photogrammetric profiles at the beaches, to enable the new data to be assessed in context with the historical data. Where considered useful, install a marker (e.g. stake with signage in the dunes seaward of a significant beach position / assets), as a community education tool to illustrate the natural fluctuations in beach position with storms, and potential recession in the future with sea level rise. The monitoring program and installation of markers / sighting poles could investigate the use of assistance from local dune care groups (e.g. as a pilot program, utilising basic survey techniques such as the Emery method)	Salts Bay Black Neds Bay barrier dunes Sand islands	LMCC
Monitoring	Channel – Part C	Collect or otherwise obtain bathymetric hydrosurvey (or equivalent survey) data for Swansea Channel and process the data to identify significant changes to channel bathymetry (particularly scour holes) at the toe of foreshore revetment and groynes. Data should be used to inform the preparation of asset condition assessments and assisting with new infrastructure design related actions	Swansea Channel	OEH/ CLD
Monitoring	Channel – Part C	Monitor frequency, depth and spatial extents of storm inundation, tidal inundation and lake flooding events. Monitor and analyse data from tidal gauges to assess local trends in sea and lake levels	Part C Study Area	LMCC/OEH
Monitoring	Channel – Part C	Monitor condition of foreshore assets including revetments, footpaths and groynes. This would involve undertaking an initial conditions assessment to establish baseline conditions for subsequent monitoring and for assisting with retrofitting/ replacement actions. Undertake annual monitoring and reporting of asset condition to identify those assets that require immediate attention	Swansea Channel, Western revetment upstream of bridge, Pelican foreshore, Northern revetment downstream of bridge	LMCC CLD
Planning and development controls	Coastal Zone	Confirm period and process for review of the CZMP Part A, B and C and report on lessons learnt. Provide clear timeframes for assessing trends in condition and for targeting funding programs	Whole of coast	LMCC/OEH

Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Existing staff time. Minor sub-consultancy (up to \$25,000) per monitoring episode	Monitoring completed	T 3-1, M1	1, 4	M
Staff time shared between agencies	Hydrosurvey completed	T 3-1, M3	1, 4	M
Internal resources shared between agencies \$5,000 - \$10,000 for analysis of water level data	Monitoring completed	T 3-1, M4	1, 4	M
Staff time	Monitoring completed	T 3-1, M6	1, 4	M
\$50,000 for data collection and analysis	Review period reflected in forward works program	Part A T15.2 22.3	1	M



**Theme 7: Knowledge and adaptation, managing uncertainty**

Approach	Landscape	Management Action	Focus	Primary Responsibility Supporting Partners
Planning and development controls	Coastal Zone	At intervals of no more than 10 years, review the implementation of the CZMP, in conjunction with review and update of other components of the Lake Macquarie CZMP	Monitoring; Community engagement; audit	LMCC All agencies having responsibilities under this plan
Monitoring	Coastal Zone	Confirm coastal management targets for the next ten years. Align coastal targets with other performance targets for the City and establish appropriate systems to track progress towards targets Provides quantitative framework for coastal zone management	Whole of coast	LMCC

**THEME 7 - APPROXIMATE TOTAL ESTIMATED COST \$350,000 + internal resourcing costs**



Cost Estimate Funding Options	Evaluation Method	Action Ref Parts A, B and C	Review Period (yrs)	Community Priority (High, Med, Low)
Existing staff resources. \$150,000 for CZMP Review	Review and report on status of implementation actions	Part B - T13 7/3	4	H
Potential cost of monitoring program high. Maintaining trained volunteer personnel for community monitoring	Targets confirmed and integrated into Council's management planning documents	Part A T15.2 – 22.1	1	H







# Reviewing the CZMP

The CZMP identifies some actions that are part of Council's long-term coastal zone management strategy.

A review of implementation progress as presented in this Part D will occur after four years and is linked to Council's Integrated Planning and Reporting Framework. Progress with CZMP actions will be reported annually in Council's State of the Environment Report.

Parts A, B and C of the CZMP are intended to be reviewed every 10 years, and will include a review of

the effectiveness of the CZMP. Strategic objectives and triggers for adaptive change to land use will be reviewed and updated at the same time as the CZMP.

Coastal hazard and risk studies will be reviewed when new climate change projections are issued by the Intergovernmental Panel on Climate Change (IPCC) and localised for NSW by the Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation, or at the direction of the NSW Government.





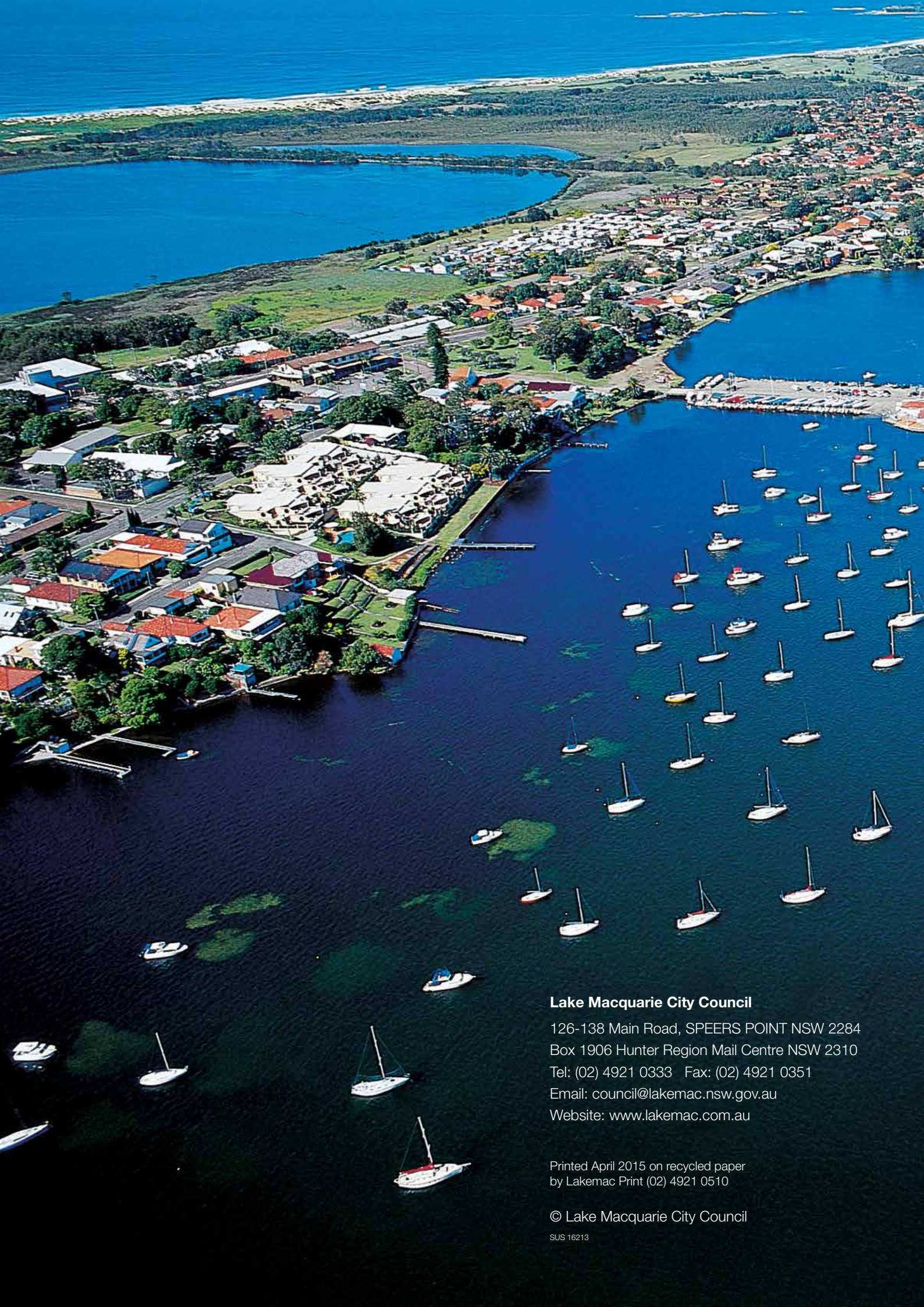
A full review of the CZMP will consider:

1. The extent to which proposed actions have been implemented, the cost of management and the reasons for variations from the proposed schedule;
2. The extent to which the actions in the CZMP can be seen to have supported improvements to the condition of coastal ecosystems, or provided for ongoing safe community enjoyment of the coastal zone; and

3. The extent to which Council and others with management responsibilities under the CZMP have delivered their actions described in this CZMP.

When reviewing the overall implementation of the CZMP, Council will involve the Lake Macquarie Estuary and Coastal Management Committee, or its successor, and provide opportunities for the broader community and agency stakeholders to contribute.





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