



# COASTAL ZONE MANAGEMENT PLAN for the Wyong Coastline

December 2011



# **Coastal Zone Management Plan for the Wyong Coastline**

**Prepared by**

**Umwelt (Australia) Pty Limited**

**on behalf of**

**Wyong Shire Council**

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# Foreword

## **Cr Graham, Mayor and Chair, Tuggerah Lakes Estuary, Coastal and Floodplain Management Committee**

The Wyong Shire coastline boasts a diverse natural landscape including long sandy beaches, numerous small bays, intertidal rock platforms, high sandstone cliffs and rocky bluffs. It's unique beauty and character makes it one of Wyong Shire's most valued natural assets. However, continued fast growth in the region, long term erosion and sea level rise trends mean the coastline is under considerable threat.

For the past ten years, in partnership with the NSW Office of Environment and Heritage, Council has been developing the Coastal Zone Management Plan (The Plan) to better manage our valued coastline. The Plan is in line with the State Government's suite of coastal legislation, policies and guidelines.

Completion of the Wyong Coastal Hazard Study (2010) and Wyong Geotechnical Issues Study (2010) provided Council with a sound basis to formulate The Plan. The Plan is based on sound science and an appreciation of the community's values and perspectives, and I have been extremely encouraged by the involvement of the community during its development.

The Plan focuses on managing risks associated with coastal processes, such as erosion, recession, lake entrance management flooding due to wave overtopping and slope instability. It sets out three broad strategies for managing risks in a timely and cost effective manner, while maintaining the lifestyle and natural values that are important to local residents and visitors. Council proposes to manage coastal risks by using the planning system, by strengthening coastal dunes and ecological communities, by allowing the construction of coastal protection works at specific times and locations and by working closely with its local communities.

By implementing a schedule of prioritised actions, Council will reduce immediate high risks and reduce the likelihood of risks increasing into the future. Council proposes to implement the Plan over the next 10 years, and will be reviewing the suitability and success of management responses as new information becomes available.

The Shire's coast is an integral part of our community's lifestyle and is therefore the focus of many recreational activities including fishing, boating, swimming, surfing, snorkelling, diving, walking, running, picnicking and sunbathing. The effective management of the coast will ensure the continued enjoyment of these activities for current and future generations.

The challenge for us now is to ensure that the Plan is implemented to guarantee a sustainable future for the Wyong Shire coastline. The significant cost of this will be shared between the State Government and Council. Council will also pursue grant opportunities when available.

On behalf of Wyong Shire Council and the Tuggerah Lakes Estuary, Coastal and Floodplain Management Committee I proudly welcome the Wyong Shire Coastal Zone Management Plan and trust that you will take the opportunity to participate in its implementation, helping to shape a healthy coastal environment that supports the well being of our community.

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## **REFERENCES**

A full list of references used in the preparation of the Plan is included in the Supporting Information Volume 1. Council will maintain a library of relevant reference material as new coastal science, coastal risk and coastal management studies become available.

## Glossary

This glossary explains a range of technical or planning terms that are used in the Coastal Zone Management Plan for the Wyong Coastline (Plan) and Supporting Information (Volumes 1 and 2). The definitions are drawn from several different sources, including the NSW Coastline Management Manual (NSW Government 1990), the First Pass National Assessment on Climate Change Risks to Australia's Coast (Department of Climate Change 2009a), definitions in NSW legislation, policy and guidelines (released by Office of Environment and Heritage in 2009, 2010 and 2011) and standard coastal engineering or coastal planning manuals.

Accretion	Growth of coastal shorelines by steady addition of sediments.
Adaptation	Adjustments in natural or human systems in response to climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.
Adaptive capacity	Ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.
Authorised Location	Defined in the current proposed amendments to the NSW Coastal Protection Act as a place that has at least five houses or a public road in the immediate coastal erosion hazard zone. In Wyong Shire, Hargraves Beach and North Entrance Beach are currently defined as Authorised Locations.
Average Recurrence interval (ARI) and annual exceedance probability (AEP)	Both of these terms are a measure of the rarity of a rainfall event, but can also be used to refer to the rarity of a storm event. The ARI is the average, or expected, value of the periods between exceedances of a given rainfall total accumulated over a given duration. The AEP is the probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.
Bathymetry	Refers to the depth of the ocean. A bathymetric chart will show the depths to the sea floor (and therefore the shape of the sea floor) at different locations.
Beach	A wave deposited accumulation of sediment, usually sand, but also cobbles and boulders, lying between the upper limit of wave swash and extending out across the surf zone to the depth at which average waves can move sediment shoreward. Short (2007) notes that on the high wave energy NSW coast, this means that beaches extend seaward to water depths of 15 to 20 metres and as much as 1 to 3 kilometres offshore.

Biodiversity	The numbers and relative abundances of different genes, species and ecological communities in a particular area.
Bluff or cliff	Coastal cliffs (especially steep and precipitous cliffs), steep rock and weathered rock slopes, headlands, indurated and cemented sand coastal slopes.
Climate	Climate in a narrow sense is usually defined as 'average weather'. The usual period for calculating the 'average' is 30 years.
Climate model	A numerical representation (typically a set of equations programmed into a computer) of a climate system. The most complex and complete climate models are General Circulation Models.
Climate projection	A projection of future climate based on simulation by climate models.
Coast	Generally used, with 'coastline', to refer to the actual shoreline where the sea meets the land.
Coastal hazard zone	The shoreline and hinterland areas determined to be at risk from coastal erosion or inundation. The zone is divided up as the Zone of Wave Impact and Slope Adjustment and Zone of reduced foundation capacity for a given time period.
Coastal inundation	This is flooding that occurs when waves overtop the frontal dune system, so that on or landward of low dunes is inundated by sea water. Some of these areas can also be flooded by rising lake waters. High lake water levels are influenced by catchment rainfall, accommodation capacity on local floodplains and the size/capacity of the lake entrance.
Coastal Risk Area	Any coastal area that is subject to coastal erosion, inundation or geotechnical hazard that has potential to negatively impact people or property. Coastal risk areas are generally identified in NSW for immediate, 2050 and 2100 planning periods.
Coastal zone	Extends from the continental shelf to as far inland as coastal processes (tides, wind-blown coast dunes) dominate. The NSW Coastal Policy defines this as including 3 nautical miles seaward of the mainland, one kilometre landward of the open coast high water mark, one kilometre around the shores of all bays, estuaries, lakes and lagoons and all tidal waters upstream to the limit of mangroves.
Coastal geomorphology	The physical structures, processes and patterns associated with the coast, including landforms, soil and geology and the factors that influence them.
Combined bluff, beach and dune hazard zone	These are the areas where there are a combination of hazards present from the geotechnical hazards of the bluffs, and the beach erosion hazards, where the two areas meet/overlap.

East Coast Lows	Intense low pressure systems which occur on average several times each year off the east coast of Australia. Severe East Coast Lows generate extreme water levels and high waves which drive storm bite erosion.
Ecosystem services	Ecological processes or functions having monetary or non monetary value to individuals or society at large.
Emergency response	Any actions taken during an erosion or inundation event to ensure the safety of people and property.
<i>El Nino</i> southern oscillation (ENSO)	Refers to widespread two to seven year oscillations in atmospheric pressure, ocean temperatures and rainfall associated with <i>El Nino</i> (the warming of the oceans in the equatorial eastern and central pacific) and its opposite, <i>La Nina</i> . Over much of Australia <i>La Nina</i> brings above average rain and <i>El Nino</i> brings drought. A common measure is the Southern Oscillation Index (SOI) which is the normalised mean sea level pressure difference between Tahiti and Darwin. The SOI is positive during <i>La Nina</i> and negative during <i>El Nino</i> events.
Exposure	Refers to the elements of risk which are subject to the impact of a hazard.
Flood hazard	A hazard associated with inundation. Flood hazard generally refers to flooding associated with storm water systems, rivers and estuaries.
Geotechnical hazard zone	Cliff and bluff areas that are at risk from slope failure.
Geotechnical processes	Refers to the processes that drive landslides and poor structural integrity of rocks and soils. Landslides are defined as the movement of a mass of rock, debris or earth (soil) down a slope. The definition includes landslides, slips, slumps, rock falls and topples.
Greenhouse effect	An increase in the temperature of the earth's surface caused by trapping of heat by greenhouse gases (i.e. gases that absorb and re-emit infrared (heat) radiation. Carbon dioxide and methane are both greenhouse gases).
Hazard	A source of potential harm or a situation with a potential to cause loss. It may also be referred to as a potential or existing condition that may cause harm to people or damage to property or the environment.
Holocene period	The Holocene interglacial period is a geological epoch that began approximately 12,000 to 10,000 years ago. Climate and sea level have been relatively stable for the last 6000 years of the Holocene period.
Interglacial period	The warm periods between ice age glaciations. The 'Last Interglacial' before the current one, dated to 130,000 to 115,000 years ago.
Littoral	In coastal environments, the littoral zone extends from the high water mark to areas permanently submerged.

Mitigation	Refers to those response strategies that reduce the sources of green house gases or enhance their sinks.
Ramsar	The Convention on Wetlands, signed in Ramsar in Iran in 1971 is an international intergovernmental treaty dedicated to the conservation and wise use of wetlands.
Resilience	The ability of a social or ecological system to absorb disturbances while retaining the same basic infrastructure and ways of functioning, the capacity for self organisation and the capacity to adapt to stress and change.
Risk and Risk Management	Risk is calculated as a product of probability (likelihood) and consequence of a hazard occurring. Risk management involves understanding all aspects of an activity that may have unanticipated consequences and determining which are the significant and unacceptable risks. The process helps identify priority actions that need to be undertaken to ensure that important values are maintained. The Australian Standard for risk assessment and management has adopted ISO 31000 (2009).
Sea level rise	An increase in the mean level of the ocean. Eustatic sea level rise is a change in global average sea level brought about by an increase in the volume of the world ocean (by warming the water – thermal expansion, or by melting of ice caps). Relative sea level rise occurs where there is a local increase of the level of the ocean relative to the level of the land, which might be due to ocean rise or to subsidence of the land. In areas subject to rapid uplift, relative sea level can fall without a change in ocean volume.
Storm surge	Elevated sea level at the coast caused by the combined influence of low pressure and high winds associated with a severe storm such as a tropical cyclone. Includes wave runoff and wave set up.
Storm tide	The total elevated sea level height at the coast above a datum during a storm, combining storm surge and the predicted tide height.
Sustainability	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Ecologically sustainable development is consistent with intergenerational equity, conservation of ecological functions and services, proper valuation of social, cultural, environmental and economic assets.
Threshold or tipping point	The point in a system at which sudden or rapid change occurs, which may be irreversible.
Tidal delta	The deposition feature just inside the mouth of an estuary. Marine sand is deposited where flood tide velocities decline as the flows enter the still waters of the lake system. Most estuaries also have a much smaller ebb tide delta forming shoals at the seaward extremity of the channel.

Trigger point	Within an adaptive coastal risk management strategy, certain circumstances will trigger a change of management response. A number of trigger points can be used, individually or in combination (cumulative risk), including the proximity of the erosion scarp to existing development, the asset life of infrastructure or Council's capacity (technical and financial) to maintain functional community infrastructure such as sewerage and stormwater systems. Rising sea level will, over time, reduce the functionality of stormwater systems draining to the sea or lake system, so that water backs up and flood risk increases, and it has the potential to cause excessive infiltration of sewer systems or to erode pumping stations.
Uncertainty	An expression of the degree to which a value (such as the future state of the climate system) is unknown. Uncertainty can result from a lack of information or from disagreement about what is known or should be known.
Vulnerability	Degree to which a system is susceptible to or unable to cope with adverse effects of stresses such as invasive species, changes to hydrology, land clearing, all of which may be exacerbated by climate change, including climate variability and extreme weather events. Vulnerability is a function of the character, magnitude and the rate of change and variation to which a system is exposed, its sensitivity and its adaptive capacity.
Wave run up	The ultimate height reached by waves (storm or tsunami) after running up the beach or coastal barrier.
Wave set up	The super elevation in water level across the surf zone caused by the energy expended by breaking waves.
Zone of Wave Impact and Slope Adjustment	The immediate hazard or 'storm bite' that is at risk during a storm. These are the areas a) seaward of the erosion escarpment and b) the part of the eroded dune which may be affected by slumping to its natural angle of repose after a storm event.
Zone of reduced foundation capacity	When extreme scour occurs on the beach face, the outer part of the dune has reduced load bearing capacity.

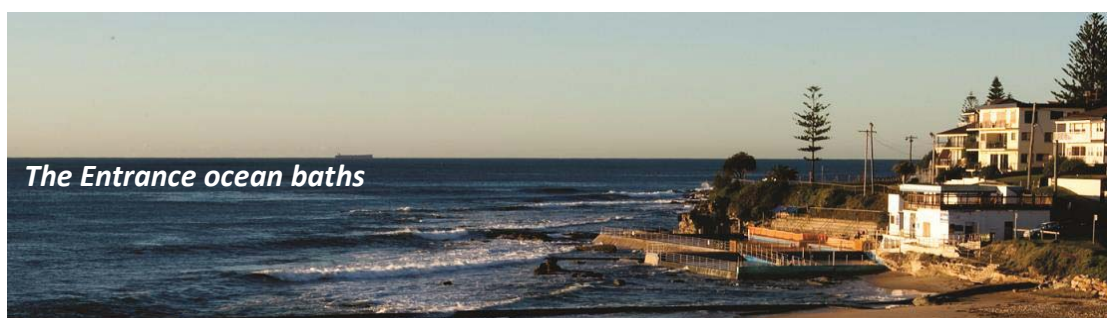
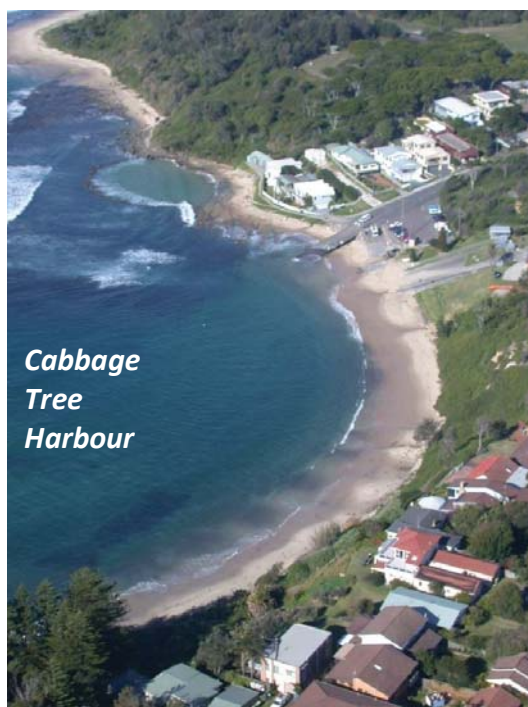
## Abbreviations

The following acronyms are used in the Plan and in the Supporting Information (Volumes 1 and 2).

BOM	<b>Bureau of Meteorology</b>
CEN	Central Coast Environment Network
CERMP	Coastal Emergency Response Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation

DCC	Department of Climate Change (Australian Government)
DCCEE	Department of Climate Change and Energy Efficiency (Australian Government)
DECCW	Department of Environment, Climate Change and Water (NSW) (now Office of Environment and Heritage)
DoP	Department of Planning (NSW); now the Department of Planning and Infrastructure
DP&I	Department of Planning and Infrastructure (NSW) (formerly the Department of Planning)
DPI	Department of Primary Industries. Relevant sections of the former Land and property Management Authority are now located within the Department of Primary Industries
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
EEC	Endangered Ecological Community
HCRCMA	Hunter-Central Rivers Catchment Management Authority
I&I NSW	Department of Industry and Investment (NSW, includes Agriculture, Fisheries, Tourism and Mineral Resources)
IPCC	Intergovernmental Panel on Climate Change
LGSA	Local Government and Shires Association
LiDAR	Light Detection and Ranging
L&PMA	Land and Property Management Authority. Relevant sections are now within the Department of Primary Industries
LRHS	Lower Hunter Regional Strategy
OEH	Office of Environment and Heritage, within Department of Premier and Cabinet. OEH includes most of the functions formerly the responsibility of the Department of Environment, Climate Change and Water
ROC	Regional Organisation of Councils
SEPP	State Environmental Planning Policy
TLEC&FMC	Tuggerah Lakes Estuary, Coastline and Floodplain Management Committee
WSC	Wyong Shire Council
Plan	Wyong Shire Coastal Zone Management Plan





## 1.0 Introducing the Coastal Zone Management Plan for the Wyong Coastline

Wyong Shire Council and its community are at the front line of managing a highly valued coastal landscape that is exposed to severe coastal hazard impacts. The *Coastal Zone Management Plan for the Wyong Coastline* (or the Plan) examines how Council and its community will manage the future of the Shire's 35km coastline, in partnership with NSW and Australian Government agencies where relevant. The extent of the Wyong coastline is shown in **Figure 1.1**.

The Plan is prepared in accordance with the objects of the *NSW Coastal Protection Act (1979)* and takes into account the objectives and requirements of the *NSW Coastal Policy (1997)*, the *NSW Guidelines for Coastal Zone Management Plans (DECCW 2010)*, the *NSW Guideline for Preparing Emergency Action Sub-plans (OEH 2011)* and the *NSW Coastal Planning Guide – Adapting to Sea Level Rise (Department of Planning 2009)*. The *Local Government Act (1994)* also requires councils to address climate change and have regard to the principles of ecologically sustainable development.

Council will submit the Plan to the Minister of Environment and Heritage for certification in accordance with Section 55G (2) of the Coastal Protection Act 1979. When the Plan has been certified and adopted by Council it will be published in the NSW Government Gazette.

The Plan focuses on coastal risks. It applies to all sections of the Wyong Shire coastline which are projected to be affected by risks associated with coastal processes and hazards from now until 2100. These areas are defined from coastal engineering studies that take into account the NSW Government Sea Level Rise Policy Statement (2009), which draws on the best available scientific advice about sea level rise and coastal response. The coastal erosion, flooding and recession studies have considered wave erosion and wave overtopping of coastal dunes, slope

adjustments on eroded dune escarpments and reduced foundation capacity landward of dune escarpments. Engineering and geomorphology studies have also assessed risks on coastal land predicted to be affected by geotechnical process hazards (such as landslip and rock fall) up to 2100.

The coastal areas affected by these processes are referred to in this document as Coastal Hazard Planning Zones. The Coastal Hazard Planning Zones are defined for the immediate, 2050 and 2100 planning horizons.

For details of coastal processes and hazard studies that support Council's risk management approach, refer to the Plan Supporting Information, Volumes 1 and 2.

### 1.1 Issues in the Coastal Risk Planning Zone

The coastline is one of Wyong Shire's greatest assets, a valued natural landscape that supports economic activity and the social well being of residents and visitors.

Coastal processes such as waves, tides and storm events threaten the liveability of the coast through active and ongoing erosion hazards that affect houses, beach access, surf clubs, coastal parks and reserves, roads, sewerage systems and the natural environment.

Occasional 'super' storms, such as those in 1974 and 1978, have cut into dunes close to coastal property, such as at North Entrance Beach and Hargraves Beach. Other short to medium term changes to beach and dune condition are influenced by the timing and severity of natural cycles such as El Nino/La Nina.

Historically, most beaches and dunes have recovered from major erosion events. However, at North Entrance a long term recession trend has been measured over the last 40 years. It is now clear that, driven by projected sea level rise, coastal recession will be widespread over the 2050 and 2100





Source: LPI NSW (2000)

Note: Criteria for inclusion in coastal zone management plan:

- Affected by coastal processes in 100year planning horizon
- Coastal landform or vegetation
- First street landward of the coastline, including Crown, Council and private land
- Visual context of beaches and coastal reserves

FIGURE 1.1  
Location and Extent of the Wyong Coastline

planning periods. Sea level is already rising, with measurements from Sydney Harbour indicating about 150mm of rise over the last century. Details of recent sea level rise records are in Section 1 of Volume 1 of the Plan's Supporting Information.

Although other factors (such as sand supply) can influence coastal erosion, coastal engineering models predict that as sea level rises the shoreline will move landward and upward. Scientists consider that relatively low storm intensity in recent decades, together with the buffering capacity of sand stored in the near-shore, in coastal dunes or in estuary entrances, has protected many beaches from recession. Continuing sea level rise means that the buffering capacity of coastal landforms will be exceeded.

This means big changes to beaches and coastal dunes that are the focus of community activity on the coast. These changes include changes to rip and bar systems, more frequent storm bite on sandy beaches, step changes to the location of the dune escarpment, stripping of sand from beaches such as The Entrance and Cabbage Tree Harbour that comprise a thin sand mantle over rock, and landward migration of coastal dunes. Coastal erosion and recession will affect:

- Landuse capability and property values;
- Beach safety;
- Surf club buildings;
- Amenity of foreshore parks and reserves;
- Dune vegetation and rock platform ecology;
- Accessibility of places such as rock platforms and small 'pocket' beaches for coastal recreation; and
- The feasibility and cost of repairing and maintaining community infrastructure such as access ways, roads, car parks, stormwater drains and sewerage systems.

All of these impacts influence the social and economic well being of the Wyong Shire.

More than 50 houses along the Wyong Shire coastline are already within the immediate

coastal erosion hazard zone. They could be impacted by major storm erosion at any time.

Two of the Shire's beaches (The Entrance North and Hargraves Beach) are identified in the list of nine NSW 'Authorised Locations' for coastal emergency works, because of the severity of the existing erosion problem. Development at these beaches could be impacted by coastal storm bite erosion at any time.

In the 2050 and 2100 planning horizons, as sea level continues to rise and the buffering capacity of coastal sand bodies is consumed, coastal recession is projected to affect up to 100 and 135 houses respectively along the Wyong Shire coastline.

In addition to these coastal erosion threats, geotechnical processes on many of the headlands along the Wyong Shire coastline also have the potential to impact on residential development and safe recreational access.

Although the coastal erosion and recession models are relatively conservative and there is some uncertainty about exactly when and at what rate coastal recession will occur, the risks are real. Reducing risks means some changes must be made now, with other changes made over time as better knowledge of coastal processes becomes available. Careful monitoring of sea level changes and of coastal responses in coming decades will refine understanding of coastal recession processes. Managing the threats to coastal values is everyone's business and is an important challenge for Council.

More detail about issues affecting the Wyong Shire coastline and how community input helped to identify and refine these issues is available in Section 3 and Section 4 of the Plan Supporting Information (Volume 1) – Analysis and Integration.

## 2.0 Wyong Council's Coastal Risk Management Strategy

Council's vision for the future of the coast is:

*Continuing community enjoyment of resilient coastal landscapes in times of change.*

The *Coastal Zone Management Plan for the Wyong Coastline* sets out Council's strategies for managing coastal risks that affect the way that the community uses and enjoys the coast. It will ensure residents and visitors are able to enjoy an attractive coastal landscape now and into the future, as a place to live and work, a place for recreational activity and a place where healthy natural systems are protected.

The Plan:

- Provides a planning context that regulates, encourages and supports appropriate development for areas affected by coastal hazards
- Minimises the risks associated with coastal processes
- Protects important community values of the coastline
- Recognises that communities need clear strategic direction but also need time to adjust to changing environmental conditions.

### 2.1 Approaches to risk management

The risk analysis undertaken for the Plan is based on ISO13000 (Risk Standard) and NSW and Australian Government coastal risk management guidelines. Table 2.1 shows how

the Plan includes measures to reduce serious coastal risks.

**Table 2.1 Measures to reduce risk**

<b>Avoiding Risk</b>	Planning controls for existing and future development
<b>Changing the likelihood</b>	Beach nourishment, revegetation and biodiversity programs, coastal protection works
<b>Change the consequence</b>	Community awareness, building and infrastructure design and relocation, access management
<b>Sharing risks</b>	Insurance measures and funding options for affected landholders
<b>Informed risk retention</b>	Emergency action – in the short term

Wyong Council's coastal risk management strategy has three main components:

- **Reducing known serious risks.** Council's long term strategy is managed retreat of assets and infrastructure from coastal risk areas. Clauses in the Wyong Shire LEP and DCP set land use planning controls and triggers for retreat. In the short to medium term, Council will allow some interim protection of existing public and private assets in immediate hazard zones, to give residents and businesses time to develop adaptive coastal land uses. This will also reduce the risk of sterilizing coastal land unnecessarily. A strategy of increased long term protection is simply not financially or environmentally sustainable for the Shire.
- **Engaging the community.** Council will work with residents in coastal risk management areas as a priority and also with the wider community to discuss coastal risks and risk management measures. Discussions will consider land use opportunities and controls in the LEP and DCP, appropriate protection structures, and progress towards resolving long term land tenure and land value issues. Council will also ensure that information about coastal risk

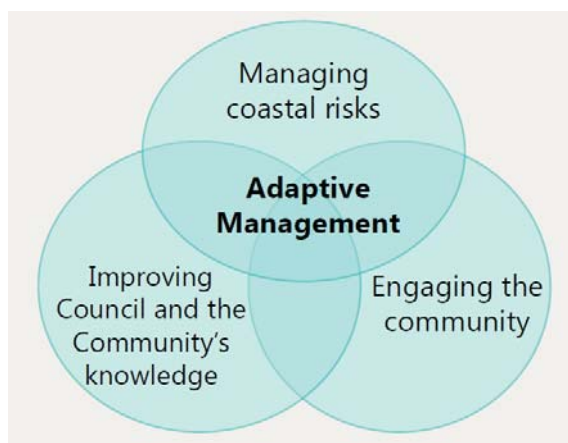


management is available on its web site, and to the Tuggerah lakes Estuary, Coastal and Floodplain Management Committee and that residents can contribute to review and evaluation of plan implementation.

- **Improving knowledge.** Council will work with the NSW government, university researchers and community to investigate coastal sediment budget processes, monitor actual change, refine models and develop more effective risk and response evaluation inputs and methods.

These three strategies will be implemented within an **adaptive management system**. Council will refine its risk management responses using new knowledge from scientific studies, from monitoring actual change along the Wyong coastline and from tracking and evaluating the success of management actions.

The Plan sets out strategies and actions to be implemented over the next ten years. Once these strategies are in place, some, such as land use planning controls will continue to guide coastal use to enhance community benefits and reduce risks, for planning periods of 40 years and longer. **Figure 2.1** shows how the three main strategies interact to deliver sustainable management of coastal risks along the Wyong Shire coastline.



**Figure 2.1 Councils three main strategies interacting to deliver sustainable management**

## 2.2 Timeframes for implementation

The Plan directs investment of Council and community resources to specific locations, identified through risk analysis and community involvement. Three time frames define the priority of actions:

- **Urgent – two years. Council has already commenced some of these actions.**
- **High – two to five years**
- **Medium – up to ten years**

Council will continue to monitor and evaluate progress in implementing the Plan, and the principal strategies and investment focus for managing the coast will evolve to get the best results for the community and the coastal environment. This ongoing review process means that new scientific knowledge and changes to State government policies and regulations can be taken into account.

## 2.3 Coastal management principles

In preparing the Plan, Council established a suite of thirteen management principles, drawing on the existing local, regional and NSW coastal and natural resources management frameworks and with particular reference to the ten principles in the NSW Guideline for preparing Coastal Zone Management Plans. **Table 2.2** summarises the coastal management principles underpinning the Plan and where relevant information can be found.

**Table 2.2 - Principles for Sustainable Coastline Management**

Coastal knowledge and community awareness	<p><b>Quality information</b></p> <p>1. Use best available information and update regularly. This includes updating the science, updating community preferences and review of the real versus expected achievements of various implemented strategies.</p> <p><b>Improve community awareness of coastal processes and risk management</b></p> <p>2. Raise the awareness of residents and recreational users of the coast about coastal hazard risks and the impacts of their activities on the resilience of the natural systems that they enjoy.</p>	<p>See Sections 15, 16 and 17 of Supporting Information Volume 1 and Appendices 3 and 4 in Volume 2.</p> <p>See Section 3 of the Supporting Information Volume 1 and the Plan Community Engagement Strategy.</p>
Risk based and logic linked decision making	<p><b>Recognise the scale of variability of coastal processes and hazards, including climate change</b></p> <p>3. Development must take into account the natural variability of coastal processes. Suitable designs, setbacks and buffers for development and for vulnerable ecological communities should be incorporated into all planning tools, so that dealing with variability and change becomes part of routine business.</p> <p>4. Consider the landscape scale effects of climate change and sea level rise in all planning decisions – both strategic and development assessment. Make planning decisions which reduce coastal risks.</p> <p>5. Be aware that the maximum possible storm event may be much larger than any recorded in historical time and consider the potential effects of extreme storm events on coastal land and property.</p> <p>6. Reduce risks associated with coastal hazards, consider risks over the life span of assets and maximise long term cumulative benefits to the community.</p> <p>7. Seek solutions that are appropriate (with clear benefits for the condition of the coast) effective, efficient, appropriate and robust – delivering a positive legacy.</p> <p>8. Seek responses which have explicit and purposeful links to the improvements in condition that are sought.</p>	<p>See Sections 16, 17 and 18 of Supporting Information Volume 1.</p> <p>Management options are evaluated against a series of criteria, including risk mitigation capacity and implementation risks, cost effectiveness, community support, and compliance with legislation and policy, in Section 19 of Supporting Information Volume 1</p> <p>These risk principles elaborate on Principles 6 and 7 of the NSW Government Guideline and also refer to risk outcomes from implementing the Plan.</p> <p>Proposed coastal risk management measures in the Plan focus on long term risk avoidance and intermediate control of likelihood and consequences.</p>
Building biodiversity resilience	<p><b>Prevent degradation of healthy marine and coastal ecological systems</b></p> <p>9. Protect and enhance/ rehabilitate marine, marine shoreline and coastal habitats to protect species, populations and ecological communities from degrading and threatening processes. High quality foreshore vegetation should be protected and degraded vegetation should be rehabilitated or improved.</p> <p>10. If quality coastal ecological communities must be disturbed by development, Council will seek offsets to provide a net sustainability benefit.</p>	<p>See Section 17 of Supporting Information Volume 1.</p> <p>The CZMP Risk Management Strategy includes actions to protect and enhance foreshore vegetation, in cooperation with CMA and Landcare programs.</p>
Community access to the coastal landscape	<p>11. Protect important coastal landscapes that reflect the natural and social values of the community and maintain the community's sense of place.</p> <p>12. Safe public access to and along beaches is a management and maintenance priority.</p> <p>13. Coastal protection works for private property must be constructed wholly on the private property and not on public land (other than certain emergency protection works, for short periods). Such private property protection works must not detract from the community access and amenity values of beaches.</p>	<p>See Section 3 and Section 17 of Supporting Information Volume 1.</p> <p>The CZMP Risk Management Strategy is structured around maintenance of safe public access and beach amenity.</p>

## 2.4 How does the Plan fit with other plans and policies?

The Plan is part of a package of policies and aims to provide a comprehensive framework for management of the Wyong Shire coastal zone.

### **Council Plans and Policies**

- Wyong Shire Strategic Vision Statement and Community Strategic Plan identify Council's key responsibilities, challenges, direction and priorities. Annual operational plans show how Council resources will be invested to provide community services, protect natural systems and encourage sustainable economic development.
- The draft *Wyong Shire Climate Change Policy* 2010 sets the direction for Council's response to climate change issues.
- Two partner plans, the *Tuggerah Lakes Estuary Management Plan* (TLEMP; 2006) and the *Tuggerah Lakes Flood Risk Management Plan* (TLFRMP) present Council's strategies for protecting and enhancing the condition of the Tuggerah Lakes system, planning for appropriate development around the lakes and supporting the contribution the lakes make to community well being and economic achievements.
- Land use planning strategies in the Plan, the TLEMP and the TLFRMP will be incorporated into Council's *Local Environment Plan* (LEP) and *Development Control Plan* (DCP).
- Council has also prepared Plans of Management for some coastal reserves and strategies for coastal recreation facilities, tourism and communication. The Plan is intended to inform and support these documents.

### **Regional and NSW Government Plans and Policies**

- Central Coast Regional Strategy Plans of Management for Wyrabalong National Park, Munmorah State Conservation Area and Crown Reserves

- NSW State natural resource management targets, as given effect through the Catchment Action Plan (CAP) prepared by the Hunter-Central Rivers Catchment Management Authority (HCRCMA). The CAP is currently being updated. Specific HCRCMA programs that support a partnership between WSC and HCRCMA include benchmarking the condition of coastal ecological communities, protection of Aboriginal cultural places and management of Weeds of National significance. The weeds programs also interact with Council plans for access ways across coastal dunes.

Details about all of these plans and policies and other local planning initiatives are available in the Supporting Information, Volume 1 and Appendix 5 of Supporting Information Volume 2.

## 2.5 Stakeholder and community engagement in the preparation of the Plan

Section 3 and Section 15 of the Plan Supporting Information Volume 1 provide the background and context of stakeholder involvement in the management of the Wyong Shire coastline and the opportunities provided for community involvement during the preparation of the Plan. In particular, Section 15.2 summarises the roles and activities of a range of coastal community organisations. Section 15.5 discusses the roles and responsibilities of diverse State agencies with interest in coastal zone management and how these roles interact with Council's roles, responsibilities and policies.

Section 3.3.2 of the Supporting Information, Volume 1 provides an overview of the opportunities provided for local landholders, residents and interest groups to contribute to the development of the plan. These opportunities commenced with a Project Launch and a series of community information days.

As the project developed, with the completion of coastal hazard studies, further community meetings, briefings and workshops provided opportunities for residents to discuss coastal issues, potential management responses and

the process for identifying priority responses with the project team and particularly with Council officers and Councillors.

Copies of presentations made at community meetings and notes that record community discussion and feedback at the meetings are included in the Supporting Information Volumes 1 and 2.

Section 18 and Section 19 of the supporting information documents show how the inputs from community stakeholders were incorporated in the option evaluation process that lead to the priority strategies and actions included in the Implementation schedules.

## 2.6 Evaluation of coastal risk management options

The Plan presents a plan for reducing unacceptable coastal risks and for enhancing the values of the Wyong coastline. Section 17 of the Plan Supporting Information Volume 1 outlines how coastal hazard assessments were used to understand significant and unacceptable coastal risks.

Section 19 of the Plan Supporting Information Volume 1 and Appendix 6 of Volume 2 explain how coastal risk management options were identified and evaluated. **Table 2.3** summarises the criteria for evaluating potential management responses.

**Table 2.3 – Option evaluation criteria**

Criteria	Better options would have these characteristics
Is the strategy or action expected to significantly reduce a high and/or unacceptable risk?	The action is specifically tailored to reduce a significant risk (identified through the hazard assessments).
Expected outcomes (such as reduced exposure of coastal development to erosion hazards, improved resilience of coastal ecological communities or improved recreational amenity) are defined quantitatively (spatial and temporal), so that progress towards them can be tested.	Outcomes are measurable and testable, so that actual processes and outcomes can be evaluated against planned processes and predicted outcomes.
The certainty of the science and practice underlying the proposed management.	Actions are based on quality science or other studies conducted at the local scale. The value of the proposed action is accepted best practice or its merit has been previously demonstrated.
Is the response robust in ongoing climate change conditions? Is it consistent with Council's climate change policy and the climate change framework provided by the NSW government?	The action provides for risk mitigation across the immediate, 2050 and 2100 planning horizons.
Can progress be measured?	The actions are linked to a meaningful implementation and outcome monitoring program.
Is the response consistent with relevant legislation and policy?	The actions are consistent with the amended Coastal Protection Act and associated legislation, policies, guidelines and codes of practice, as well as Council's LEP.
Is Council able to afford the response on its own?	The investment required can be incorporated into Council's budget within a reasonable time frame.
Will it attract external funding – from State or Australian Government, that is relevant to the scale of investment required?	The action meets the criteria for relevant grant programs and would be considered a high priority.
Costs and benefits (up-front costs and ongoing maintenance) – do high cost responses address high risks and are they predicted to achieve significant benefits?	Maintenance costs are affordable. Cost recovery for maintenance does not require statutory or policy change.
Level of community support – is the community prepared to pay? Prepared to be involved?	The community is aware of the spatial and social distribution of costs and benefits and has indicated satisfaction.
Does the action achieve multiple benefits?	The action would mitigate several risks, protect multiple assets or create a range of opportunities for the community.

## 3.0 Implementing the Coastal Risk Management Strategy

### 3.1 Responsibility and budget

Council has the primary role for land use planning and carrying out on ground works to reduce coastal risks. LEP's and DCP's implement strategic land use decisions from the coastal zone management plan. Council owns and/or manages coastal land on behalf of local communities. Council works in partnership with community organisations to manage coastal vegetation and to provide safe and attractive beach access facilities for residents and visitors.

Diverse sections of Council have been involved in the preparation of the Plan, and many sections have a role in the implementation of the Plan. The overall implementation process will be managed by Council's Environment and Natural Resources Unit, reporting to the Director of Environment and Planning Services. Details are in the Implementation Tables below. Policies and strategies across Council will be aligned to minimise duplication or conflicting priorities.

Council has prepared detailed budget requirements for all actions, linked to its internal budget planning cycles. Budget planning focuses on actions to be implemented in years 1 to 5 of the Plan, with estimates for actions in years 6 to 10.

**Table 3.1** shows the total budget commitments for Wyong Shire Council in Year 1, Years 2 to 5 and Years 6 to 10.

**Table 3.1 Total budget commitments for years**

<b>WSC budget commitment Year 1</b>	\$325,000
<b>WSC budget commitment Years 2 to 5</b>	\$2,070,000
<b>WSC budget commitment Years 6 to 10</b>	\$2,205,000

There are several strategies open to Council to provide human and financial resources for implementation of the Plan. Council is already addressing many issues through existing staff responsibilities.

Additional options that Council is considering include:

- Review and reallocate priorities in Council's overall Business Plan so that greater resources are allocated to coastline management.
- Modify job descriptions for Council officers in line with new priorities, to clarify where officer time is to be invested.
- Focus on a sound, risk-averse planning framework (LEP and DCP) so that new development is directed out of coastal risk areas.
- Council will foster its partnerships with land holders and community based organisations along the coast and with key NSW agencies such as Office of Environment and Heritage (OEH), HCRMA and Department of Lands, to foster research and on ground works programs relevant to Wyong Shire's coastal issues and priorities. Community involvement is critical to dune vegetation rehabilitation, and to monitoring the condition of coastal natural resources.
- Apply for funding through special coastal grant schemes (such as Caring for our Country Coastal Program, OEH programs, Commonwealth emergency response programs. To ensure timely and coordinated delivery of the priority actions in the Plan, Council has identified grant programs which would support implementation of some actions (see Section 6.4 of Supporting Information, Volume 1) and is actively submitting project applications to these programs. Internal and grant fund requirements are identified in the Implementation Tables below.

Council has adopted the NSW Government policy that private landholders should contribute to the cost of constructing and maintaining coastal protection works that benefit them. Council also proposes that, in



the longer term, all Shire landholders could contribute in some way to the costs of managing community infrastructure in coastal hazard zones, so that services (both ecosystem services and infrastructure services) that are broadly enjoyed are able to be maintained. With these principles in mind, Council is considering the following additional options to generate funds for implementing coastal risk management actions:

- Require that all private landholders who are directly impacted by coastal process hazards pay for any coastal protection works (on private land) from which they benefit, including maintenance of protection works.
- Implement a special levy on affected coastal landholders, to cover the costs of maintaining beach amenity, where public access and recreational amenity are indirectly impacted by private coastal protection works. This charge is authorised by recent amendments to the *Coastal Protection Act* (1979).
- Implement a Shire-wide levy (similar to the existing stormwater levy) to provide additional funds for works to relocate or protect community assets and infrastructure that are impacted by coastal recession. These assets include surf clubs, park facilities, beach access ways, sewerage systems, roads, The Entrance sea wall and pathways. Apart from protection works at the toe of the slope at Cabbage Tree Harbour (for which grant funds have already been obtained), works to relocate or protect community assets in the 2050 and 2100 coastal hazard zones are the biggest financial commitment for Council from the Plan.

### 3.2 Adaptive management and knowledge enhancement – systems for uncertainty and change

The adaptive coastal knowledge management strategy is the key to continuous

improvement in the management of the coastline. It is an effective way to manage natural resource and community values in a context of uncertainty, incomplete data or where ongoing change is expected. An adaptive management cycle has four main steps:

- Step 1: Benchmark current condition and set objectives (**Understand systems and Plan**):
  - Benchmarks for management and an effective and flexible record keeping and data management system for coastal information.
  - Community and stakeholder engagement about the vision and objectives for the coast
  - Institutional arrangements to ensure that Council managers have access to the best available information about the condition of the coastal system, changes to coastal science and feedback about the performance of the management program.
- Step 2: Select and **implement actions** to reduce risk to property, community assets, safe community recreational access to beaches and Council infrastructure.
  - An ongoing need for a coastal zone coordinator position, to facilitate streamlined implementation of key strategies.
- Step 3: Enhance knowledge and monitor achievements (**Monitor and Audit**)
  - Monitoring of outputs and outcomes of the implementation of the Plan.
  - How the community and other stakeholders will contribute to the monitoring, evaluation and review process.
  - How Council will keep abreast of new science, new techniques and new policy that are relevant to its coastal management.

- Research projects to clarify how specific coastal processes are driving change along the Wyong coastline.
- Step 4: Status review and progress evaluation (**Reflect, Communicate and Respond to Improve**)
  - How the Coastline Management Plan will be reviewed, refocused and updated over time.
  - How routine reviews will include implementation outcomes (did actions achieve what was expected?), review of expenditure and review of community support and satisfaction.
  - The continuation of the TLEC&FMC as a community forum for coastal zone issues.
  - Capacity building and training for Council officers, Councillors and the community.
  - How information about coastal processes, hazards, climate change, responses and evaluation of coastal condition or management outcomes will be provided to residents, landowners and visitors.
  - How the community, Councillors, State government and Australian government partners will be kept informed of progress and emerging science, policy or issues.

In the Plan Supporting Information Volume 1, all coastal risk management options were placed in one of these four steps, to provide a framework within which adaptive management of the coastline could be implemented. For details see Sections 7-14 of Supporting Information Volume 1.

The Plan Implementation Schedule for adaptive management and knowledge enhancement is presented in **Table 3.2** (at the back of this section).

### 3.3 Managing severe coastal risks

Significant coastal risks are associated with both coastal erosion processes and slope instability on coastal cliffs and bluffs. **Figures 3.1 to 3.12** (in the back section) show coastal risk areas and planning lines for the immediate, 2050 and 2100 timeframes. The figures also show the locations of the technical assessments undertaken by the consultants. SMEC undertook the coastal erosion hazard assessment) and Shirley Consulting Engineers (SCE) who undertook the geotechnical hazard assessment.

Erosion associated with major storms over the last 40 years has threatened residential development and associated infrastructure at North Entrance and Hargraves Beach. Coastal erosion hazard studies completed during the preparation of the Plan indicates that 62 residential properties and 53 houses at these beaches, and at Blue Bay, are partly or wholly within the immediate coastal erosion risk area. In addition, 38 buildings on headlands along the Wyong Shire coastline, many at Cabbage Tree Harbour, are at least partly within the immediate risk area for geotechnical/slope instability processes.

Council's priorities are strategies which provide effective risk reduction for both short and longer term timeframes. The risk management strategy includes:

- Emergency response (coastal protection) actions for properties in immediate high risk areas which are identified as 'Authorised Locations'. Emergency Action Subplans for Authorised Locations at North Entrance, Hargraves Beach and Cabbage Tree Harbour.
- Broader emergency response actions for existing assets and infrastructure along the coast, in a context of planning to reduce long term risks. Both the Emergency Action Subplans and the Emergency Response Management Plan distinguish appropriate roles for Council

and landholders and from other agencies, such as the SES.

- Medium term reduction of consequences or likelihood and long term risk avoidance, by interim protection works, land use planning and relocation of assets.

In the longer term, Council's risk treatment strategy is planned or managed retreat. Over time, as trigger points are exceeded, affected assets, infrastructure and development are moved out of coastal hazard zones. Planning controls, which provide a clear signal for **new development** are therefore a priority for the coast. Council will use a suite of land use planning tools (such as LEP and DCP clauses, and design guidelines) to ensure that new development does not increase the risks associated with coastal hazards in the 2050 and 2100 planning horizons. Council will inform landholders about coastal hazards that affect their property with section 149 (s149) certificate notations and in other community information.

In general, Council planning controls for the coast will use a 2050 planning period for new residential development on land already appropriately zoned and a 2100 planning period for major infrastructure, new subdivisions and strategic land use studies. **Figure 3.13** shows the planning framework for coastal risk areas (in the figures section at the back of the document).

In the short to medium term, Council will permit some interim protection of **existing public and private assets**, to give residents and businesses time to develop adaptive measures to mitigate coastal hazards. This will also reduce the risk of sterilizing coastal land unnecessarily before hazards are fully realised.

Council will not approve protection of existing assets or private development where the works could increase risks to other land owners or to community use of the coastal landscape. Council will consider the public and private costs and benefits of protection works, managed retreat and adaptive strategies.

Council accepts that to maintain coastal biodiversity on a changing coast, coastal ecological communities must have room to migrate (roll back landward) and adjust to new climate and sea level conditions. Council will use an Open Space or Environmental Protection zoning for coastal risk areas, where practicable, to enhance ecological resilience. Council's policy is to maintain buffers zoned to enhance ecological resilience, wherever practicable. To achieve this, Council will use an Open Space or Environment Protection Zoning for coastal risk areas.

**Table 3.3** shows the proposed evolution of the risk management strategy over ten years. Further refinement will occur after ten years, following a full review of the plan as implemented.

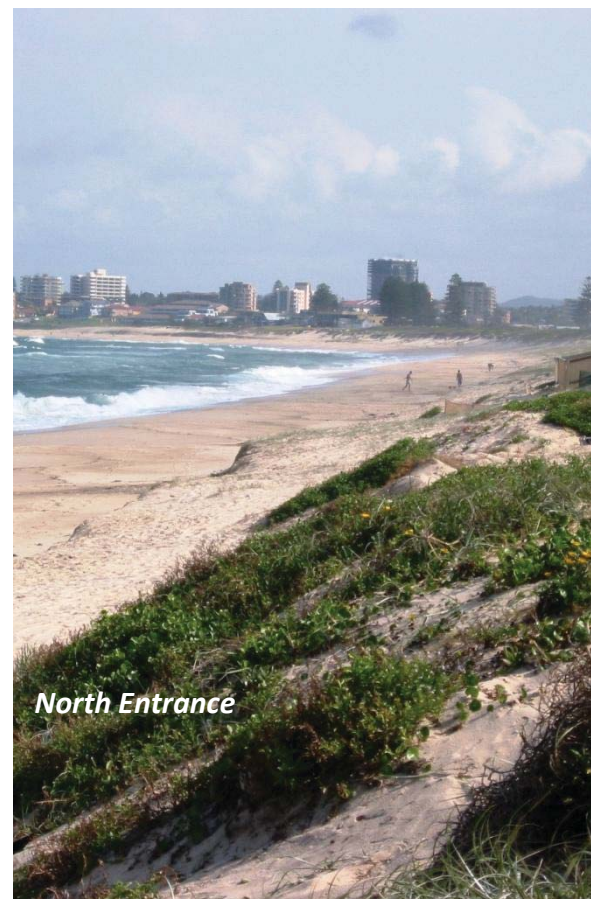


Table 3.3 -Taking Action - Timing and Strategy

Strategy/Timeframe	2 years (Urgent) Most actions for this period will use Council funds <b>ESTABLISH SYSTEMS AND PLANNING CONTROLS</b>	5 years (High priority) Diversify funding sources for coastal zone management <b>IMPLEMENT SYSTEMS AND PLANNING CONTROLS – CONSOLIDATE AND REINFORCE</b>	10 years (medium priority) Maintain and diversify funding sources for coastal zone management <b>IMPLEMENT, EVALUATE PROGRESS AND REVIEW Plan</b>
<b>Monitor actual change</b>	<ul style="list-style-type: none"> <li>Establish systems for adaptive management</li> <li>Establish community awareness and communication programs</li> <li>Secure the role of coastal coordinator</li> </ul>	<ul style="list-style-type: none"> <li>Collect quality data about climate change, coastal process responses and impacts.</li> <li>Keep abreast of all relevant new policy and guidelines for coastal zone management</li> <li>Enhance collaboration with local Aboriginal knowledge holders</li> </ul>	<ul style="list-style-type: none"> <li>Review assumptions, progress and strategic approaches</li> <li>Use best available monitoring and change evaluation techniques, such as digital terrain models based on regularly collected LiDAR and LADS data.</li> </ul>
<p><b>Allow some interim protection of public and private assets</b></p> <p><b>This risk strategy changes the consequence or the likelihood of hazards.</b></p> <p>This approach includes ‘accommodation of change’ and ‘defence of existing coastal development’.</p> <p>Both strategies involve maintaining existing land uses, at least until certain trigger conditions are met.</p>	<ul style="list-style-type: none"> <li>Allow interim protection of <b>existing</b> public and private assets (in accordance with legislation and guidelines) that are affected by hazards now, so that landholders can prepare for longer term change.</li> <li>Strengthen the ecological resilience of the coast using beach nourishment, dune enhancement and vegetation management.</li> </ul>	<ul style="list-style-type: none"> <li>Continue to allow interim structural protection measures, in accordance with legislation and guidelines</li> <li>Continue to strengthen the ecological resilience of the coastal zone.</li> <li>Integrate management of coastal processes and flood hazards in the coastal zone</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate the cost/benefit of alternative sand sources to buffer coastal ecological communities and private assets against climate change induced coastal recession</li> <li>Evaluate the viability of coastal protection structures</li> </ul>
<p><b>Retreat of assets and infrastructure to outside coastal hazard zones</b></p> <p><b>This is a risk avoidance approach.</b></p> <p>This strategy is known as ‘managed retreat’.</p>	<ul style="list-style-type: none"> <li>Prepare for managed retreat -Use precautionary planning tools to reduce future coastal hazard risks for <b>new development</b>.</li> <li>Advance planning for coastal recreation facilities such as coast walking track and Plans of management for coastal reserves (with any new facilities located outside of relevant coastal risk areas).</li> </ul>	<ul style="list-style-type: none"> <li>Implement and monitor LEP and DCP requirements in the coastal zone – managed retreat from receding immediate hazard zone.</li> <li>Continue to facilitate visitor attracting recreational access infrastructure, outside immediate hazard zones (such as planning for the relocation of priority surf club facilities)</li> </ul>	<ul style="list-style-type: none"> <li>Implement, monitor and review LEP and DCP requirements in the coastal zone – managed retreat from receding immediate hazard zone.</li> <li>Continue to facilitate visitor attracting recreational access infrastructure, outside immediate hazard zones (such as relocation of surf clubs)</li> </ul>



**Table 3.4** presents the Plan Implementation Strategy for actions to reduce existing and projected serious coastal risks, in relation to coastal erosion/recession and slope instability processes (at the back of this section).

### 3.4 Engaging with the community

The visual attractiveness, easy access and lack of crowding of beaches and reserves along the Wyong coastline are significant attractions for residents and visitors. The coast is a key element of the Wyong lifestyle. Coastal amenity and safe recreational use also underpin a major part of the local economy, through businesses providing accommodation and services to visitors.

In preparing the Plan, Council has provided information and sought feedback from residents, landholders and community organisations. Details are in Section 3 of the Supporting Information Volume 1 and in Supporting Information Appendix 1 (in Volume 2).

Council proposes to maintain a high level of community information, education and involvement during the implementation of the Plan. Community engagement during the implementation of the Plan will include the following broad strategies:

- Council will advise and consult with residents and landholders about coastal zone management issues affecting their property and their enjoyment of the coast,

so that they can make informed decisions about their property and assets and can participate actively in coastal management. In particular, Council will commence consultation as soon as possible with residents in high priority locations about options for coastal protection works. These discussions will commence with residents and landholders at:

- Curtis Parade and Hutton Road, North Entrance
- Cabbage Tree Harbour
- Blue Bay
- Hargraves Beach
- Council will continue to support Landcare volunteers working on coastal dunes and headlands
- Council will share coastal information through its web site and continue to brief local community groups about new coastal science and policy
- Council will conduct regular surveys of beach users about access and facilities
- Council will support a Coastal Zone Management Committee (covering coastal erosion, estuary health and flood risk issued) throughout the implementation of the Plan.

The full range of community engagement activities within the Plan is in **Table 3.5** (at the end of this section).





Table 3.2 – Implementation Schedule - Adaptive Management and Knowledge Enhancement

**Strategies:**

- Establish systems for adaptive management
- Collect quality data to evaluate progress
- Review assumptions, progress and strategic approaches
- Report progress and evaluation to stakeholders and community

Further information about coastal knowledge management is in **Section 7 of the Supporting Information document, Volume 1**. This includes relevant principles, objectives performance and targets.

Action	Comments	Responsibility	Commencing	Location	Cost			Potential grant funds
					Yr 1 (2011-2012)	Yr 2-5 (2013-2017)	Yr 6-10 (2018-2022)	
<b>A83:</b> Secure funding for and maintain a coastal zone management coordinator position	To facilitate streamlined implementation of key strategies in the Plan.  1 FTE for the entire period of implementation of the CZMP	Report to Manager Natural Resources within Environment and Planning Directorate of Council.	Year 1-2	Across the entire Wyong Shire coastline	\$80,000	\$320,000	\$400,000	Grant funds are unlikely – fund from Council budget
<b>A1:</b> Acquire new high resolution LiDAR data at regular intervals (approximately 5 years)	LiDAR data, combined with aerial photogrammetry and satellite imagery provides a rapid process for evaluating changes to coastal terrain and terrestrial coastal ecology as sea level rises. It reduces field survey requirements and provides data for ongoing modelling and evaluation.	WSC Environment and Natural Resources Unit Support from OEH, DP&I	Year 4 and 9	Across the entire Wyong Shire coastline	\$20,000	\$30,000	\$30,000	50%, NSW or Australian government
<b>A12:</b> Establish an asset register and maintenance program for major council infrastructure in the coastal risk areas, such as stormwater systems sea walls and sewage pumping stations	For streamlined asset and infrastructure management, including condition records, storm impacts.	Environment and Natural Resources Unit, with Asset/Infrastructure Manager	Year 1 and 2	Across the whole coastline of Wyong Shire	Within existing responsibilities	Within existing responsibilities	Within existing responsibilities	No grants required

Action	Comments	Responsibility	Commencing	Location	Cost			Potential grant funds
					Yr 1 (2011-2012)	Yr 2-5 (2013-2017)	Yr 6-10 (2018-2022)	
<b>A67:</b> Establish a detailed monitoring program to clarify how sand placed on North Entrance beach is redistributed and to facilitate a review to provide more effective sand retention	Monitoring using a combination of ground survey and remote sensing will calibrate models, underpin management reviews and help landowners understand how sediment budget processes can best be managed to protect assets.	Environment and natural Resources Unit, with support from OEH	Commencing years 1-2 and ongoing	North Entrance, The Entrance Beach and the entrance channel. Some monitoring of dredged sand already occurs	Include in future dredging budgets	Include in future dredging budgets	Include in future dredging budgets	OEH part funding
<b>A37:</b> Work with NSW government to provide most up to date method for assessing coastal erosion and recession hazards, including the interaction of coastal recession and processes operating at the entrance to Tuggerah Lake	More reliable models of coastal processes provide better predictions of the actual behaviour of beaches and dunes in storm conditions, <i>el Niño/la Niña</i> cycles and with rising sea level. Council will also review and refine hazard assessments for beaches and dunes that have bedrock at shallow depths.	Investment in improved models is primarily the responsibility of OEH	Expect Year 5 and 10	Across the entire coastline of Wyong Shire.	No Council budget allocated	No Council budget allocated	No Council budget allocated	No grants required
<b>A15:</b> Conduct a regular technical review of the validity and effectiveness of management actions	The focus of this review is on the science and engineering – whether actions have achieved the predicted improvement in coastline condition or resilience.	All relevant Council units will maintain industry standards in their work. OEH will provide technical support on current best practice	Year 5 and 10	Across the entire coastline of Wyong Shire	No Council budget allocated	No Council budget allocated	No Council budget allocated	No grants required
<b>A38:</b> Review and update the assessment of coastal erosion and recession hazards as new information from IPCC, Australian and NSW Governments becomes available, and using best available techniques.	Improve the resolution and certainty of inputs to erosion and recession analysis. The outcomes of these reviews will inform planning and on ground works priorities, including review of LEP and DCP clauses.	Environment and Natural Resources Unit Support from OEH	Year 5 and 10	Relevant to all of the Wyong coastline	No Council budget allocated	\$80,000	\$80,000	50% (NSW Government)
<b>A13:</b> Conduct research into specific coastal issues	Research topics include sediment dynamics at The Entrance; response of frontal dune morphologies to sea level rise; feasibility of offshore sand supplies for beach nourishment.		Year 1 and 2 and ongoing		\$70,000	\$180,000	No Council budget allocated	50% (NSW Government)

Action	Comments	Responsibility	Commencing	Location	Cost			Potential grant funds
					Yr 1 (2011-2012)	Yr 2-5 (2013-2017)	Yr 6-10 (2018-2022)	
<b>A16:</b> Establish a schedule of annual progress reviews and broader program reviews (every 3 to 5 years)	Annual reviews are implementation tracking; broader reviews aligned with other Council and NRM reviews and reporting – key element of adaptive management	WSC Environment and Natural Resources nit, with TLECFMC. Condition reviews may be undertaken by management partners such as the OEH or HCRMA.	Annual reviews commence Year 1 and 2, with broader program reviews Year 5 and 10	Whole of Wyong Shire coastline	Within responsibilities of existing staff	Within responsibilities of existing staff	Within responsibilities of existing staff	No grants required
<b>A56:</b> Continue the role of the Tuggerah Lakes Estuary, Coastline and Floodplain Management Committee.	A regular venue for liaison between key community and agency stakeholders with Council; supports integration of coastal, estuary and flood risk management.	WSC Environment and Natural Resources Unit	Year 1 and 2 and ongoing	Whole of coastal zone of Wyong Shire	Within responsibilities of existing staff	Within responsibilities of existing staff	Within responsibilities of existing staff	No grants required
<b>A17:</b> Report outcomes of management decisions and investment in coastal management to the community on a regular basis	Keep community informed about how risks are being managed and raise awareness about why some actions are more effective than others. Use State of the Environment Report and Council web site	WSC Environment and Natural Resources Unit	Major progress reports at year 5 and years 10	Whole of Wyong Shire coastline	Within responsibilities of existing staff	Within responsibilities of existing staff	Within responsibilities of existing staff	No grants required
<b>A74:</b> Make Australian GeoGuides, published by Australian Geomechanics Society, available on Council's web site, as reference material for good practice by landowners and council.	Provides clear information about geotechnical processes	Council web manager, with Environment and Natural Resources Unit	Years 1-2	Relevant to multiple headlands along the coast	Within responsibilities of existing staff	Within responsibilities of existing staff	Within responsibilities of existing staff	No grants required
<b>A89:</b> Develop and continue to refine a 3D geomechanical model for predicting slope instability hazards.	Will facilitate continuous improvement of Council's knowledge and capacity to manage slope instability hazards.	WSC Asset planning and natural resources sections	Indicative model is included in the Plan (Appendix 4 Of Volume 2 Supporting information). Refine and update in years 2-5.	All rock and indurated sand landscapes along the coast. Cliffs and bluffs with residential development are a priority.	Preliminary tasks are within existing Council staff responsibilities.	\$50,000	No additional budget proposed	OEH coastal management grant may be feasible, or engage with universities for research and development tasks.

Action	Comments	Responsibility	Commencing	Location	Cost			Potential grant funds
					Yr 1 (2011-2012)	Yr 2-5 (2013-2017)	Yr 6-10 (2018-2022)	
<b>A24:</b> Consider options for government acquisition of private land affected by coastal hazards.	Council will work with NSW and Australian Governments to develop an appropriate strategy for high risk locations. Government acquisition of private land in coastal risk areas is not currently supported by any of these levels of government.	WSC Environment and Natural Resources Unit, Planning Directorate, Asset managers and General Manager	Years 2-5 and 6-10; policy change may take several years.	Relevant to the entire coastline where there is existing development in coastal risk areas.	Within existing staff responsibilities; no additional budget proposed	Within existing staff responsibilities; no additional budget proposed	Within existing staff responsibilities; no additional budget proposed	Not suitable for grant funding.
<b>A61:</b> Council will work with the NSW and Australian Government to study the feasibility of off shore sand being used for beach nourishment purposes for maintaining beach area, volume and amenity at key locations.	For instance a large volume of sand would be needed to enhance the dune buffer to prevent overtopping/breakthrough at Budgewoi. Offshore sand supplies are a high cost sand source and Council's decisions will be affected by decisions made for very high profile beaches in the Sydney metropolitan area and the evolution of NSW Government policy over the next five to 10 years.	WSC Environment and Natural Resources Unit	Not for use in the immediate term, but in the context of likely increasing need after 2020. Discussions will be ongoing in the context of policy reviews by NSW and Australian government.	Most important for North Entrance and Budgewoi, but also relevant to all sandy beaches along the Wyong coastline.	Within existing staff responsibilities; no additional budget proposed	Within existing staff responsibilities; no additional budget proposed	Within existing staff responsibilities; no additional budget proposed	Grants expected to be available to assist Councils if use of offshore sand is approved in the future, but the nature of the program is yet to be determined.

Table 3.4 – Implementation Schedule - Managing significant coastal risks

<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Use precautionary planning tools to reduce future coastal risks</li> <li>• Allow interim protection of assets (in accordance with legislation and guidelines) that are affected by hazards now, so that landholders can prepare for longer term change</li> <li>• Strengthen the ecological and erosion resilience of the coast with beach nourishment and dune management</li> <li>• Evaluate the cost/benefit of alternative sand sources to buffer dune communities against climate change</li> </ul> <p>Further background and rationale is available in Section 8, Section 9, Section 10 and Section 11 of the Supporting Information documents, Volume 1</p>								
Action	Comments	Responsibility	Commencing	Location	Cost			Potential grant funds
					Year 1	Year 2-5	Year 6-10	
<b>E4:</b> Train relevant Council officers in coastal hazard management for coastal risk areas, from strategic planning to emergency response activities and time frames. Share training and coordination management with SES and OEH where feasible	At this stage, Council officers will not be designated as Authorised Officers for regulation of coastal protection works under the <b>Coastal Protection Act 1979</b> .	WSC Environment and Natural Resources Unit (and/or other staff as determined by Council, including Infrastructure Management) Support from OEH	Year 1-2	Applies to all planning and environmental staff, for CPA 1979 regulatory activities along the entire Wyong coastline.	\$5000	\$20,000		
<b>A85:</b> OEH will issue certificates for emergency protection works at North Entrance and Hargraves Beach, in accordance with the Emergency Action Subplan for those locations and the requirements of the Coastal Protection Act 1979	Council's strategy includes provisions to give landholders in immediate coastal risk areas some opportunity for short term coastal protection – as emergency protection works for authorised locations or medium term removable structures.	WSC Environment and Natural Resources Unit, but certificates will be issued by OEH.	Years 1-2, a few applications may continue in year 3, but unlikely after that time with current legislation. No applications have been made to date.	Authorised Locations.	No Council funds required outside existing staff responsibilities	No Council funds required outside existing staff responsibilities	\$25,000	Statutory training component provided by OEH at no cost.
<b>A57:</b> Identify sand sources which may be used for emergency protection works,	Few appropriate sources are currently available. Linked to investigations in The Entrance and	WSC Environment and Natural Resources Unit, with support from OEH	Initial options scoping in years 1-2. Other	Sand demand priority at locations where there is development	Within existing Council staff roles; no	Within existing Council staff roles; no	No Council funds required outside existing	OEH will use its staff resources for this activity



either by private landholders or by Council. Ensure necessary approvals are in place to access this sand.	to future opportunities to access off shore sand.		options will not be resolved until years 6-10.	in immediate coastal risk areas, but likely to be required elsewhere over time.	additional budget proposed	additional budget proposed	staff responsibilities	
<b>A8:</b> Conduct dune stabilisation and revegetation works to encourage sand accretion and stabilisation of frontal dunes, in accordance with Plans of Management for ocean frontage reserves managed by Council.	Prepare vegetation management plans for reserves. Dune enhancement is important for biodiversity, recreational access and ecological resilience in the short to medium term, but less effective as a control for long term recession.	WSC Open Space Unit, with Dunecare/Coastcare groups and CEN. Strategic direction from Environment and Natural Resources Unit. Program support from H-CRCMA	Years 1-2 and ongoing	Key locations are Budgewoi Beach, Lakes Beach, Soldiers Beach, North Entrance Beach, Hargraves Beach	\$50,000	\$200,000	Within existing Council staff roles; no additional budget proposed	Detailed investigations and major policy decisions likely to be within OEH responsibility
<b>A44:</b> Use beach nourishment or beach scraping to reinforce dunes and maintain dune crest heights above 7m at affected locations, and 8 metres at North Entrance	To prevent oceanic overtopping and inundation.	WSC Environment and Natural Resources Unit, with WSC Open Space Unit. OEH technical support. Partnerships with Coastcare/Dunecare (see A8)	Years 1-2 and ongoing	Relevant to all beaches and dunes, but particularly at North Entrance, Hargraves Beach and Lakes Beach Budgewoi.	\$50,000	\$200,000	\$250,000	50%, OEH and H-CRCMA
<b>A9:</b> Continue to dredge sand from the active tidal delta in The Entrance channel and place the sand on North Entrance beach. Some sand may also be placed on The Entrance Beach.	Uses locally available sand to manage sediment budget – Council has approval to dredge up to 50,000m3 annually.	Environment and Natural Resources Unit to provide strategic direction. Works carried out by Open Space Unit. Department of Lands (land owner), OEH and H-CRCMA also involved in support roles.	Years 1-2 and ongoing	The Entrance channel, North Entrance Beach and The Entrance Beach	Council allocation already made	Continue existing funding arrangements	\$250,000	Not likely to be eligible for grant funding.
<b>A3:</b> Integrate Coastal Emergency Response Management plan with other elements of Council's DISPLAN	Streamline emergency response procedures.	WSC Environment and Natural Resources Unit and Asset Manager (Council Services)	Years 1-2	Relevant to entire Wyong Shire coast	Within existing staff responsibilities; not additional budget proposed	Within existing staff roles; no additional budget proposed	Continue existing funding arrangements	No grants
<b>A58:</b> Continue to refine understanding of tsunami risk and appropriate warning and emergency response mechanisms.	Tsunami are infrequent on the Australian east coast, so awareness of potential risks at the local scale is low.	Primarily the responsibility of Geoscience Australia, SES and OEH. Council has a watching brief and will align its activities with best knowledge and practice.	Ongoing	Relevant to the entire Wyong coast	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	No grants are relevant
<b>A60:</b> Involve the TLECFMC informed of progress in implementing the Emergency Response Management Plan/Emergency Action	Committee is the interface between Council and the community	WSC Environment and Natural Resources Unit	Shire coast emergency response management plan to be	Whole of coast with specific actions for Authorised Locations.	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Council has a minor role; most research and policy development

Subplans and involve the committee in the review of these plans			reviewed within 5 years. EASP to be reviewed annually, from Years 1-2					will be done by NSW and Australian government
<b>A35:</b> Contribute to development of new tools and communication measures to refine safe egress models during coastal emergencies, particularly when flooding and coastal erosion coincide.	LiDAR models will allow various egress models to be tested and will assist with integration of lake flooding and coastal emergencies.	WSC, in consultation with SES and OEH	2-5 years and 6-10 years	Whole of coast, with particular priority for North Entrance, Budgewoi and Hargraves Beach	Costs included in coastal research actions (A13)	Costs included in coastal research actions (A13)	Within existing staff roles; no additional budget proposed	Grants are not relevant.
<b>A6:</b> Include clauses in the Wyong LEP and DCP to restrict new development in immediate coastal hazard planning zones and to control the type and design of development in 2050 and 2100 coastal hazard planning zones. Refers to erosion and recession risks, coastal inundation risks and geotechnical risks.	Measures to be considered include: <ul style="list-style-type: none"> <li>No new development will be approved within the immediate coastal risk area. All development within the 2050 coastal risk area will require development consent (complying development does not apply).</li> <li>Appropriate designs for new development in the 2050 coastal erosion hazard area and the 2100 coastal erosion hazard area to including, for example, modular development which can be relocated landward as the coastal erosion scarp recedes.</li> <li>Prohibit new subdivisions, vulnerable development (including nursing homes and hospitals) or other development that intensifies land use in the 2050 or 2100 coastal risk areas.</li> </ul>	WSC Strategic planning	Immediate	Whole of coastal risk areas	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Costs included in coastal research actions (A13)	50% grant funding.
<b>A18:</b> Introduce clauses into the Wyong LEP and DCP to include timed consents as a planning option for development in the 2050 coastal risk area.	Before the expiry date of the timed consent the proponent must apply for and obtain an extension of time, or relocate the structure landward on the block (where this is feasible) or remove the development. Council will review the LEP	WSC Strategic planning	Immediate	Whole of coastal risk areas	Within existing staff responsibilities; not additional budget proposed	Within existing staff responsibilities; not additional budget proposed	Within existing staff roles; no additional budget proposed	No grants are relevant

	and DCP at 5 year intervals, using best available knowledge about risks and the cost effectiveness of planning controls.							
<b>A20:</b> Use zoning and other planning measures to provide land for retreat of important coastal ecological communities, where possible	Allow for roll back of coastal dune landforms and associated ecological communities, within risks associated with additional development.	WSC Strategic planning	Immediate	Whole of coastal risk areas	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff responsibilities; not additional budget proposed	No grants are relevant
<b>A33:</b> Place notation on s149 certificates of all properties within immediate, 2050 and 2100 coastal risk areas; and also properties within the 2100 coastal risk area for geotechnical hazards; and coastal inundation risk areas.	To ensure that landowners and potential land owners are informed of coastal risk affecting their property.	WSC Strategic planning	Immediate	Whole of coastal risk areas	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	No grants are relevant
<b>A62:</b> Reference maps showing areas affected by coastal inundation in the Wyong LEP	Require that development applications in areas affected by coastal inundation to take the inundation hazard into account. Floor levels for new development in inundation areas must consider the 1% AEP storm wave runoff for each beach.	WSC Strategic planning and development assessment planners.	Immediate, with a review of impacts on land owners after no later than 5 years.	Where coastal inundation will interact with lake and catchment inundation	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	No grants are relevant
<b>A80:</b> Zone ocean front land that is within the immediate coastal risk area for open space or environment protection.	Encourage over time, lower intensity and lower risk development, consistent with Council's long term managed retreat policy. These zones also facilitate roll back of coastal ecological communities.	WSC Strategic planning	1-2 years	All immediate coastal risk areas.	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	No grants are relevant
<b>A72:</b> Construct properly engineered toe protection at the base of the steep unstable slope at Cabbage Tree Harbour.	To stabilise the slope and prevent ongoing toe trimming by wave action.	WSC Environment and Natural Resources Unit, in conjunction with other sections of Council, OEH, Department of Lands and affected landowners	Completed 2011	Cabbage Tree Harbour	\$1,954,000 already invested	No further budget proposed at this time	Within existing staff roles; no additional budget proposed	No grants are relevant
<b>A66:</b> Review the structural integrity of The Entrance sea wall and schedule structural upgrades as necessary to balance risk and cost	The wall is part of a major tourism area and protects community infrastructure, including road, parking and pedestrian promenade	WSC Asset Manager, with OEH and Department of lands	1-2 Years for structural condition assessment; maintenance requirements ongoing	The Entrance – southern shore	Within Council operational budget	Within Council operational budget	No further budget proposed at this time	50% State government grant.

<p><b>A10:</b> Council may protect public assets and infrastructure in the short term with properly engineered geotextile structures, with a life of up to ten years. Council may build protection structures for public assets that are vulnerable in the 2050 and 2100 planning periods, but only for major assets with long asset life, whose function will not be compromised by other aspects of climate change.</p>	<p>Intended to provide protection from storm bite erosion to community assets such as surf clubs and pumping stations, over the asset life or until the asset can be relocated landward. Council will not approve new major infrastructure (such as main roads and sewerage systems) in the 2050 or 2100 coastal risk areas, except where it can be protected in a cost effective manner that does not increase risks to other coastal values.</p>	<p>WSC Asset Management Unit, Contract and Project Management Unit, Environment and Natural Resources Unit, with support from OEH</p>	<p>Commencing 1-2 years as necessary, limit at 10 years</p>	<p>Surf clubs with major assets in immediate hazard zone</p>	<p>No budget allocation</p>	<p>\$100,000</p>	<p>Within Council operational budget</p>	<p>50% government grant likely for major structural works</p>
<p><b>A11:</b> Council may grant development consent to private landholders to install temporary, but properly engineered structural protection, such as sand filled geotextile bags structures, to protect existing private assets in the immediate coastal risk area</p>	<p>Must be installed on private land and be designed to withstand a 1 in 20 year event. The intent is to provide protection for up to ten years. Development applications will be considered on a merit basis. Council will consider applications for the construction of permanent rock sea walls to protect existing houses which are located in the <b>immediate hazard zone</b> only if:</p> <ul style="list-style-type: none"> <li>all affected properties along a section of beach are involved/included</li> <li>the wall is built entirely on private property</li> <li>the wall will have minimal impact/risk in terms of erosion at the ends</li> <li>the landholders agree to contribute to the ongoing cost of beach nourishment to maintain beach amenity for the agreed life of the rock wall</li> </ul> <p>Landholders are responsible for ongoing maintenance of the structure, as per standards specified by the Office of</p>	<p>Private landholders, in consultation with WSC development assessment unit, D&amp;PI, OEH and Department of lands.</p>	<p>1-2 years, with consents to be timed to expire at ten years. Review effectiveness of this action at ten years.</p>	<p>Considered for North Entrance, Hargraves Beach and Blue Bay.</p>	<p>Costs met by landholders</p>	<p>Costs met by landholders</p>	<p>\$100,000</p>	<p>From Council funds</p>

	Environment & Heritage (Department of Premier and Cabinet) and Council public safety and access are not compromised.							
<b>A21:</b> Prepare a schedule of trigger points for action – for relocating existing community infrastructure and public assets to outside coastal risk areas.	Linked to risk profile and asset life.	WSC Environment and Natural Resources Unit	1-2 years	Applies to all coastal hazard planning zones along the Wyong Shire coastline; priority to assets in immediate hazard areas.	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Costs met by landholders	No grants are relevant
<b>A22:</b> Council will plan for the relocation of surf clubs out of coastal risk areas when major upgrades of facilities are due.	Council manages six surf clubs and associated infrastructure. Council will work with surf clubs to identify services/facilities which must remain within the immediate coastal risk area. Council will prepare detailed designs and REF for providing interim (up to 10 years) protection for existing surf clubs and major access infrastructure at surf clubs which are at immediate risk.	WSC Asset Management Unit, Contract and Project Management Unit, Environment and Natural Resources Unit and Sports Leisure and Recreation Unit.	Commencing in 1-2 years, and ongoing depending on risk and asset life.	All surf clubs in WSC	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	Within existing staff roles; no additional budget proposed	No grants are relevant
<b>A23:</b> Council will design some surf club buildings and other infrastructure for retreat during erosion emergencies	Relocatable structures are an option both for surf clubs and for private buildings in the 2050 coastal risk area.	WSC Asset Management Unit, with support from Development Assessment Unit and Sports Leisure Unit	Commencing years 1-2, and ongoing	All surf clubs	No budget allocated at this time	No budget allocated at this time	Within existing staff roles; no additional budget proposed	No grants are relevant for planning, but Council will apply for grants for construction, and has been successful in the past. Major surf club rebuilds estimated at \$4 million each.
<b>A70</b> Review stormwater drainage systems in the vicinity of geotechnical hazard areas to ensure they do not discharge runoff where it could trigger a landslide.	Some geotechnical processes are exacerbated by inappropriate management of surface and groundwater flows.	WSC and landholders. Link to Water Sensitive Urban Design projects within Council.	Commence within 5 years and review after 10 years.	All cliffs and bluffs within coastal hazard planning zone or where stormwater drains to these zones.	No budget allocated – within existing staff roles and programs	No budget allocated – within existing staff roles and programs	No budget allocated at this time	Some grants may be available for new infrastructure.
<b>A71:</b> Review Plans of Management for coastal reserves affected by slope instability hazards and	Consider drainage, lookouts and walking tracks. Gosford Council DCP 163 is an example.	WSC asset managers, and relevant managers in OEH (Parks Service) and Department of Lands.	Years 2-5	Norah Head and southern sections of Wyrabalong National Park are priorities,	No budget allocated	No budget allocated	No budget allocated – within existing staff roles and	No grants are relevant



ensure that the PoM takes slope instability hazards into account.				then all headland reserves in Council management			programs	
<b>A90:</b> Further investigate the interaction of coastal erosion and geotechnical hazards in areas where both types of hazard may apply now or within the 2100 planning period.	Recession hazard is reduced where there is a bedrock base, current recession assessments have assumed full sand profiles.	WSC Environment and Natural Resources Unit.	1-2 years	Where rock terrain is overlain by a thin mantle of beach/dune sand. Dunes immediately adjacent to headlands are an example.	No Council budget allocated	No Council budget allocated	No budget allocated	Estimated cost is \$50,000 per Plan. Grants may be available from OEHS and Department of Lands; plus their responsibility for PoM over their land
<b>A81:</b> Conduct a benchmark survey of the condition of coastal ecological communities.	Will extend survey coverage already completed, such as for rock platforms (H-CRCMA)	WSC Environment and Natural Resources Unit, in partnership with HCRMA and local Landcare groups	1-2 years, with follow up at approximately 3 year intervals.	Locations to be selected with partner organisations, for representative coverage of coastal ecological communities.	No budget allocated	No budget allocated	No Council budget allocated	50% OEHS Coastal Program grant
<b>A32:</b> Where feasible establish conservation agreements for high value ecological communities in coastal reserves.	No conservation agreements, negotiated with OEHS or HCRMA currently exist in Wyong Shire. Results of A81 will contribute to selection process.	Department of Lands is the major player – with tenure over rock platforms, coastal slopes and frontal dunes outside National Park.	2-5 years, and continuing	Locations to be negotiated by Department of Lands and other landholders.	No Council budget allocated	No Council budget allocated	No budget allocated	HCRMA Partnership program
<b>A75:</b> Continue to work with OEHS to protect nesting and roosting habitats for protected shorebirds such as Little tern.	Bird habitats are disturbed by pedestrians, dogs and vehicles	OEHS are likely to have the lead role, with support from Council and local community environment groups. HCRMA will support this activity.	Ongoing	Norah Head rock platform is a key site identified by HCRMA.	No additional Council budget allocated – contribution is within role of existing staff.	No additional Council budget allocated – contribution is within role of existing staff.	No Council budget allocated	

Table 3.5 – Implementation Schedule: Community Engagement

<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Inform and advise residents and land owners about coastal processes and coastal risk management</li> <li>• Support community involvement in on-ground works and monitoring</li> <li>• Facilitate visitor-attracting recreational access infrastructure</li> <li>• Enhance collaboration with local Aboriginal knowledge holders</li> </ul> <p>Further context and background to these actions is in <b>Sections 13, 14, 15 and 17</b> of Supporting Information Volume 1.</p>								
Action	Comments	Responsibility	Commencing	Location	Cost			Potential grant funds
					Year 1	Year 2-5	Year 6-10	
<b>A5:</b> Enhance community awareness of coastal hazards and emergency response management actions, using tools such as web site, information sheets, face to face meetings, information boards at beaches, media coverage.	Priority action in first two years of the Plan.	WSC Environment and natural Resources unit with WSC Media manager and community development unit.	Commencing immediately, and ongoing; review outcomes after 5 years.	Relevant to all beaches in the Shire, but priority beaches are: Curtis Parade and Hutton Road North Entrance; Cabbage Tree Harbour, Blue Bay, Hargraves Beach	\$20,000 plus existing staff resources	\$30,000 plus existing staff resources	Within existing staff responsibility	Some funds may be available from NSW Environmental Trust and HCRCA programs (where risks relate to natural resource values).
<b>A14:</b> Involve community in data collection and record keeping through NRM monitoring programs	Community involvement in monitoring means that additional data can be collected. Dunecare groups already provide a good model for how this could evolve.	WSC Environment and natural Resources Unit, with input from OEH and HCRCA	Investigate options in years 1-3, implement years 3-5 and ongoing.	Whole of coastline, but priority for locations of high ecological value and where there are active community groups.	Within existing staff responsibilities, no additional budget proposed	Within existing staff responsibilities, no additional budget proposed	Within existing staff responsibilities, no additional budget proposed	Liaise with HCRCA re community monitoring programs. Also with LMCC about programs being implemented by that Council.
<b>A51:</b> Council will continue to support Landcare/Coastcare groups to maintain and enhance the condition and function of native vegetation on coastal dunes, including weed removal and replanting.	Builds on existing successful projects such as Weeds of national significance at Budgewoi, Norah head, North Entrance and Lakes Beach South. Action combines community enjoyment of	WSC Open Space Unit will work with HCRCA and Landcare/Coastcare groups	Years 1-2; review program after 5 years	To be determined in consultation with HCRCA, but likely to include further work at North Entrance, Budgewoi, Hargraves Beach and at Soldiers Beach and Blue Bay.	Within existing staff responsibilities – no additional budget	Within existing staff responsibilities – no additional budget	Within existing staff responsibilities – no additional budget	Partnership grants are available from HCRCA.

	the coastal landscape with major ecological condition benefits							
<b>A46:</b> Maintain a close working relationship with surf clubs and Surf Life Saving Australia re beach patrols, beach safety information and beach environment information	The surf life saving community is a valuable partner in the management of the coastal zone.	WSC recreation and tourism development units; continue the role of the Beach Liaison Committee.	Ongoing, with review at 5 years.	All patrolled beaches along the coast	Within existing staff responsibilities – no additional budget proposed	Within existing staff responsibilities – no additional budget proposed	Within existing staff responsibilities – no additional budget proposed	From existing Council funds.
<b>A76:</b> Prepare and/or review Plans of management and Master Plans for the main recreational beaches along the Wyong coastline.	Upgrade shade and picnic facilities at high profile beaches in accordance with Plans of Management. Review design and integrity of beach access structures, stormwater outlets, viewing platforms. Align action with plans for relocation of surf clubs.	WSC Open Space and Community Development Units, in consultation with Department of lands	Years 2-5, with on ground works in year 6-10	Examples include Mazlin Reserve, and reserves at main beaches – Toowoan, Shelly, Soldiers, The Entrance, North Entrance and Lakes Beach.	No additional budget	\$750,000	\$1,000,000	50% grant funding, from NSW and Commonwealth community infrastructure programs.
<b>A79:</b> Review Plans of management for Crown coastal holiday parks and Crown Reserves, to reflect climate change hazards and sea level rise.	These parks are a major social and economic asset for Wyong Shire	Council Asset manager and Open Space and Recreation Manager, with Department of lands	Years 2-5	Toowoan Bay, Norah Head, Sun Valley and Blue Lagoon	No Council budget allocated	No Council budget allocated	No Council budget allocated	Expect some funding from Department of Lands
<b>A52:</b> Review access ways at high profile beaches, foreshore and headland reserves and provide disabled access	Include disabled access considerations in Plans of Management	WSC Open Space and Recreation and Community Development Units. Involve Department of Lands.	Immediate and ongoing. Work has already commenced. Review usage and feedback after 5 years.	Consider Toowoan Bay as a priority because flat and protected beach.	No budget allocated in this year	\$50,000	\$50,000	NSW and Australian government community infrastructure programs
<b>A48:</b> Assess the safety and suitability of ocean boat launching ramps and associated facilities and identify necessary upgrades/need for new facilities	Include review of structural integrity of ramp at cabbage Tree Harbour with sea level rise; also trailer parking, ramp capacity and interaction with other users.	Liaise with NSW Roads and Maritime Services, Marine rescue and commercial and recreational fishers; also scuba clubs/commercial users.	Watching brief in years 2-5	Cabbage Tree Harbour	No additional budget	No additional budget	No additional budget	Upgrade of the ramp, if required, would be funded by NSW Roads and Maritime Services.
<b>A47:</b> Plan routes and develop a coastal walk along full length of the Wyong coast, and a Mountains to Sea walk.	Potential tourism opportunity, plus encourages outdoor recreation.	WSC Sport and Leisure Unit, with support from Planning and Policy Unit and Asset Management Unit. Liaise with OEH, Department of Lands and adjoining councils.	Planning over five years, investment to commence after five years.	Priority areas include Norah Head to Budgewoi, The Entrance and North entrance area and extensions of existing paths in National park lands.	No budget currently allocated	No budget currently allocated	No budget currently allocated.	NSW and Australian government grants for community infrastructure

<b>A50:</b> Develop a design theme for coastal information, interpretation and safety signage		WSC Communications Unit has a key role. Involve SLSA, Precinct Committees and Landcare.	Design studies and planning in year 1-2, with implementation in Year 2-3.	High usage/high profile sites as first priority – Shelly Beach, Toowoona Bay.	No additional budget proposed	\$50,000	No additional budget proposed	From Council funds only
<b>A53:</b> Conduct regular surveys of beach users in relation to facilities and services.	Provides regular feedback on the condition of the coast and outcomes of investment in recreational facilities.	WSC Sport and recreation Unit; consult with Coast, Estuary and Flood Risk Management Committee	At intervals of approximately 4 years, aligned with Council's 4 year delivery plan. May be integrated with Council Open Space Survey.	Whole of Wyong coastline	Within existing staff responsibilities; No additional budget allocated	Within existing staff responsibilities; No additional budget allocated	Within existing staff responsibilities; No additional budget allocated	From Council funds only
<b>A77:</b> Document stories of Aboriginal attachment to the Wyong coastline.	Identify with the Aboriginal community which information could be used in interpretative material about the coast, and where such information should be placed.	WSC Environment and Natural Resources Unit, with Darkinjung LALC, other Aboriginal community groups and HCRMA (Aboriginal Community Support Officer and Aboriginal Culture and Environmental Network)	Data gathering and documentation year 1. Interpretative material in years 2-5.	Relevant to whole of Wyong coastline; specific locations determined in consultation with Aboriginal community	Within existing staff responsibilities; No additional budget allocated	\$30,000	Within existing staff responsibilities; No additional budget allocated	From Council funds; in partnership with HCRMA
<b>A78:</b> Monitor the condition of known Aboriginal sites on coastal land under Council's care and control.	Include protection measures in plans of management for coastal reserves.	WSC Community Development Unit, with Darkinjung LALC and other Aboriginal community groups, OEH cultural heritage staff.	Audit condition in Year 1. PoM to reflect Aboriginal site protection measures within 2 years.	Whole of Wyong coastline in Council care and control. Specific locations determined in consultation with local aboriginal community and OEH.	Within existing staff roles; No additional budget allocated	\$10,000	Within existing staff roles; No additional budget allocated	From Council funds, in partnership with HCRMA and OEH.