

PLANNING & NATURAL SYSTEMS

ATTACHMENT A

**GAZETTAL OF CERTIFIED GREAT LAKES
COASTAL ZONE MANAGEMENT PLAN**

ORDINARY MEETING

20 DECEMBER 2017

“Where will our knowledge take you?”



Great Lakes Coastal Zone Management Plan

Final Report August 2016

Great Lakes Coastal Zone Management Plan

Prepared for: Great Lakes Council

Prepared by: BMT WBM Pty Ltd (Member of the BMT group of companies)

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	Authors	Verity Rollason	Synopsis: This Coastal Zone Management Plan outlines implementation details for the recommended management actions for managing coastal risks in the Great Lakes LGA. The management actions target those assets at immediate 'intolerable' risk from coastal hazards, with potential management options for assets at intolerable risk by 2100 detailed for use if and when required. The Plan also references actions for managing community use and ecological health in the coastal zone of Great Lakes.	

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by	Issued by
0	4 th March 2015	VPR	VPR
1	30 th March 2015	PEH	VPR
2	31 st October 2015	VPR	VPR
3	22 nd December 2015	PEH	VPR
4	12 th August 2016	VPR	<i>V.Rollason.</i>

DISTRIBUTION

Destination	Revision										
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Great Lakes Coastal Zone Management Plan Summary

Our Coast

Great Lakes' beaches and coastline are key assets to the entire region. Visitors from near and far return regularly to enjoy swimming, walking, surfing and many other recreational and relaxation activities along the coast. The beaches vary from urbanised environments like Forster to rugged natural coastline like Seal Rocks.

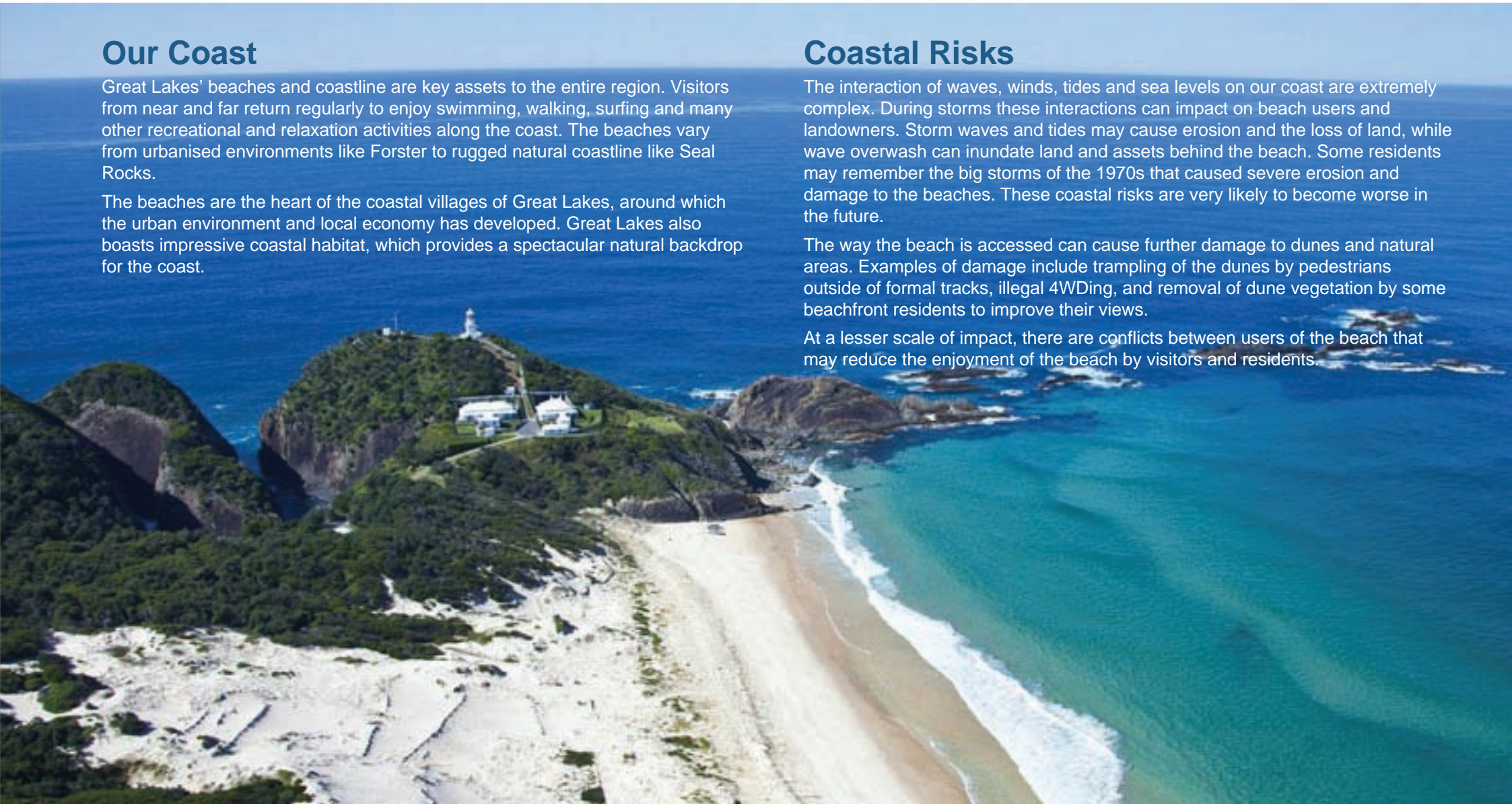
The beaches are the heart of the coastal villages of Great Lakes, around which the urban environment and local economy has developed. Great Lakes also boasts impressive coastal habitat, which provides a spectacular natural backdrop for the coast.

Coastal Risks

The interaction of waves, winds, tides and sea levels on our coast are extremely complex. During storms these interactions can impact on beach users and landowners. Storm waves and tides may cause erosion and the loss of land, while wave overwash can inundate land and assets behind the beach. Some residents may remember the big storms of the 1970s that caused severe erosion and damage to the beaches. These coastal risks are very likely to become worse in the future.

The way the beach is accessed can cause further damage to dunes and natural areas. Examples of damage include trampling of the dunes by pedestrians outside of formal tracks, illegal 4WDing, and removal of dune vegetation by some beachfront residents to improve their views.

At a lesser scale of impact, there are conflicts between users of the beach that may reduce the enjoyment of the beach by visitors and residents.



What Assets are at Risk?

Erosion and wave overwash threaten the beaches and dunes, and community assets behind the beach. Assets behind the beach at risk include the beach access tracks, car parks, nature reserves and important habitat, roads, stormwater outlets, sewer and water services. In some places even private land and houses are at risk.

Coastal dunes provide a vital buffer against erosion that protects land and assets behind the beach – the dunes are “nature’s seawalls”. Damage to dune vegetation by pedestrians, 4WDs, and beachfront residents reduces the ability of a dune to capture and store sand, reducing the storm buffer provided by the dunes.



How are Coastal Risks Managed?

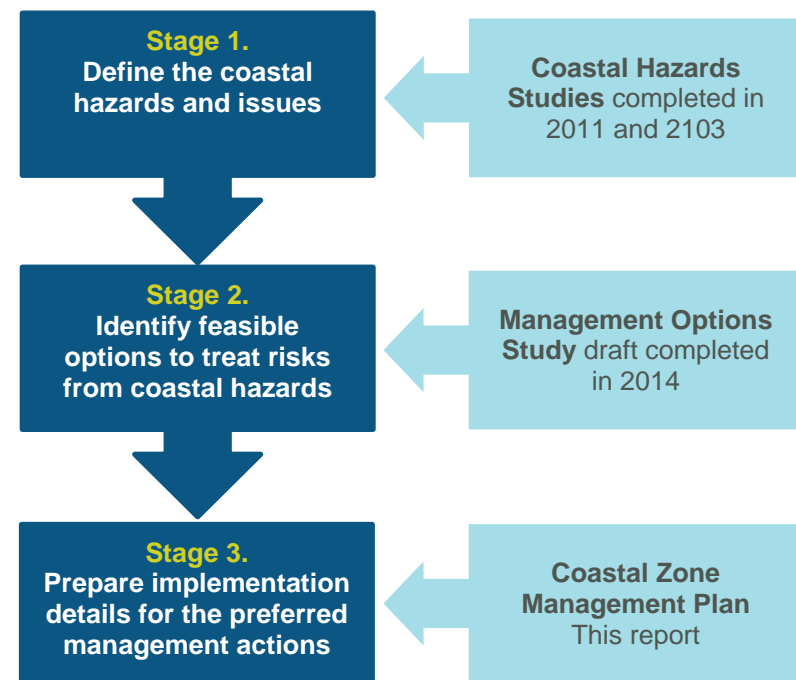
Great Lakes Council has prepared this Great Lakes Coastal Zone Management Plan (the Coastal Plan) to outline what steps are needed to manage the coastal risks now, and in the future.


The NSW Government supports councils to prepare such plans. NSW legislation sets out the legal process for preparing coastal zone management plans. This process defines how to assess the coastal 'risks' (or hazards), the timeframes over which to define the risks (i.e. present day, 2060 and 2100), and suggests a range of options to consider for treating the coastal risks. Great Lakes Council has followed this legislated process to prepare the Coastal Plan.

As a first step, Great Lakes Council investigated the potential for coastal risks along the coastline. The potential extent of erosion or wave overwash at present, 2060 and 2100 was mapped in Coastal Hazard Studies for Blueys and Boomerang Beaches (see WorleyParsons, 2011), and the remaining beaches (see SMEC, 2013).

The next step was to define the level of risk to beaches and assets, and assess options for managing the highest risks. The Great Lakes Coastal Zone Management Plan: Options Study (BMT WBM, 2015) outlined the most affordable and practical management options for managing present and future risks on Council beaches in the Great Lakes area.

The final step has been to prepare this Great Lakes Coastal Plan. This documents the preferred actions to manage coastal risks over the next 5-10 years. A map of the Coastal Plan is provided at the end of this summary.



An aerial photograph showing a coastal town with a mix of residential and commercial buildings, a long sandy beach, and a large body of water. The town is situated on a peninsula or a narrow strip of land, with a large bay or inlet to the right. The water is a deep blue, and the sky is clear. The foreground shows a wide, sandy beach with some vegetation on the right side.

Area Covered by the Coastal Plan

This Coastal Plan covers the open coastline from Black Head at the northern end of Nine Mile Beach to Yacaaba Head at the southern end of Bennetts Beach. The developed beaches have been given particular focus, including Tuncurry (Nine Mile Beach), Forster Main, One Mile, Seven Mile, Elizabeth, Boomerang, Blueys, Sandbar Beach, Seal Rocks Number One, Seal Rocks Boat and Bennetts beaches.

A separate Coastal Plan has already been completed for Jimmys Beach (SMEC, 2015). This means Jimmys Beach is not included in this Great Lakes Coastal Plan. Wallis Lake, Myall Lakes and Smiths Lake are also not included in the Coastal Plan, as they each of the lakes have a separate estuary coastal zone management plan.

Actions in the Coastal Plan

The Great Lakes Coastal Plan is focussed on actions over the next 5-10 years to manage presently known risks, and improve our ability to manage future risks. In most cases existing assets may not be at risk until well into the future. Monitoring to record the response of beaches to storms may be all that is necessary for now. Other actions to build the resilience of the beaches include enhancing dune vegetation to capture sand that may otherwise be blown off the beach. Captured sand provides a sacrificial buffer when storm erosion occurs.

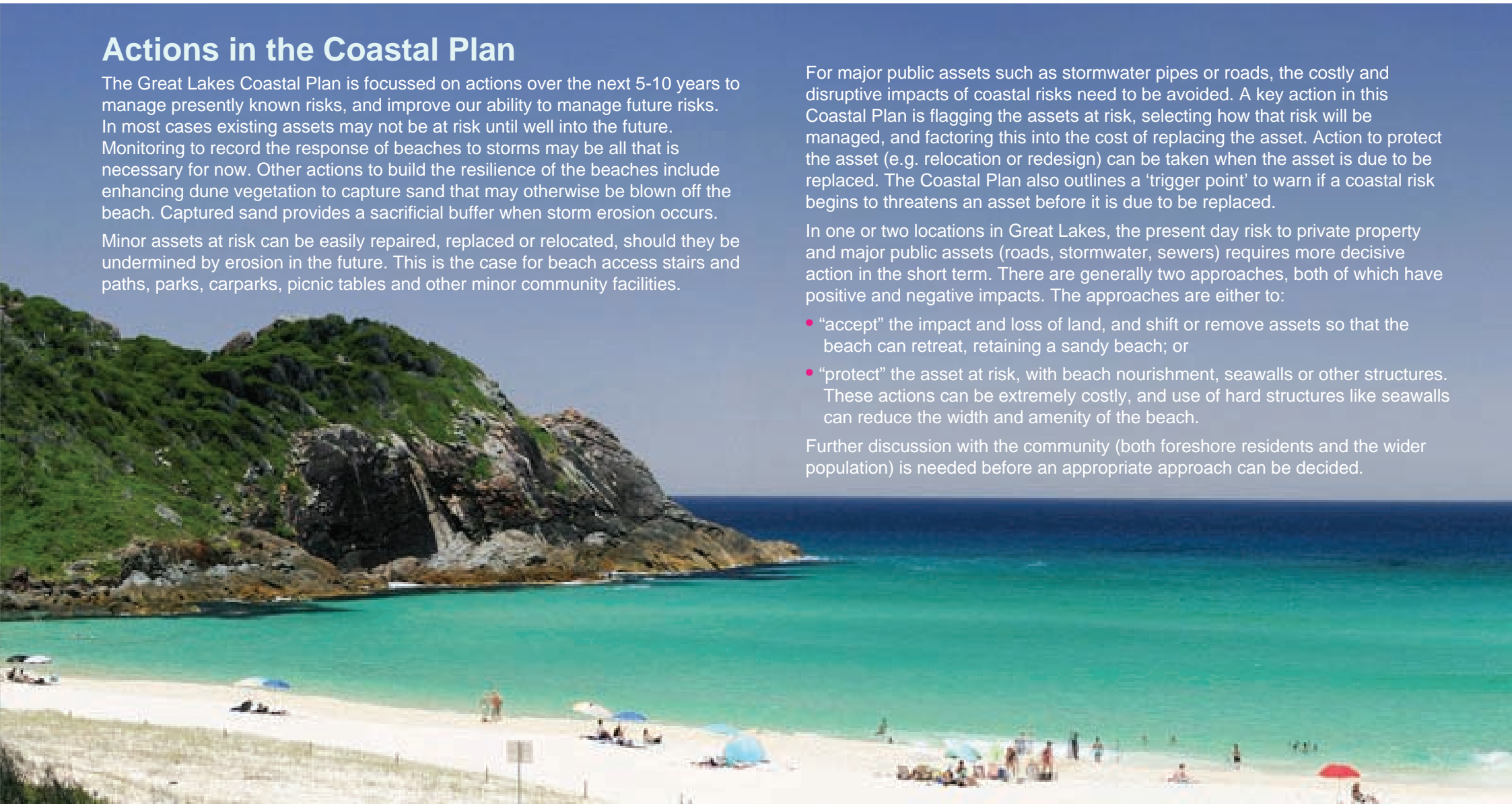
Minor assets at risk can be easily repaired, replaced or relocated, should they be undermined by erosion in the future. This is the case for beach access stairs and paths, parks, carparks, picnic tables and other minor community facilities.

For major public assets such as stormwater pipes or roads, the costly and disruptive impacts of coastal risks need to be avoided. A key action in this Coastal Plan is flagging the assets at risk, selecting how that risk will be managed, and factoring this into the cost of replacing the asset. Action to protect the asset (e.g. relocation or redesign) can be taken when the asset is due to be replaced. The Coastal Plan also outlines a 'trigger point' to warn if a coastal risk begins to threaten an asset before it is due to be replaced.

In one or two locations in Great Lakes, the present day risk to private property and major public assets (roads, stormwater, sewers) requires more decisive action in the short term. There are generally two approaches, both of which have positive and negative impacts. The approaches are either to:

- “accept” the impact and loss of land, and shift or remove assets so that the beach can retreat, retaining a sandy beach; or
- “protect” the asset at risk, with beach nourishment, seawalls or other structures. These actions can be extremely costly, and use of hard structures like seawalls can reduce the width and amenity of the beach.

Further discussion with the community (both foreshore residents and the wider population) is needed before an appropriate approach can be decided.





Actions for Private Property

For existing private properties, the key management action is development controls, which only apply when a development application is lodged. The controls guide the siting and design of new structures to reduce their exposure to coastal risks.

For the majority of properties within the “coastal risk planning area”, the development controls should be easy to achieve. Properties located immediately adjacent to the beach are at higher risk because they are close to the ocean. Development controls for these locations may be stricter, but this is aimed at prolonging the life of new, often expensive, developments.

Managing Future Risks

Many risks are not expected to eventuate for 50 years or more. For these future risks, a management option(s) is identified along with a trigger for implementing the option. It is highly unlikely that these options will need to be actioned before the initial plan revision by 2020.

Identifying a management option with a trigger for implementation at the present time enables Council and others to be prepared should a high risk situation present itself earlier than anticipated, without committing to a course of action unnecessarily. This approach avoids costly, large-scale, difficult or unpalatable actions being implemented until it is certain that they are needed.





Community Involvement in the Coastal Plan

All members of the community, from local beachside residents to residents of the broader region, as well as visitors from outside the area who enjoy Great Lakes beaches, have been encouraged to get involved in the preparation of the Great Lakes Coastal Plan.

A range of consultation activities have taken place, such as public information sessions (advertised in the local newspaper, radio and Council's website), online surveys, information brochures and meetings with community groups. The online surveys have been particularly successful, with nearly 200 responses from the public. There were a further 65 submissions during public exhibition of the Management Options Study. This community feedback has informed the preparation of the Coastal Plan.

Once the Coastal Plan is adopted, community engagement will be ongoing through the course of implementing the plan.

What Happens Next?

This Coastal Plan was adopted by Great Lakes Council on 24 November 2015, then submitted to the Minister for Planning on 23 December 2015 for certification under the NSW Coastal Protection Act 1979. Certification of the Coastal Plan is a critical step empowering Council and other responsible parties to implement the actions in the plan, and gain access to NSW Government funding for such actions.

As part of the certification process, the NSW Office of Environment and Heritage and the NSW Coastal Panel undertook an in depth review of the document. The NSW Coastal Panel and the Minister commended Great Lakes Council for preparing a comprehensive, practical and forward thinking CZMP, and indicated that the Plan will be certified once it is re-submitted with some minor amendments, including a technical revision of the supporting documents to this CZMP by 2020. The required amendments have been made within this document.

Following the 2020 revision, this Coastal Plan will generally be reviewed every 5-10 years. The review will consider how effective implementation of the actions has been in managing coastal risks. The preceding Hazards Studies will also be revised and updated with new coastal data, including monitoring data collected by Council. This will inform the subsequent version of the Coastal Plan, and associated changes to Council's planning documents (LEP, DCP) and other actions as required.

The Coastal Plan is an evolving document, to continually improve our understanding and management of coastal risks.

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Introduction

1 Introduction

1.1 Purpose of the Great Lakes Coastal Zone Management Plan

Great Lakes Council (Council) with the assistance of the NSW Office of Environment and Heritage (OEH) has resolved to prepare a Coastal Zone Management Plan (CZMP) for the beaches of the Great Lakes Local Government Area (LGA). Preparing this CZMP is intended to provide:

- Practical actions to address the risks to assets and land from **coastal hazards** (erosion, recession and inundation) at the present, 2060 and 2100;
- Broad objectives and actions to manage **community use and amenity** of the coastal zone; and
- Broad objectives and actions to manage **ecological health** in the coastal zone, including rehabilitation and protective actions for ecological assets.

The beaches south from Black Head to Hawks Nest are included in this Plan, including the beaches of Tuncurry, Forster, Pacific Palms, Smiths Lake, Seal Rocks, and Hawks Nest. Jimmys Beach is not included in this Plan as it is the subject of a separate CZMP because it is an identified coastal risk “hot spot” of state significance. The estuaries (Wallis Lake, Smiths Lake, Myall Lakes) are also not included in this Plan, as they are the subject of separate estuary coastal zone management plans.

The main coastal hazards addressed by this CZMP are:

- **Erosion** of the beach and dunes during storms;
- **Recession** (or retreat) of the shoreline due to projected sea level rise, which will occur as periodic erosion that progressively reduces the beach and foredune width;
- **Inundation** and overtopping of coastal barriers by the ocean waves during storms, which will increase in frequency and depth with rising sea levels; and
- **Slope Instability**, typically occurring as debris slides or rock falls, at specific locations on the coast.

The above coastal hazards may threaten houses, roads and associated assets, and affect the amenity and enjoyment of the beaches by the community. Stormy periods in the past have been known to significantly erode the frontal dunes and inundate local creeks, for example in the 1970s at Blueys and Boomerang Beaches. The severity of these hazards is expected to increase in the future with rising sea levels. Many of the properties at highest risk are also those with the highest property values in the LGA, and subject to demand for redevelopment to improve values further.

Other plans relating to community use and ecological health exist for Great Lakes LGA, but there is no single, coordinated document for the whole of LGA coastline. This Great Lakes CZMP therefore aims to link with existing

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programs, and extend or modify management actions for community use and ecological health issues on the coast.

The CZMP has been prepared in accordance with the *Coastal Protection Act, 1979* and its associated *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013), and other relevant NSW legislation.

While this CZMP must consider risks to 2100, the plan is focussed upon actions that can be implemented over the next 5-10 years. For risks not expected to occur until 2060 or beyond, risk mitigation measures and triggers for their implementation are provided, but it is unlikely these measures will need to be implemented over the 5-10 year life of this CZMP.

This CZMP is the first iteration of the coastal plan to preserve and enhance the Great Lakes open coastline. It is expected that this CZMP, and the hazards and management options studies that support it, will be revised at regular intervals (5-10 years) to capture updated coastal processes data, advances in hazard assessment techniques, updated assessment of coastal risks, new approaches to managing existing assets and new funding opportunities for implementing actions.

1.2 Objectives of the Great Lakes CZMP

The objectives for the Great Lakes CZMP identified by Council are as follows.

- Link Council's coastal zone management planning with other planning processes in the coastal zone to facilitate integrated coastal zone management.
- Engage the community in the preparation of the CZMP, including providing information relating to the plan as soon as practicable.
- Recognise and accommodate natural coastal processes and hazards. The CZMP will include strategies to deal with threats to existing development and to ensure that new development adequately manages such threats.
- Maintain the condition of high value coastal ecosystems; rehabilitate priority coastal ecosystems where practicable.
- Recognising the limits of economic practicability, protect and preserve beach amenity, maintain and improve public access arrangements to beaches, estuary foreshores and headlands, support recreational uses and protect the cultural and heritage environment.
- Incorporate effects of projected climate change, including sea level rise, on coastal hazards, ecosystem health and community uses of the coastal zone into an adaptation pathway to guide future investment.
- Prioritise management actions within the CZMP on the basis of public benefit; including cost-effectively achieving the best practical, transitional and long-term outcomes.
- Develop a rational sequence of responses based on cost-effectiveness (typically cost effectiveness analysis) that are relevant to the challenges faced in particular locations and which have projected timeframes, trigger points and action thresholds.

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- Base decisions for managing risks to public safety and built assets, coastal ecosystems and community values on the best available information and reasonable practice, including an adaptive management approach.
- Adopt a risk management approach to threats to public safety and assets and pressures on coastal ecosystems, including avoiding risks where feasible and mitigation where risks cannot be reasonably avoided, and adopting interim actions to manage high risks while long term options are implemented.

1.3 Area covered by this CZMP

The Great Lakes LGA coastline lies on the mid north coast around 300 km north of Sydney. The coastline extends from Black Head at the northern end of Nine Mile Beach to Yacaaba Head at the southern end of Bennetts Beach (see Figure 1-1). The beaches, headlands, nearshore and dunes of these embayments are included in the Plan. The beaches included in this Plan are listed in Table 1-1.

This CZMP excludes Jimmys Beach, as a separate CZMP has been prepared for this beach. Coastal waterways entering the ocean via the beaches (i.e. Wallis Lake, Smiths Lake, Myall Lakes) are also not included in this Plan, as they are the subject of separate estuary coastal zone management plans.

The Great Lakes coastline is diverse, comprising a series of long barrier beaches (e.g. Nine Mile and Seven Mile Beaches) interspersed between prominent cliffed headlands. Occasional bluffs backed by smaller pocket beaches (e.g. Pebbly and Elizabeth Beaches) are also present. The beaches are mostly exposed to a high energy wave climate, with the exception of some north facing pocket beaches which are sheltered from the dominant south easterly swells (e.g. Burgess, Boat Beaches).

As well as recreational and environmental lands, the study area includes prime beachfront residential lots noted to have the highest land values in the LGA. Many of the beachfront dwellings are holiday houses and/or investment properties. However an increasing number of landowners are becoming permanent residents, as they retire from fulltime occupations elsewhere.

The majority of the beaches are located within the Department of Primary Industries Port Stephens – Great Lakes Marine Park (PSGLMP) (see Table 1-1). Some beaches are also within National Parks (e.g. Treachery, Lighthouse Beaches), and so coastal hazards have not been assessed (see SMEC, 2013). Those beaches are under the jurisdiction of the Office of Environment and Heritage National Parks and Wildlife Service (NPWS), but contain some minor Council lands and assets (e.g. road asset at Lighthouse Beach, Caravan Park at Treachery Beach). Generally, it is expected that the beaches in National Parks will be allowed to respond naturally to future recession and erosion processes.

Introduction

Table 1-1 Great Lakes Beaches covered by this CZMP

Beach	Description ¹	Within PS-GL ² Marine Park	Hazards Mapped / Defined
Nine Mile - Tuncurry	Long open coast beach with dunes in a mostly natural state.	No	Erosion, recession, wave runup, southern end only
Forster Main	Small beach backed by a vertical seawall, with high density development behind.	No	Erosion, recession, wave runup.
Pebbly	Small pocket beach with rock outcrops at either end.	No	Wave runup only.
One Mile	Open coast beach backed by urban development.	Cape Hawke only, sanctuary zone	Erosion, recession, wave runup.
Burgess	Pocket beach protected by rock outcrops all along the beach.	Yes, habitat protection zone	Wave runup only.
Seven Mile	Long open coast beach.	Yes, habitat protection zone	Erosion, recession, wave runup.
Elizabeth	Pocket beach, backed by road.	Yes, habitat protection zone	Erosion, recession, wave runup.
Shelly	Pocket beach	Yes, habitat protection zone	None.
Boomerang	Open coast beach backed by urban development.	Yes, habitat protection zone	Erosion, recession, wave runup.
Blueys	Open coast beach backed by urban development.	Yes, habitat protection zone	Erosion, recession, wave runup.
Sandbar	Open coast beach fronting Smiths Lake.	Yes, habitat protection zone	Erosion, recession, wave runup.
Seal Rocks - Number One	Open coast beach, backed by caravan park and road.	Yes, habitat protection zone, with Skelton Rocks in a Sanctuary zone.	Erosion, recession, wave runup, and slope stability.
Seal Rocks - Boat	Pocket beach backed by development.	Yes, habitat protection zone	Erosion, recession, wave runup, and slope stability.
Seal Rocks - Lighthouse	Open coast beach.	Yes, habitat protection zone	Wave runup only.
Treachery (inc. Yagon and Mungo)	Long open coast beach.	Yes, habitat protection zone; beach between Yagon Gibber and Big Gibber in sanctuary zone	Wave runup only.
Bennetts	Long open coast beach.	Yes, habitat protection zone	Erosion, recession, wave runup, southern half only

¹ Description is taken from SMEC, 2013 or Worley Parsons, 2011.

² PS-GL Marine Park = Department of Primary Industries Port Stephens – Great Lakes Marine Park.



KEY PLAN

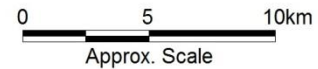


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Locality Map - Great Lakes CZMP

Figure:
1-1

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BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Introduction

1.4 The Coastal Management Process in NSW

The Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013) ('CZMP Guidelines') specify the requirements for preparing a coastal zone management plan in accordance with the Coastal Protection Act 1979, including requirements additional to those specified in the Act. The CZMP Guidelines dictate the process to be followed when preparing a CZMP including the hazards to be investigated and the timeframes for the hazard assessments and management actions (typically being the immediate, 2050 and 2100 timeframes). The stages for preparing the Great Lakes CZMP are illustrated in Figure 1 3.

Under Section 733 of the Local Government Act 1993, councils are taken to have acted in 'good faith' and thus receive an exemption from liability for land affected by coastal hazards where their actions substantially accord with the principles contained in the specified manual, in this case being the CZMP Guidelines.

A summary of legislation relevant to managing the coastal zone in NSW is provided in the Great Lakes Coastal Zone Management Plan: Options Study ('the Options Study') (BMT WBM, 2015), in Appendix A.

How this CZMP addresses the Principles for Coastal Management and the minimum requirements for preparing CZMPs outlined in the CZMP Guidelines are also provided in the Options Study in Appendix A.

Subsequent steps for the CZMP include:

- Public exhibition of the draft CZMP, then update of the CZMP with relevant Council, community and state agency comments;

- Submission of the final draft CZMP to the Minister for Planning and Environment for certification, and if certified, Council to gazette the plan; and
- Review of the CZMP on a regular basis (5-10 years).

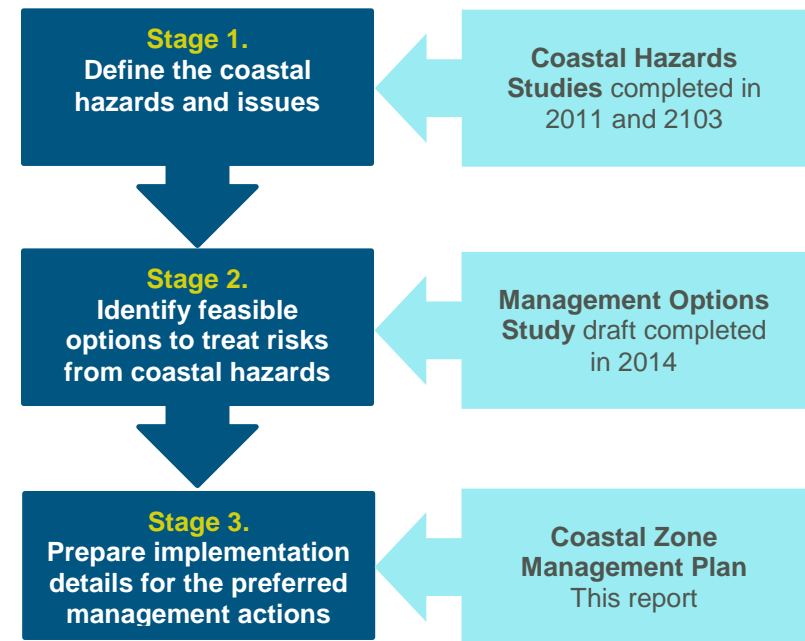


Figure 1-2 Stages of Preparation of the CZMP

Introduction

1.4.1 Certification of this CZMP

This CZMP was adopted by Council on 24 November 2015, then submitted to the Minister for Planning on 23 December 2015 for certification under the *Coastal Protection Act 1979*. Certification of the CZMP is a critical step empowering Council and other responsible parties to implement the actions in the plan, and gain access to NSW Government funding for such actions.

As part of the certification process, the NSW Office of Environment and Heritage and the NSW Coastal Panel undertook an in depth review of the document.

The NSW Coastal Panel and the Minister for Planning commended Council for preparing a comprehensive, practical and forward thinking CZMP. They found this CZMP to have a straight forward approach to adaptively managing identified coastal risks into the future, and to provide a significant commitment and provision for amenity enhancement, improved public access and dune maintenance elements. The CZMP was also noted to have good flexibility for managing various classes of public infrastructure with clear direction on what will be 'retreated' and what will be 'protected'; and a significant commitment to long-term monitoring initiatives in order to augment future decision making. Council was also commended for its diligence in the extensive community consultation undertaken at all stages of preparing the Plan.

The Coastal Panel and Minister indicated they are prepared to certify the Plan in accordance with the *Coastal Protection Act 1979* provided the plan is resubmitted with some minor revisions. The requested revisions and their location within this document are listed in Table 1-2.

Table 1-2 Amendments to this CZMP to enable Certification

Required amendment	Report Section
A re-assessment of coastal processes of the Great Lakes coast, with the aim of developing a comprehensive and robust understanding of the sediment budget of the region.	Noted in Sections 1.5.1.1, 1.5.1.2 and 2.2 Action 2.4.11 Regional Coastal Processes, Sediment Budget and Coastal Risk Study
In view of the improved sediment budget understanding, conduct a re-assessment of key hazards at Blueys and Boomerang beaches, namely: <ul style="list-style-type: none"> sea level rise recession and the zone of reduced foundation capacity at Boomerang Beach, due to the sensitivity of these elements to the active profile slope and height of the dunal system; and the potential for inundation and flooding at the southern end of Blueys Beach, particularly where this may be affected by the sediment budget for the region 	Noted in Section 2.2 Action 2.4.11 Regional Coastal Processes, Sediment Budget and Coastal Risk Study Action 2.4.11 to feed into Action 2.4.19 Combined Flood Studies for Blueys Beach
Taking account of the outcomes of the above re-analyses, undertake a cost-benefit and funding analysis of specific options to manage the vulnerabilities identified at Blueys and Boomerang beaches.	Action 2.4.12 Boomerang Beach Erosion Risk Management Options Study Action 2.4.19 Combined Flood Studies (inc. a FRMP for Blueys)
A staged timetable to give effect to these actions by, or preferably prior to, 2020	Noted in Section 2.2 Detailed in Section 2.2.1, from Actions 2.4.11, 2.4.12 and 2.4.19

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1.5 Previous Studies Supporting This CZMP

1.5.1 Coastal Hazards Studies

The extent of the coastal hazards at the immediate, 2060 and 2100 timeframes was defined for Boomerang and Blueys Beaches in the *Boomerang Beach and Blueys Beach Coastal Processes and Hazards Definition Study* (WorleyParsons, 2011), and for the remaining Great Lakes beaches in the *Great Lakes Coastal Hazards Study* (SMEC, 2013).

Both the WorleyParsons (2011) and SMEC (2013) studies applied a standard approach to the estimation of coastal hazards, as follows.

- The immediate erosion hazard was derived by considering the historical beach volume data (available from photogrammetry), and then applying the standard storm erosion volume typically used in NSW.
- Recession by 2060 and 2100 due to sea level rise was calculated using the Bruun Rule. The calculation was based upon bathymetric data from Charlotte Head, and used the sea level rise projections prescribed in Council's Sea Level Rise Policy, which was based upon the latest science available at the time (see also Section 1.5.1.2).
- Wave run up was calculated using numerical wave modelling, with inputs including wave data from Crowdy Head, sea level rise projections given by Council's Sea Level Rise Policy (based upon the latest projections available at the time), and ocean water levels prescribed for the NSW coast by OEH (see DECCW, 2010).
- The schema of Nielsen *et al* (1992) was applied to calculate the zone of reduced foundation capacity (ZRFC) that exists behind dune barriers following erosion events. As was done in the WorleyParsons (2011) and SMEC (2013) studies, use of this schema with an assumption that the dune barriers are composed entirely of sand is standard industry practise in NSW. This approach provides an initial estimation of an area that may have reduced foundation strength to support buildings, on or adjacent to the frontal dunes. It is also industry practise to recommend that detailed site specific geotechnical assessment be conducted prior to the construction or remodelling of buildings within that initial area.
- Limitations to the original hazard definition work at Blueys and Boomerang Beachers were recognised by Council, prompting further geotechnical investigation (ground penetrating radar) to more closely examine the occurrence of harder strata that may limit erosion and foundation capacity hazards. The additional work was used to revise the mapping of hazard lines in the northern and southern corners of Boomerang and Blueys Beaches. The investigation also found the central sections of both beaches to be composed of sand. The additional work is documented in the *Ground Penetrating Radar Investigation of Blueys and Boomerang Beaches* (BMT WBM, 2014) and *Bedrock Based Coastal Hazard Revision for Blueys and Boomerang Beach* (BMT WBM 2014) reports.
- Cliff and slope instability risk was assessed at two specific sites only, being Boat Beach (between Kinka Road (crest of the slope) and the beach (toe of the slope)) and Number One Beach (between Seal Rocks Road (crest of the slope) and the beach (toe of the slope)). Risk

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assessments for slope instability hazards were conducted in accordance with the method set out in the *Landslide Risk Assessment Procedures* in Australian Geomechanics, Volume 42, Number 1, March 2007.

1.5.1.1 Suitability of Hazard Studies for Preparing a Coastal Zone Management Plan

The community has raised concern that due to the limitations in the data and the assumptions used, the WorleyParsons (2011) and SMEC (2013) hazard studies are not of suitable quality to define erosion/recession hazards for planning purposes and other coastal management responses.

Coastal erosion is a known risk in Great Lakes, having threatened coastal land and property during the severe storms in the 1970s. Thus, there is an imperative to take action now to manage coastal erosion impacts prior to damages occurring again in the immediate future.

Likewise, sea level rise is occurring at present and there is 'very high confidence' (see CSIRO, 2015; IPCC 2014) that sea levels will continue to rise, and at a faster rate in the future. As such, the effects of sea level rise on the coastline, such as beach retreat, are also known risks for which action will be required in the future.

A level of uncertainty will always be present in coastal hazard definition and risk assessment, as with most other fields of scientific and engineering endeavour. This does not mean that work to date (hazard definition, options analysis and risk management) should be ignored, and that initial land use planning and other actions not be pursued to help manage the existing risks to Great Lakes' coastline.

The WorleyParsons (2011) and SMEC (2013) hazard studies were reviewed by OEH and considered to present the best available information on coastal risk at the present day. Therefore in accordance with current NSW legislation, the reports are suitable for use in preparing a CZMP for the Great Lakes coastline.

Notwithstanding, this CZMP represents the first assessment of coastal risk for Great Lakes. It needs to be revised within 5 years so that new data is incorporated into the definition of coastal hazards, and their appropriate management. As per the requirements of the Minister for Planning for certifying this CZMP, the first revision of coastal hazards is intended to be completed before 2020 (refer Section 1.4.1 for further details).

1.5.1.2 A Note on Sea Level Rise

Council has a legal imperative to consider sea level rise, as it is a known and measured coastal process that will affect the likely occurrence and severity of coastal hazard impacts. Under Section 733 of the *Local Government Act 1993* (the LG Act), Council has a duty of care to inform its local constituents of known risks and receives an exemption from liability for acting in good faith with respect to known hazards (including coastal hazards). Under Section 733(4) of the LG Act, Council is considered to have acted in good faith where decisions are made substantially in accordance with the relevant manual for the hazard, in this case, the CZMP Guidelines.

The incorporation of sea level rise into the assessment of coastal hazards is a requirement of the CZMP Guidelines upon which the LG Act exemption from liability is based. Similarly, object (h) of the *Coastal Protection Act 1979*

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is “to encourage and promote plans and strategies for adaptation to coastal climate change impacts, including projected sea level rise”.

The *NSW Sea Level Rise Policy Statement 2009* was repealed in September 2012. This means that prescribed state-wide sea level rise benchmarks no longer apply to coastal hazard assessments, such as this CZMP. The NSW Government indicated that local councils “have the flexibility to determine their own sea level rise projections to suit their local conditions” (NSW Environment and Heritage, 2012), although it is unclear if or how local councils may be equipped to do this. In lieu of prescriptive sea level rise benchmarks, the Office of Environment and Heritage (OEH) suggest that councils should adopt sea level rise values that are “widely accepted by competent scientific opinion” (OEH, 2013).

At the time of preparation of the hazards studies for this CZMP, the sea level rise projections that were ‘widely accepted by competent scientific opinion’ were that given by the former Sea Level Rise Policy Statement, being 0.4 m and 0.9 m rise above 1990 mean sea level by 2050 and 2100, respectively. These projections were based upon the latest reports by the IPCC (2007) and CSIRO (2007) available at that time. The NSW Chief Scientist and Engineer (2012) assessed the former NSW Sea Level Rise Policy Statement levels and advised that the science informing the policy levels was adequate. In 2010, Council adopted the Sea Level Rise Policy Statement benchmarks of 0.4 m and 0.9 m rise above 1990 mean sea level by 2050 and 2100, respectively.

The global projections for sea level rise are largely unchanged between the IPCC (2007) and the most recent IPCC report in 2014. The CSIRO also

released new regional projections for Australia in 2015, including the east coast. These projections suggest a ‘likely’ range for sea level rise of 0.45 to 0.88m by 2090 for the highest emission scenario (and along which sea level rise is currently tracking). The minor discrepancy between the sea level rise projections adopted in the hazard studies supporting this CZMP and the latest projections is unlikely to substantially affect the actions prescribed in this CZMP for the next 5-10 years.

The next revision of coastal processes and hazards is intended to be completed prior to 2020. The most up-to-date projections for climate change and sea level rise in particular for the Great Lakes region (e.g. as in CSIRO, 2015) will be incorporated into this coastal processes and hazards revision.

1.5.2 Management Options Study

The *Great Lakes Coastal Zone Management Plan: Options Study* (‘the Options Study’) (BMT WBM, 2015) outlines the range of management options to treat coastal risk. The Options Study is a companion document to this CZMP, and is provided in Appendix A.

The CZMP Guidelines and principles require a risk-based approach to managing coastal hazards. The risk-based approach used for this Great Lakes CZMP was adapted from the Australian Standard Risk Management Principles and Guidelines (AS/NZS ISO 31000:2009), and is explained in detail in the Options Study (Appendix A). As stated in AS/NZS ISO 31000:2009, risk is defined as the combination of likelihood and consequence.

Introduction***Risk = Likelihood x Consequence***

During the Options Study, the likelihood of the coastal hazards was determined based upon a review of the SMEC (2013) and WorleyParsons (2011) studies. The potential consequence of coastal hazards was assessed considering the natural, economic, social, and cultural heritage values of existing assets and land that may be affected. By combining the likelihood and consequence of the coastal hazards, the level of risk to specific land and assets in the coastal zone was identified.

Management options were developed to treat the areas and assets at high and extreme risk from coastal hazards, as documented in the Options Study. Management options were differentiated between existing assets and future assets (or redevelopments), as they require different approaches, funding mechanisms and community priorities for implementation.

In terms of community use and ecological health, a broad assessment of the community and ecological values associated with the Great Lakes coastal zone, and the level of threat to these values posed by issues typically experienced along the coast was conducted as part of the Options Study. This guided a broad listing of actions in the CZMP to preserve ecological health and community use of the Great Lakes coastal zone.

1.5.2.1 Summary of Assets at Risk

The outcome of the risk assessment for coastal hazards conducted as part of the Options Study highlighted the following assets to be at extreme or high risk from coastal hazards, at present or future (2060, 2100). The risk assessment was based upon assets identified within estimated hazard extents only, not including the zone of reduced foundation capacity. The slope instability risk assessment conducted for Number One Beach and Boat Beach in Seal Rocks did not identify any extreme or high risks (see SMEC, 2013). A complete list of assets likely to be affected by coastal risks is given in the Asset Risk Registers in the Options Study (Appendix A).

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Table 1-3 Assets at Extreme or High Risk from Coastal Erosion or Recession

Asset Type	Location	Extreme or High Erosion / Recession Risk		
		Present Day	2060	2100
Beaches	All beaches.	All	All	All
Dunes, Dune Vegetation	All beaches.	All	All	All
Roads	North St (Forster Main), Cliff Rd (One Mile), Lakeside Cr (Elizabeth), Seal Rocks Rd (Number One), Boat Beach access Rd, Kinka Rd (Boat Beach). By 2060 add Boomerang Dr (S. Boomerang), Newman Ave (Blueys). By 2100 add Red Gum Rd (S. Boomerang), Boomerang Beach Rd (Boomerang).	4 minor, 2 major	5 minor, 3 major	7 minor, 3 major
Stormwater - Outlets and Pipes	One Mile (1), Blueys (1 northern end); Forster Main (1 assuming no seawall), Elizabeth (1 Unknown risk). By 2060 add Elizabeth (1), Boomerang (4), Bennetts (1). By 2100, add Blueys (1).	3 + 1 unknown*	10 + 1 unknown*	11 + 1 unknown*
Water Infrastructure (Mid Coast Water)	Elizabeth (1), Forster Main (1, assuming no seawall). By 2060 add Boomerang (1), Forster Main (1, assuming no seawall). By 2100 add One Mile (1), Blueys (2).	2 pipe sections	4 pipe sections	7 pipe sections
Littoral Rainforest (SEPP26)	Remnants at One Mile, Seven Mile. By 2100, add Sandbar.	2 remnants	2 remnants	3 remnants
Residential Development	Southern Boomerang - 11 lots. By 2060 add 2 more lots at S. Boomerang, 9 lots on Blueys, Forster Main assuming no seawall. By 2100 add 9 lots at S. Boomerang, 37 lots at Blueys, lots at One Mile.	11 lots	22 lots +	68 lots +
Boat Ramps	Elizabeth Beach (east = unknown). By 2060 add Boat Beach (east), Boat Beach (middle).	1 unknown*	2 + 1 unknown*	2 + 1 unknown*

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Asset Type	Location	Extreme or High Erosion / Recession Risk		
Car Parks	Elizabeth Beach (east = unknown). By 2060 add Elizabeth Beach (North), One Mile Beach (South), Main Beach, Number One Beach. By 2100 add Elizabeth Beach (SLSC), One Mile Beach (SLSC), S. Boomerang, Bennetts.	1 unknown*	4 + 1 unknown*	8 + 1 unknown*
Beach Accessways (pedestrian, 4WD)	By 2060, all beaches.	-	All beaches	All beaches
Surf Clubs	By 2060 Cape Hawke SLSC at One Mile (note: DA approved with appropriate design floor levels and foundations). By 2100 add Tea Gardens-Hawks Nest SLSC at Bennetts, Forster SLSC at Forster Main (assuming no seawall).	-	1	3
Sewer Infrastructure (Mid Coast Water)	By 2060, Seven Mile (Gravity); S. Boomerang (Gravity, Rising), N. Blueys (Gravity), Bennetts (Gravity). By 2100 add One Mile (Gravity), Blueys (Pump Station, Rising and Gravity mains on Newman Ave), Forster Main (Gravity, assuming no seawall).	-	5 pipes	9 pipes, 1 pump station
Tourist Parks	By 2060, Sundowner Tiona at Seven Mile; Seal Rocks at Number One. By 2100 add Forster Beach (assuming no seawall/ bedrock).	-	2	3
Walkway / Cycleway	By 2060, Forster Main, assuming no seawall. By 2100, add sections at Forster Main (2), One Mile (1), Boomerang (1).	-	1 section	5 sections
Rural Zoned Land	By 2100, Boat Beach (1).	-	-	1
Waterways	Elizabeth Creek (unknown).	1 unknown*	1 unknown*	1 unknown*
Seawalls	Forster Main Beach, Number One Beach.	1 + 1 unknown*	1 + 1 unknown*	1 + 1 unknown*

* Note: "unknown" refers to an asset being at unknown risk, as it is adjacent to the shoreline, but the hazard lines have not extended to cover that section of shoreline. Refer to Action: *Revise Hazard Lines Based on Geological Data.*

Risk identification is based upon the estimated hazard extent not including the zone of reduced foundation capacity.

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Table 1-4 Assets at Extreme or High Risk from Wave Runup and Overwash

Asset Type	Location	Extreme or High Wave Runup Risk		
		Present Day	2060	2100
Residential Development	21 lots at S Blueys, 1 lot at Forster Main and 32 lots at One Mile. By 2060 add 1 lot at Blueys, 1 lot at Forster Main and 11 lots at One Mile.	54 lots	67 lots	67 lots
Sewer Infrastructure (Mid Coast Water)	Blueys (Gravity, Rising), Forster Main (Gravity), One Mile Beach (Pump Station, Gravity, Rising).	6 pipes, 1 pump station	6 pipes, 1 pump station	6 pipes, 1 pump station
Littoral Rainforest (SEPP26)	By 2060, Burgess, One Mile, and Seven Mile (2 remnants)	4 remnants	4 remnants	4 remnants
Seawall / Breakwater	Seawall at Number One Beach (Seal Rocks). By 2060 add Northern and Southern Breakwater at Cape Hawke Harbour (Wallis Lake). By 2100 add seawall at Main Beach (Forster).	1 seawall	1 seawall, 2 break-waters	2 seawalls, 2 break-waters
Stormwater - Outlets and Pipes	Elizabeth (1), Blueys (1), Forster Main (1) and One Mile (1). By 2060 add Blueys (1), Forster (1) and One Mile (1).	4	7	7
Surf Life Saving Clubs	By 2060 Cape Hawke SLSC at One Mile.	-	1	1
Walkway / Cycleway	By 2060, Forster Main (4), Pebbly (1) and Tuncurry (1)	-	6	6
Roads	By 2060 Lakeside Cr (Elizabeth) and Seal Rocks Road (Number One)	-	2 major	2 major

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1.6 Aligning the CZMP with Council's Integrated Planning and Reporting Framework

OEH has indicated that through the NSW Government's Stage 2 Coastal Reforms there will be a transition to incorporating coastal zone management planning within the local government IPR. This aims to mainstream coastal management into councils' overall service delivery and asset management responsibilities. It is also likely that streamlining actions in the CZMP with the service delivery and asset management process of Council will improve implementation of CZMPs.

To meet this aim, the Implementation Schedules of this CZMP have been designed to:

- Demonstrate the alignment between the CZMP actions and the activities in the current Delivery Program 2013-2017;
- Provide details (responsibility, performance measures, estimated costs/resource requirements) to enable Council to easily include or implement CZMP actions within their Operational Plan;
- Flag a timeframe to implement the CZMP action in accordance with the IPR reporting period, such that:
 - Immediate Actions should be implemented during the current Operational Plan (i.e. 2015-16)
 - Short term actions should be implemented during the current Delivery Program (2013-2017); and

- Long term actions should be implemented within the next 10 years, and can be integrated into later Delivery Programs (e.g. Delivery Program 2017-2021 and so on).

1.7 Integration with other Government Organisations and Stakeholders

Consultation with other Government Agencies has been an important component in developing this CZMP. Section 55C of the *Coastal Protection Act 1979* requires that a CZMP must not contain proposed actions or activities to be carried out by any public authority or relating to any land or other assets owned or managed by a public authority, unless the public authority has agreed to the inclusion of those proposed actions or activities in the plan. Proposed options were discussed with stakeholders during a workshop to gauge any possible issues. Formal written agreement for specific actions will be sought to support the submission of the Draft CZMP to the Minister.

1.8 Community Consultation

Community consultation is vital when developing a CZMP, and in gaining support for its implementation. A range of activities were conducted throughout the course of this project to engage with the general community, Council, the state agencies and other stakeholders. A summary of the consultation activities is provided in the Options Study (Appendix A).

Community and stakeholder responses in relation to the Draft CZMP have as far as possible been considered in finalising the CZMP. Council has drafted responses to the 18 submissions received in Appendix B.

2 Implementation Schedules

In preparing this CZMP, a strong focus has been maintained on preparing a practical and realistic program of activities that can be achieved within the next 5 years. Consideration has also been given to including realistic maintenance and monitoring costs over that period.

The preferred actions were selected based upon their technical feasibility, affordability, environmental and social benefit, and Council and community priorities for the next 5-10 years. A map illustrating the Great Lakes CZMP is provided in Figure 2-1.

For risks not expected to eventuate for 50 years or more, a risk mitigation option(s) has been identified along with a trigger for implementing the option, but it is unlikely these options will need to be actioned over the life of the plan (5-10 years). The pathway for managing future risk is discussed in Chapter 3.

2.1 Responsibilities

Council is primarily responsible for the implementation of this CZMP. The success of implementation, however, will be highly dependent on support from the local community and other government agencies. Responsibilities for each action are given in the implementation tables.

2.2 Timeframes

The design life of this CZMP is 5 years, with a full coastal processes review to be commenced prior to 2020, and revision of this CZMP into the new

Coastal Management Program (CMP) format required by 2021 in accordance with the new Coastal Management Bill 2016. Generally, 5-10 years is the maximum period that can be planned for in the local government budgetary context.

Each action within the plan has a suggested initiation date within the next 5 years. In reality available Council resources and funding grant success, and other external forces may inhibit this timeline. Opportunities to implement actions ahead of schedule may also arise. A process for the regular review of the Plan to track implementation of actions is described in Chapter 4.

It is noted that a key action to be commenced within this CZMP is a re-assessment of coastal processes and sediment budget for the Great Lakes Region, then specifically for Blueys and Boomerang Beaches in particular before 2020 (see Action 2.4.11). The revised coastal processes assessment will bring the revision of the CZMP forward to within or on 5 years.

The action to complete a full revision of coastal processes by 2020, including Blueys and Boomerang specifically, was requested by the Coastal Panel and the Minister for Planning to enable this CZMP to meet certification requirements. Such a study will allow for an earlier review of the entire CZMP into the new CMP format by 2021.

As commended by the Coastal Panel and the Minister for Planning, this CZMP contains a suite of management strategies to address coastal risks at specific sites and in a regional context for the Great Lakes coast. This includes best practise and state approved LEP and DCP provisions that will allow for continued appropriate development of the coastal zone, including for beaches such as Blueys and Boomerang. This plan also includes a

measured and responsible approach to the ongoing management of coastal risks to public assets and infrastructure such as roads, sewer, water, stormwater and recreational facilities.

2.2.1 Timetable for Actions Relating to Blueys and Boomerang Beach

In addition to the support given to the suite of management actions supplied in this CZMP to address coastal risks at Blueys and Boomerang Beaches, the NSW Coastal Panel and Minister for Planning requested an additional action to review coastal processes regionally (now Action 2.4.11) and strengthening of the options feasibility study at Boomerang Beach (Action 2.4.12) and Floodplain Risk Management Study for Blueys Beach (Action 2.4.19).

A staged timetable to give effect to the actions as required by the NSW Coastal Panel is provided in Table 2-1.

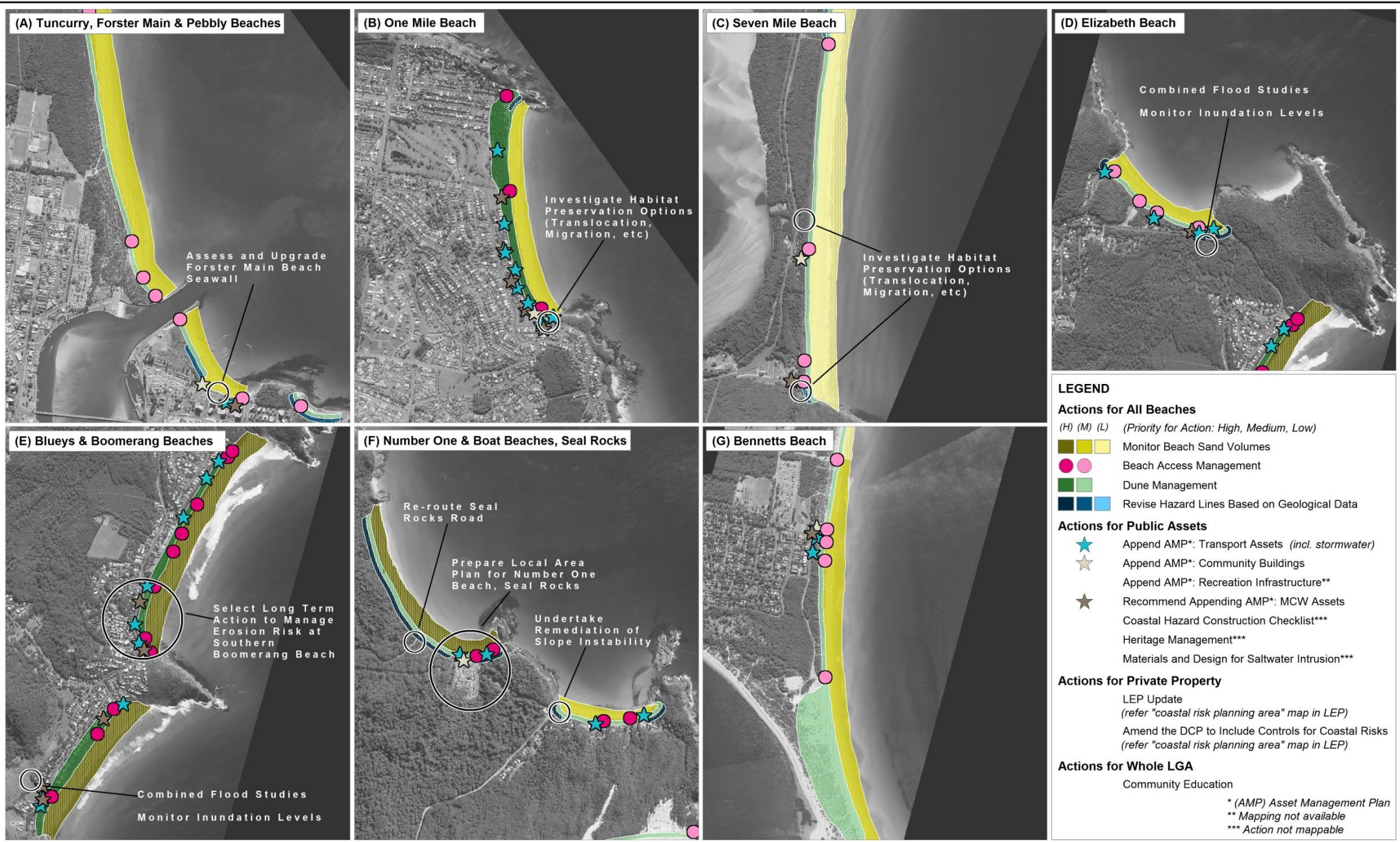
Table 2-1 Staged Timetable for Actions at Bluey and Boomerang Beaches

Action	Start Date	Completion Date
Action 2.4.11 Regional Coastal Processes, Sediment Budget and Coastal Risk Study , including:	2017	2019
• Coastal processes and sediment budgets defined for the entire Great Lakes region	2017	2018
• Specific re-assessment of erosion risks at Boomerang Beach (<i>completed in advance to aid Action 2.4.12, but will form a subsection of the regional study</i>)	Jan 2018	Dec 2018
• Specific assessment of potential influences of regional sediment budget on inundation risks at Blueys Beach (<i>completed in advance to aid Action 2.4.19, but will form a subsection of the regional study</i>)	Jan 2018	Dec 2018
• Coastal risks for the remaining beaches redefined, completing the regional study.	2018	Dec 2019
Action 2.4.12 Boomerang Beach Erosion Risk Management Options Study	Jan 2019	Jan 2020
Action 2.4.19 Combined Flood Study and Floodplain Risk Management Plan for Blueys Beach , incorporating findings of inundation review above.	Jan 2019	Jan 2020
Revision of CZMP into new CMP format (Section 4.3), using outcomes of the regional study	2020	2021

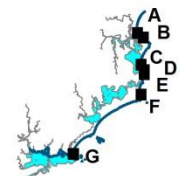
2.3 Funding Opportunities

A range of grant funding opportunities are available to assist with actions in a certified CZMP. These may be sought and used to implement the actions by different units within Council. This is in addition to the existing budgets and resources of Council that are available when implementing actions in the Delivery Program and Operational Plan. The following programs and other potential revenue streams may be investigated by Council when implementing actions in this CZMP:

- NSW Government Coastal Management Program (administered by OEH);
- NSW Government Estuary Management Program (administered by OEH);
- NSW Government Floodplain Management Program (administered by OEH);
- Hunter Local Land Services Grant Programs, including delivery of the Catchment Action Plan;
- Crown Lands Grant Programs;
- Federal and State Government Emergency Management Funding; Disaster Relief Funding;
- Federal and State Government Climate Change adaptation programs;
- New Council levies or increased land rates;
- Undertake a funding case study to use the Coastal Protection Service Charge to maintain (but not construct) new coastal protection works including beach nourishment works, see *Coastal Protection Service Charge Guidelines* (DECCW, 2010); and
- Revenue generated through hire, rental or other commercial partnerships with Council (e.g. for the SLSCs).



Beach Inset Maps:
 (A) Tuncurry, Forster Main & Pebbly, (B) One Mile, (C) Seven Mile, (D) Elizabeth, (E) Blueys & Boomerang, (F) Number One & Boat, Seal Rocks, and (G) Bennetts



Refer to Section 2.4 of this CZMP for Action Details

Title:
**Great Lakes Coastal Zone Management Plan
 Action Map**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Approx. Scale

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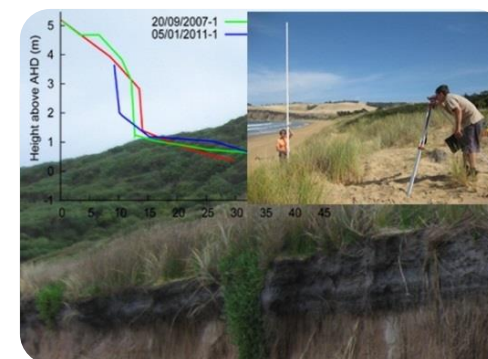
2.4 Implementation Action Plan

2.4.1 Monitor Beach Sand Volumes

Activity	Actions	Performance Measure	Responsibility
Monitor Beach Sand Volumes	<p>Develop and deliver a monitoring program for beach condition and volume, to determine when trigger points are reached and improve data for future revision of coastal hazard studies.</p> <ul style="list-style-type: none"> Utilise outputs from existing NSW Government programs, e.g. 3 yearly LiDAR and aerial photography/photogrammetry collection. Undertake monitoring after storm events. Check beach condition if real time $H_s \geq 3$ m and/or ocean water level ≥ 1.3 m AHD. Conduct monitoring if erosion is evident (refer Figure 3-2 for decision support tool for monitoring trigger points). Review monitoring data immediately on collection to check if asset trigger points have been reached (e.g. with a GIS based database). 	<p>Monitoring program developed by 2016.</p> <p>Trigger point set and monitoring commenced immediately (end 2016) for southern Boomerang</p> <p>Number of times Monitoring program delivered.</p>	<p>GLC: Design and Investigation.</p> <p>Existing NSW Government Programs</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 1 Objective 3</p> <p>Strategy 3.1</p> <p>Activity 3.1.1</p>	<p>Extreme Priority</p> <ul style="list-style-type: none"> Southern Boomerang trigger point to flag when risk of erosion to properties is imminent <p>High Priority</p> <ul style="list-style-type: none"> Blueys Seal Rocks Number One (focussing on Seal Rocks Rd protection works south to tourist park). <p>Medium Priority</p> <ul style="list-style-type: none"> One Mile Elizabeth Tuncurry (northern end) Boat Bennetts (southern end) Forster Main <p>Low Priority</p> <ul style="list-style-type: none"> Seven Mile Sandbar 	<p>Staff time.</p> <p>Link with existing NSW Government monitoring programs (e.g. OEH LiDAR, aerial photography collection).</p>	<p>Immediate 2015 / 2016 for development of program.</p> <p>Short term (2013-2017 Delivery Program) to commence program.</p>

Further Information

- Investigate the use of drones to collect and process data for high priority beaches/sites after severe storm events (e.g. ADS80 Aerial Photogrammetry). Collaborate with NSW Government (OEH) where storm erosion is severe across a large region.
- If required, use traditional survey techniques to monitor key sites/assets when erosion is evident.
- Installation of stakes at trigger points is recommended for assets on extreme and high priority beaches, as a community education tool.
- Survey cross sections should run perpendicular to the beach/shoreline, and be measured to the waterline (refer to TASMARC Survey Instructions – Levelling (2012) for example guidance). Survey should be collected in front of Council assets for which a trigger has been identified (see Asset Management), and otherwise at regular intervals along the beach (~100 m, or in line with cross section profiles used in the historical photogrammetry)
- In the future, 'trigger points' may be set as part of conditions of consent for developments on private land. It is currently unclear who will be responsible for monitoring 'trigger points' for private property. As part of preparing the monitoring program, consider how future monitoring needs for private residents may overlap, be incorporated, or contribute (physically or financially) to the beach monitoring program.



2.4.2 Append Asset Management Plan: Transport Assets

Activity	Actions	Performance Measure	Responsibility
Append Asset Management Plan: Transport Assets	<ul style="list-style-type: none"> Document in the Asset Management Plan the hazard type (erosion/recession, inundation, wave runup) and timeframe for impact (immediate, 2060, 2100) for all transport assets affected by coastal hazards, as shown by the hazard mapping. Determine an appropriate hazard management action for assets at immediate risk, then assets at risk by 2060 (which may include relocation, retrofit/redesign or manage to fail), and document this in the Asset Management Plan. Include the hazard management action in the asset replacement cost. Implement the action when the asset is due for replacement, or when a specified hazard trigger point is reached. Inform the Monitoring program of triggers for assets. 	Coastal Hazards actively considered in replacement / upgrade of transport assets and infrastructure.	GLC: Transport Assets; GLC Design & Investigation (to assist with hazard management action)
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 2 Objective 7 Strategy 7.1 Activity 7.1.1, 7.1.2.	<p>Transport Assets to be included:</p> <ul style="list-style-type: none"> Major Roads Minor Roads Car parks Stormwater outlets, pipes Footpaths Cycleways/Shared paths <p><i>Refer to Asset Risk Registers (see the Options Study, Appendix A) for transport assets at risk from erosion; and from wave runup at present to 2100; or, refer to Coastal Hazards Mapping.</i></p>	<p>Staff time or</p> <p>Minor consultancy (\$5,000-10,000) to assist with asset database.</p> <p>Funding Options: NSW Coastal Management Program, Federal / State Climate Change adaptation programs.</p>	Immediate 2015 / 2016

Further Information

Hazard management action may include:

- Relocation (as the first preference, see note below);
- Retrofit/redesign (which may include protection);
- Use of relocatable or sacrificial structures and materials; or
- Manage to fail.

Preferably, assets should be relocated outside of hazard impact zones, which allows natural beach movement and reduces impact on adjacent land uses. Particularly for car parks, the spaces could be reconfigured and the general amenity retained, without the need for protection, and allowing for some loss of land within the car park.

Where relocation is not feasible, any decision to “protect” an asset should involve careful consideration of adjacent land uses, and consultation with GLC Design and Investigation and others (see Coastal Hazard Construction Checklist).

Protection structures may cause erosion of adjacent land. Where the structure additionally protects adjacent land uses, shared funding arrangements may be possible (e.g. private landholders, asset owners such as Mid Coast Water, etc).

An appropriate trigger for erosion / recession management may include:

- When sand volume in front of the asset is less than or equal to 250 m³, commence funding, approvals etc for asset replacement; then
- When the zone of reduced foundation capacity (as determined by a suitably qualified structural / geotechnical engineer) is reached, commence asset replacement.

An appropriate trigger for inundation will relate to the frequency of inundation that can be tolerated, whilst still maintaining public safety.

2.4.3 Append Asset Management Plan: Community Buildings

Activity	Actions	Performance Measure	Responsibility
Append Asset Management Plan: Community Buildings	<ul style="list-style-type: none"> Document in the Asset Management Plan the hazard type (erosion/recession, inundation, wave runoff) and timeframe for impact (immediate, 2060, 2100) for all community buildings affected by coastal hazards, as shown by the hazard mapping. Determine an appropriate hazard management action for assets at immediate risk, then assets at risk by 2060 (which may include relocation, retrofit/redesign or manage to fail), and document this in the Asset Management Plan. Include the hazard management action in the asset replacement cost. Implement the action when the asset is due for replacement, or when a specified hazard trigger point is reached. Inform the Monitoring program of triggers for assets. 	Coastal Hazards actively considered in replacement / upgrade of community buildings.	GLC: Property & Building Assets; GLC Design & Investigation (to assist with hazard management action)
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 3 Objective 8 Strategy 8.1 Activity 8.1.1	<p>SLSCs at High Risk from Erosion By 2060: Cape Hawke SLSC at One Mile (note: DA approved with appropriate design floor levels and foundations). By 2100: Tea Gardens-Hawks Nest SLSC at Bennetts,</p> <p>SLSCs at High Risk from Wave Runup By 2060: Cape Hawke SLSC at One Mile.</p> <p>Tourist Parks at High Risk from Erosion By 2060: Sundowner Tiona at Seven Mile; Seal Rocks at Number One.</p> <p><i>Refer to Asset Risk Registers (see the Options Study, Appendix A) for all community buildings at risk from erosion; and from wave runoff at present to 2100; or, refer to Coastal Hazards Mapping.</i></p>	<p>Staff time or Minor consultancy (\$5,000-10,000) to assist with asset database.</p> <p>Funding Options: NSW Coastal Management Program, Federal / State Climate Change adaptation programs.</p>	Immediate 2015 / 2016

Further Information

Hazard management action may include:

- Relocation (as the first preference, see note below);
- Retrofit/redesign (which may include protection);
- Use of relocatable or sacrificial structures and materials, or
- Manage to fail.

Preferably, assets should be relocated outside of hazard impact zones, which allows natural beach movement and reduces impact on adjacent land uses. E.g. for tourist parks, facilities can be relocated and sites reconfigured, retaining the general amenity of the park without the need for protection, and allowing some loss of land within the tourist park.

Where relocation is not feasible, any decision to “protect” an asset should involve careful consideration of adjacent land uses, and consultation with GLC Design and Investigation and others (see Coastal Hazard Construction Checklist).

Protection structures may cause erosion of adjacent land. Or, where the structure additionally protects adjacent land, shared funding arrangements may be available (e.g. private landholders or other asset owners such as Mid Coast Water).

An appropriate trigger for erosion / recession management may include:

- When sand volume in front of the asset is less than or equal to 250 m³/m, commence funding, approvals etc for asset replacement; then
- When the zone of reduced foundation capacity (as determined by a suitably qualified structural / geotechnical engineer) is reached, commence asset replacement.

An appropriate trigger for inundation management will relate to the frequency of inundation that can be tolerated, whilst still maintaining public safety.

2.4.4 Append Asset Management Plan: Recreation Infrastructure

Activity	Actions	Performance Measure	Responsibility
Append Asset Management Plan: Recreation Infrastructure	<ul style="list-style-type: none"> Interrogate hazard mapping for <u>immediate</u> timeframe against recreation infrastructure, to document in the Asset Management Plan the potential hazard (erosion/recession, inundation, wave runup) to all recreation infrastructure. Include hazard type and timeframe as part of condition audit (e.g. calculating asset replacement costs and timeframes). For assets at risk, document approach to hazard impacts in Asset Management Plan (see further information). 	Coastal hazards actively considered in the placement and materials used for new and renewed recreation assets.	GLC: Parks and Recreation
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 3 Objective 8 Strategy 8.1 Activity 8.1.1, 8.1.2	Beach Accessways Viewing Platforms Walkways Picnic tables Public Toilets Boat ramps Other minor community facilities <i>Recreational assets have not been included in the Asset Risk Registers, as GIS based mapping was not available. Council will need to overlay Coastal Hazard mapping (immediate timeframe only) with asset location information to determine assets at risk for key assets on the high priority</i>	Staff time or Minor consultancy (\$5,000-10,000) to assist with asset database. Funding Options: NSW Coastal Management Program, State/Federal Climate Change adaptation programs. For asset replacement, may be eligible for emergency management or disaster relief funding.	Immediate 2015 / 2016

Further Information

Approaches to hazard management may include:

- Relocate and/or replace asset landward of immediate impact area, if and when damages occur (e.g. beach accessways);
- Consider the use of relocatable structures for more substantial facilities (e.g. lifeguard towers), and setting of triggers to move such structures in the event of a storm; and
- Consider designing sacrificial structures in locations where a facility is needed, but the risk of impact is high (e.g. viewing platforms).



For some recreational assets such as beach accessways and 4WD tracks, this action shall initially require that an inventory of accessways (location, construction type) be collated and added to the Asset Management Plan.

As recreation infrastructure is generally of short lifespan (< 50 years), consideration of future timeframes of 2060 and 2100 is not relevant to managing these assets.

2.4.5 Recommend Appending Asset Management Plans MCW Assets

Further Information

None.



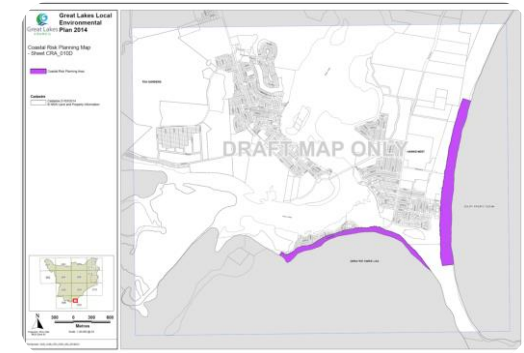
Activity	Actions	Performance Measure	Responsibility
Recommend Appending Asset Management Plans: MCW Assets	<p>Establish a working group with Mid Coast Water (MCW) (and other service providers as required), to assist each other in managing assets.</p> <p>Provide coastal hazards information MCW, to support them to document in their Asset Management system the hazard type (erosion/recession, inundation, wave runoff) and timeframes for impact (immediate, 2060, 2100) for all water and sewer assets in the coastal zone. This aims to encourage MCW to:</p> <ul style="list-style-type: none"> • use hazard likelihoods as part of calculating asset replacement costs and timeframes; • determine suitable future action for assets at high risk (which may include relocation, retrofit/redesign or manage to fail); and • document the preferred action in Asset Management Plan for implementation, either when the asset is due for replacement, or a hazard impact occurs. 	<p>Hazard mapping and asset risk register information has been provided to MCW.</p> <p>MCW has agreed to use hazard information in their asset management.</p>	<p>GLC to convene working group, and provide hazards information to MCW.</p> <p>MCW is responsible for updates to Asset Management Plans <i>(written agreement for this action required)</i>.</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 1 Objective 3 Strategy 3.1.1	<p>Water infrastructure at High Risk from erosion</p> <p>Present: Elizabeth (1).</p> <p>By 2060: Boomerang (1),</p> <p>By 2100: One Mile (1), Blueys (2).</p> <p>Sewer infrastructure at High Risk from erosion</p> <p>By 2060: Seven Mile (Gravity); S. Boomerang (Gravity, Rising), N. Blueys (Gravity), Bennetts (Gravity).</p> <p>By 2100: One Mile (Gravity), Blueys (Pump Station, Rising and Gravity mains on Newman Ave), Forster Main (Gravity, assuming no seawall).</p> <p>Sewer infrastructure at High Risk from Wave Runup</p> <p>Present: Blueys (Gravity, Rising), Forster Main (Gravity), One Mile Beach (Pump Station, Gravity, Rising).</p>	Staff time	Immediate 2015 / 2016

2.4.6 LEP Update

Activity	Actions	Performance Measure	Responsibility
LEP Update	<p>Update the LEP Coastal Risk Planning Area maps with the latest coastal hazard estimates (as per the currently proposed amendment).</p> <p>At a subsequent LEP review, modify this area to be termed the “Coastal Planning Area”, as analogous to the existing “Flood Planning Area”.</p> <p>Update the Area whenever coastal hazard mapping is revised.</p> <p>Where necessary and feasible, consider rezoning of land to provide retreat buffers for migration of beach and other coastal ecosystems.</p>	The LEP Coastal Risk Planning Area has been amended to include the latest coastal hazards mapping.	GLC: Strategic Land Use Planning.
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1; Key Direction 3 Objective 9 Strategy 9.1 Activity 9.1.1</p> <p><i>Secondary ref:</i> Key Direction 1 Objective 2 Strategy 2.1 Activity 2.1.1</p>	<p>Future development Rezoning to provide buffers: Littoral rainforest, saltmarsh. Current zonings are suitable at beaches at present (no changes required).</p>	Staff time	Immediate 2015 / 2016; Ongoing

Further Information

- An amendment to the LEP to capture revised coastal risk planning area maps covering all areas subject to a 2060 hazard line has commenced.
- Future changes to the LEP should include a change of wording from “Coastal Risk Planning Area” to “Coastal Planning Area”, as this is analogous to the terminology applied for Flood Planning. Such a change would involve negotiations with the Department of Planning.



2.4.7 Amend the DCP to Include Controls for Coastal Risks

Activity	Actions	Performance Measure	Responsibility
Amend the DCP to Include Controls for Coastal Risks	<p>Amend the Great Lakes DCP to detail controls for managing development applications on land within the Coastal Risk Planning Area (as mapped within the LEP). The DCP shall aim to minimise or avoid risk to life and property, including adverse impacts to neighbouring property including public property. The DCP shall aim to limit the financial losses of the impacts of coastal hazards on property, while still providing for the development and redevelopment of coastal land in a manner that is appropriate to the expected hazard impact over the lifespan of the new development.</p> <p>Providing development controls seeks to avoid inappropriate development of land affected by coastal risks. The controls do not unnecessarily sterilise land prior to the occurrence of coastal hazard impacts.</p>	<p>The DCP has been amended to include development controls for coastal risks.</p> <p>Number of DAs approved that meet required Coastal Risk Planning Area development control objectives.</p>	<p>GLC: Strategic Land Use Planning. DCP amendments to be implemented by GLC: Development Assessment</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1;</p> <p>Key Direction 3 Objective 9 Strategy 9.1 Activity 9.1.1</p> <p>Secondary ref: Key Direction 1 Objective 2 Strategy 2.1 Activity 2.1.1</p>	<p>DCP applies to all future developments (infill, re-developments, greenfields) in the Coastal Risk Planning Area.</p> <p>Highest Priority: Redevelopments at southern Boomerang Beach.</p> <p><i>NB – Future amendments to the LEP may include a change of wording from Coastal Risk Planning Area to Coastal Planning Area. The DCP should be amended accordingly.</i></p>	<p>Staff time</p>	<p>Immediate 2015 / 2016; Ongoing</p>

Further Information

Controls for coastal risks should include the following.

- For subdivisions, the building envelope, services (water, sewer, electricity, stormwater etc), and other structures (roads, retaining walls, etc) shall be located outside of the coastal risk planning area. Services and other structures are also not to be located seaward of the building envelope.

- New buildings, additions to existing buildings (which includes replacement/refurbishment of existing floor area) should be located outside of the coastal risk planning area wherever possible.
- New buildings and additions may only be permitted within the coastal risk area, provided:
 - A report from a suitably qualified structural engineer certifying either:
 - Building footings (including strip-footings and piers) are designed to provide safe bearing below or beyond the zone of reduced foundation capacity (as calculated specifically for the proposed site); or
 - The building is designed to be easily removed or relocated, once a specified 'trigger' is reached. The 'trigger' would be set as part of the conditions of consent for the development; and
 - Vehicle access and services associated with the building/addition is located outside of the coastal risk planning area;
 - If erosion protection measures are proposed, this must be located wholly within the private property boundary of the proponent (i.e. not on adjacent public or private land); and the measures designed to avoid adverse impacts to adjacent property (public or private).
- Ancillary structures (e.g. swimming pools, retaining walls) shall likewise only be permitted within a coastal risk planning area if they comply with the above requirements, and are also designed to be structurally separate from the existing building (to facilitate their removal / relocation).
- Where a 'trigger point' is set in the conditions of consent, this may trigger future actions such as: further investigation of the coastal hazard; landward relocation of the structure; or removal of the structure and stabilisation of the land. It may also trigger cessation of use or occupation of the building/structure.
- The 'trigger point' may relate to an amount of beach erosion (volume of sand or distance) seaward of the building/structure envelope, the zone of reduced foundation capacity, or other measurable factor relating to coastal hazard. The 'trigger point' should be designed to provide sufficient time for inhabitants to evacuate and the building/structure be removed / relocated. This aims to avoid uncontrolled collapse of the building/structure that would pose a risk to life and property.
- Responsibility for monitoring of the 'trigger point' (e.g. surveying after storm events to measure distance to the trigger) should be specified as part of the conditions of consent. This may include financial contribution from the proponent for monitoring to be conducted within an existing Council program.

The DCP should continue to be amended as new hazards information is made available, approaches to controlling development and coastal risks are improved, and feedback from the community and council regarding the practicality of implementing the DCP provisions is gathered.

2.4.8 Coastal Hazard Construction Checklist for Council Works

Activity	Actions	Performance Measure	Responsibility
Coastal Hazard Construction Checklist for Council Works	<p>Prepare a checklist / policy for internal use by Council when replacing, repairing, protecting or building new infrastructure in the coastal zone. The checklist shall augment the self-assessment (REF) process. The checklist shall identify:</p> <ul style="list-style-type: none"> • Where to access coastal hazard information; • Other officers/departments in Council to be consulted, particularly Design and Investigations who manage the coastal management program; • Other agencies required to give concurrent consent (e.g. Crown Lands, MEMA, NPWS); and • Controls / measures to reduce coastal risk to the new construction. <p>The measures should consider the lifespan of the proposed structure and apply coastal risk controls accordingly, such as:</p> <ul style="list-style-type: none"> • assets that have an intended lifespan of 50-100 years, and /or are extremely costly (e.g. stormwater assets) should be located outside of the coastal risk planning area wherever possible; • assets that have an intended lifespan of 10-20 years, and / or that are relatively inexpensive (such as beach viewing platforms or picnic tables) may be permitted within the immediate hazard area. Council should flag the asset as temporary or sacrificial (in the Asset Management Plan), to be removed and replaced landward once a hazard impact has occurred. • The recommended controls / measures should replicate those in the proposed Coastal Risk Planning Area section of the DCP (see Amend the DCP to Include Controls for Coastal Risks). 	<p>A Checklist / Policy has been prepared. Number of times the Policy has been used.</p>	<p>GLC: Design and Investigations. Checklist to be utilised by all departments, especially:</p> <ul style="list-style-type: none"> -Operations -Parks and Recreation -Property and Building Services -Transport Assets -Development Assessment
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1; Key Direction 4 Objective 14 Strategy 14.3-4 Activity 14.4.2, 14.3.4	Future council assets, Replacement council assets (see <i>Asset Risk Registers in the Options Study, Appendix A</i>)	Staff time, or Minor consultancy (\$5,000).	Immediate 2015 / 2016; Ongoing

Further Information

Recommended controls/measures may include:

- Assets constructed to be readily relocated, either prior to a storm (e.g. lifeguard towers), when an impact occurs (e.g. stormwater outlets progressively shortened as beach erosion occurs); or at a specified 'trigger point';
- Assets designed with foundations to provide bearing capacity below the zone of reduced foundation capacity, or otherwise designed to withstand erosion impacts; or
- In the case of essential services where there is no viable alternative location, coastal protection works may be appropriate. The structures must be designed by a suitably qualified coastal engineer, include measures to reduce or ameliorate adverse impacts to adjacent public or private land caused by the structure; and provide for public access and amenity wherever possible.

Triggers for asset relocation may include:

- A predicted storm event (e.g. $H_s \geq 3$ m and / or ocean water level ≥ 1 in 1 yr ARI of 1.3 m + SLR);
- When a specified sand volume has been eroded, as measured seaward from the asset;
- When a specified distance is reached, as measured seaward from the asset to the erosion escarpment (e.g. 4m AHD); or
- When the zone of reduced foundation capacity is reached, as measured seaward from the asset to the erosion escarpment.



2.4.9 Beach Access Management

Activity	Actions	Performance Measure	Responsibility
Beach Access Management	<p>Rationalise, improve and maintain pedestrian and 4WD access to protect beach / dune health and provide high quality and safe public access to the beach. This may include the following tasks.</p> <ul style="list-style-type: none"> Formalise and upgrade preferred beach access paths; Close and rehabilitate unnecessary or informal paths. Consolidate the number of private accessways by negotiation with beachfront residents to create shared paths. Remove informal / illegal private paths (Some urban beaches have numerous private access paths, reducing the integrity and performance of the dune system). Inspect the condition of accesses after storms. Temporarily close unsafe, damaged or eroded accessways, and repair as soon as practicable. Refer to decision support tool for monitoring beach accesses after storms in Figure 3-1. 	Number of beach accessways maintained or upgraded.	<p>GLC: Parks and Recreation.</p> <p>For 4WDs, may involve negotiations with Greater Taree Council (combined Vehicles on Beaches Policy that involves a permitting system and issue of a map of where vehicles are permitted and general codes of conduct); NPWS; and MEMA (who allow vehicles on beaches from designated boat launching facilities for purpose of launching and retrieving vessels)</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 3 Objective 8 Strategy 8.1 Activity 8.1.1, 8.1.2. Strategy 8.2 Activity 8.2.1.</p>	<p>High Priority</p> <ul style="list-style-type: none"> Blueys Beach Number One Beach (linking to LAP Action, see below) One Mile Beach Boomerang Beach Boat Beach Pebbly Beach – tanks opposite Forster School Burgess Beach (accessway, viewing platform – erosion and unstable cliffs) <p>Medium Priority</p> <ul style="list-style-type: none"> Remaining Council managed beaches. <p>High Priority 4WD Accesses</p> <ul style="list-style-type: none"> North Tuncurry/Nine Mile/ Darawank Beach Sandbar <p>Illegal 4WD access at:</p> <ul style="list-style-type: none"> Jimmys Hawks Nest / Bennetts Beach / Yacaaba Treachery, Lighthouse and Number One Beaches at Seal Rocks. 	<p>Staff time and existing budget. Seek additional funding.</p> <p>Funding Option: NSW Coastal Management Program, Crown Lands Grant Programs, Hunter Local Land Services Grant Programs.</p>	Immediate 2015 / 2016

Further Information

Additional considerations include:

- Investigate internet / smart phone / tablet based packages to log beach access inspections and upload details to the Asset Management Plan, and forward repairs & maintenance requirements to works crews.
 - Utilise novel approaches to reduce informal pedestrian or 4WD traffic on dunes and beaches, e.g. by fencing formal paths; placing beach showers at the end of preferred pedestrian paths, etc.
 - Investigate materials for beach accessways that are more resilient to storm damage.
 - For temporary closure of accessways (pedestrian or 4WD), use approaches that reduce the ability for informal access around the damaged path, e.g. fencing or other obstructions. Informal trampling around closed paths often increases the damage footprint.
 - Increase resources for compliance and repairs.
- Further actions relating to 4WD tracks are as follows.
- Rationalise and simplify signage to increase compliance (requires collaboration between authorities).
 - Link Sandbar/Smiths Lake 4WD access to entrance conditions.
 - Target compliance activities to peak usage times of day/year, events (e.g. surfing comps), and at illegal and legal access.
 - Monitor patterns of usage and impacts.
 - Temporarily close tracks to allow regeneration (and consult with community to explain the purpose of the closure(s)).

Note: an inventory of accessways (location, construction type, 4WD, pedestrian) will need to be collated and added to the Asset Management Plan, see Append Asset Management Plan: Recreation infrastructure.



2.4.10 Dune Management

Activity	Actions	Performance Measure	Responsibility
Dune Management	Implement dune care / revegetation programs, with new programs in locations where vegetation is degraded (voluntary and non-voluntary), and continued (or increased) resourcing of existing successful Dunecare programs (voluntary and Council-run).	Number of existing programs continued. Number of new dune care programs established.	GLC: Parks and Recreation
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 1 Objective 1 Strategy 1.1 Activity 1.1.3	<p>Highest Priority:</p> <ul style="list-style-type: none"> • Blueys • One Mile <p>Continue Existing Programs:</p> <ul style="list-style-type: none"> • Boomerang Beach <p>Medium Priority Remaining Council managed beaches</p>	<p>Existing staff and budget, plus seek collaboration with other agencies or new grants.</p> <p>Funding Options: NSW Coastal Management Program, Collaboration with or new funds through Crown Lands Grant Programs, Hunter Local Land Services Grant Programs, and / or NPWS activities.</p>	Immediate 2015 / 2016

Further Information

This activity may include:

- Collaboration between landholders (e.g. Council, NPWS, Crown Lands);
- Trials/ pilot programs for best practise methods;
- Inspection of dunes after erosion events to remediate storm impacts (see Table 3-1) decision support tool for storm event monitoring);
- Investigation of capture and deterrent methods for landowners clearing vegetation to improve their views, e.g. installation of remote cameras; and/or
- Investigation of impact of vegetating active sand dunes, i.e. at northern One Mile Beach.



2.4.11 Regional Coastal Processes, Sediment Budget and Coastal Risk Study

Activity	Actions	Performance Measure	Responsibility
Regional Coastal Processes, Sediment Budget and Coastal Risk Study	<p>Conduct a comprehensive review of coastal processes and risk for the former Great Lakes LGA coastline. The review must include the following elements:</p> <ul style="list-style-type: none"> • Re-assessment of coastal processes acting on the Great Lakes coast in the context of the sediment compartment within which it exists; • Development of a comprehensive and robust sediment budget understanding for the region, including a review of (but not limited to) the texts listed as “Further Information” with this action; • Assessment of the location and extent of bedrock particularly at the ends of the beaches, which may include geophysical investigation, and interpretation of geological data. The data shall be used to taper or ‘tie-in’ the revised coastal risk lines to areas of known bedrock. • Application of a risk-based approach to defining coastal risk probabilities at each beach; • Re-assessment of risks relating to sea level rise (recession and inundation), using the latest available projections (e.g. within CSIRO, 2015) within a risk-based scenario framework. • Consider alternate approaches to the Bruun Rule (1962) for assessing shoreline impacts of sea level rise, particularly for Boomerang Beach (e.g. Cowell’s Shoreface Translation Model, Patterson’s Shoreline Evolutions Model etc.). • Re-assessment of erosion (present and future) risks and the zone of reduced foundation capacity at Boomerang Beach, in advance of remaining beaches. The re-assessment is to be conducted in light of new sediment budget understanding, sea level rise projections, geologic data (refer BMT WBM, 2014), and alternate approaches to Bruun (1962). • Re-assess the potential for inundation at southern Blueys Beach in view of the improved sediment budget understanding. Outcomes to inform the Combined Flood Study (see Action 2.4.19) 	<p>Coastal processes and sediment budgets have been defined for the entire Great Lakes region by 2018.</p> <p>Specific re-assessments of erosion at Boomerang Beach and inundation at Blueys beach by end 2018 (to be provided in advance, but will form subsection to overall study on completion).</p> <p>Coastal risks for the remaining beaches redefined by 2019.</p>	GLC: Design and Investigations.

IPR Ref.	Locations	Cost / Resources / Funding Option	Time-frames
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1	<p>Entire Great Lakes LGA coastline.</p> <p>Advanced findings to be provided for Blueys and Boomerang Beaches</p> <p>Geologic study priorities - High:</p> <ul style="list-style-type: none"> • Number One • One Mile • Elizabeth • Boat <p>Medium Priority:</p> <ul style="list-style-type: none"> • Forster Main • Pebbly • Seven Mile <p>Low Priority:</p> <ul style="list-style-type: none"> • Sandbar • Bennetts • Nine Mile (Tuncurry) 	<p>\$150,000 for external consultancy for all elements listed, including geologic studies at all locations listed.</p> <p>Funding Option: NSW Coastal Management Program.</p>	Immediate commencement (2016/2017 Operational Plan)



Further Information

The coastal processes re-assessment should include, but not be limited to, the following data reports:"

- Roy, P.S., Zhuang, W.Y., Birch, G.F., Cowell, P.J. and LI Congxien. (1997) *Quaternary Geology of the Forster-Tuncurry Coast and Shelf, Southeast Australia*. Geological Survey of New South Wales Department of Mineral Resources.
- Nielsen, A. F. and A. D. Gordon. (2011) The Impact of Entrance Breakwaters on Large Estuaries. *Proceedings 34th IAHR World Congress, Brisbane, 26th June – 1st July, 2011*.
- Kinsela, M. A., Daley, M.J. and P.J. Cowell. (2016) Origins of Holocene coastal strandplains in Southeast Australia: Shoreface sand supply driven by disequilibrium morphology. *Marine Geology*, 374, pp.14-30.

An example of the assessment of location and extent of bedrock, and tying of hazard lines into areas of known bedrock that is required in this study is contained in:

- BMT WBM (2014). *Bedrock Based Coastal Hazard Revision for Blueys and Boomerang Beach*.
- BMT WBM (2014). *Ground Penetrating Radar Investigation of Blueys and Boomerang Beaches*.

2.4.12 Boomerang Beach Erosion Risk Management Options Study

Activity	Actions	Performance Measure	Responsibility
Boomerang Beach Erosion Risk Management Options Study	<p>Conduct a Boomerang Beach Erosion Risk Management Options Study, to:</p> <ul style="list-style-type: none"> Develop a suite of viable options to manage coastal erosion (and reduced foundation capacity) risks particularly at the southern end of Boomerang Beach Conduct a detailed cost benefit analysis and funding investigation (business case / economic model, and funding model) for the options; and Determine a viable management strategy (which may include a suite of staged actions) to specifically address coastal erosion risks at Boomerang Beach. <p>This detailed investigation should involve:</p> <ul style="list-style-type: none"> Use of the revised erosion and reduced foundation capacity risk profile across Boomerang Beach (derived through Action 2.4.11) when developing options for the present and future. Comprehensive and ongoing engagement with the community, including but not limited to the directly affected residents, when developing and assessing the management options. 	<p>Options study is commenced by 2019 and completed by 2020.</p> <p>Funding and approvals to implement preferred option have commenced.</p>	GLC: Design and Investigation
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1	Southern end of Boomerang Beach	<p>External consultancy ~ \$40,000.</p> <p>Funding Options: NSW Coastal Management Program, Federal / State Climate Change adaptation programs.</p>	Short term (2017-2021 Delivery Program), with study to be commenced and completed by 2020.

Further Information

Setting and monitoring of a trigger for erosion risk to the southern properties on Boomerang Beach has been given extreme priority within Action 2.4.1 Monitoring of Beach Sand Volumes. This aims to flag when or if the risk of erosion requires action prior to completion of this options study action.

Implementation of the DCP section for the Coastal Risk Planning Area will provide for appropriate development practises on the at-risk foreshore properties at present, prior to implementation of this action. Controls may include piling / piers into the stable foundation zone, or use of relocatable structures.



Options investigated in the Options Study (Appendix A), that may be reconsidered through this action included:

- Beach nourishment;
- Seawall construction (with nourishment); and
- Accepting impacts, involving the purchase of private properties, relocation of public assets (roads, stormwater, sewer, water) and accepting impacts (loss) of public foreshore land.

Should a protection structure be selected, the design should provide for public access and amenity (e.g. promenades, stepped seating etc.).

2.4.13 Community Education

Activity	Actions	Performance Measure	Responsibility
Community Education	Undertake a range of activities through a range of media (website, newspaper, meetings, seminars, brochures, social media etc) to improve understanding of coastal risks, and target key issues of community use and ecological impacts on the coast.	Number of events held and attendees. Number of articles in various forms of media. Number of hits to relevant webpages. % reduction in non-compliant behaviour (as relevant).	GLC: Natural Systems, Parks and Recreation, Management Executive Team.
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 1 Objective 1 Strategy 1.2 Activity 1.2.1 Strategy 1.4 Activity 1.4.2 Key Direction 4 Objective 15 Strategy 15.1 Activity 15.1.1	Whole LGA, not just beachside residents. Activities / education material may be targeted to: <ul style="list-style-type: none"> users (e.g. real estate agents, conveyancers, fishers, walkers, 4WDers etc); and issues (e.g. teaching value of dunes to discourage removal of vegetation for views). 	Staff time, existing budget plus seek additional funding. Funding Options: State / Federal education, environmental, and / or climate change adaptation grants programs.	Short term (2013-2017 Delivery Program)

(perpendicular to the stake in a seaward direction). Monitoring would be led by Council staff with community volunteers. The data should then be uploaded to Council's website and combined with outputs from other Monitoring of Sand Volume actions, and freely available sea level information etc.

- Teach the value of dunes and dune vegetation to provide a buffer to storms, in addition to ecological benefits. Target some content / media towards foreshore residents where dune vegetation has been 'pruned' to enhance views.
- Seminars for real estate agents and conveyancers to explain the DCP coastal risk planning provisions and Section 149 notifications, to improve information flowing to buyers and sellers of coastal property regarding development potential of land.

Activities to support community use and ecological health actions, may include, for example:

- Targeted education (e.g. via holiday rentals, 4WD permit distributors) about impacts of illegal 4WD and pedestrian traffic on dunes;
- "Codes of practise" for key users/ uses, e.g. surf competition organisers to reduce beach use conflicts; domestic animal owners to reduce cat/dog impacts on native wildlife and manage litter; etc;
- Education (e.g. via signage, Council's website, campervan rentals) for campers regarding free campsites, and risks from bushfire at illegal sites;
- Programs to help community identify and respect valuable habitat areas, e.g. littoral rainforest, intertidal rocky shores;

Further Information

Activities to improve understanding of coastal hazards and related issues may include the following.

- Provide ongoing information about coastal hazards and risks, to build acceptance and resilience surrounding coastal risk management, which may include updates on CZMP implementation, beach monitoring (see below).
- Establish beach-based Coastal Stakeholder Groups comprising OEH, Council, property owners, local beach users from wider area, community organisations (Boardriders, Dunecare), tourism, utilities (sewer, water, electricity, telecomms, etc.), Department of Planning and other relevant state agencies.
- Develop a Community Beach Sand Monitoring Program. This may involve placing stakes or poles as trigger markers for key 'at-risk' assets/sites. Traditional ground survey and photographs would be collected

- Targeted education regarding litter impacts on marine life (e.g. for recreational fishers, commercial fishers, tourists, school children, surfers, SLSCs etc); and
- Education regarding dumping of garden (and other) waste in reserves.



2.4.14 Assess and Upgrade Forster Main Beach Seawall

Further Information

None.



Activity	Actions	Performance Measure	Responsibility
Assess and Upgrade Forster Main Beach Seawall	<ul style="list-style-type: none"> Assess the seawall at Forster Main Beach to determine its current condition, ability to provide future protection from recession and wave overtopping, and maintenance needs (including raising the structure to manage wave overtopping). The assessment may require excavation to inspect the seawall. Recommended upgrades should aim to meet protection objectives in a manner that improves public access and amenity of the seawall. Add seawall into appropriate Asset Management Plan and schedule upgrades and ongoing maintenance to the seawall based upon condition assessment outcomes. Deliver program of upgrades and maintenance to Forster Main Beach Seawall. 	<p>Seawall condition has been assessed, Seawall added to appropriate AMP, program of upgrades developed.</p> <p>% of upgrades underway by 2025.</p>	<p>GLC: Design and Investigation, Parks & Reserves, Operations</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 2 Objective 7 Strategy 7.1 Activity 7.1.2</p>	<p>Forster Main Beach Seawall</p> <p><i>Note: the Asset Risk Registers in the Options Study (Appendix A) identify numerous facilities protected by this wall that would benefit from this action, including Forster SLSC, cycleway/walkway, stormwater assets, sewer assets, water services and Forster Beach Tourist Park.</i></p>	<p>Minor consultancy for condition assessment (~\$5,000). Use of Council plant and staff for excavation (if required). Staff time to schedule upgrades.</p> <p>Funding Options: NSW Coastal Management Program; State or Federal Climate Change adaptation programs, emergency management programs.</p>	<p>Short term (2013-2017 Delivery Program) for assessment, upgrades commenced by 2025.</p>

2.4.15 Re-route Seal Rocks Road

Activity	Actions	Performance Measure	Responsibility
Re-route Seal Rocks Road	<p>Commence process for re-routing Seal Rocks Road, and rehabilitate existing road corridor to appropriate public use.</p> <ul style="list-style-type: none"> Commence negotiations with NPWS and Crown Lands to select and gain permissions for an alternate route through Crown and NPWS land. An existing but unused Crown Lands road easement (west of the Seal Rocks Holiday Park) may be a suitable route. Once re-routed, remove and rehabilitate the road (including recent seawall construction) to complementary public use. 	<p>New road easement for Seal Rocks Road has been agreed between GLC and relevant state agencies.</p> <p>Rehabilitation of existing Seal Rocks Rd and seawall is included in Local Area Plan (see Section 2.4.16.)</p> <p>% of the road re-alignment and rehabilitation of former road complete.</p>	<p>GLC: Design and Investigations and GLC: Transport Assets.</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1</p> <p>Key Direction 2 Objective 7 Strategy 7.1 Activity 7.1.2</p>	<p>Seal Rocks Road, Number One Beach, Seal Rocks</p>	<p>Staff time. Costs for road re-alignment to be determined through the course of the action.</p> <p>Funding Options: NSW Coastal Management Program; State & Federal grant programs to re-align road.</p>	<p>Commence negotiations and plans immediately (2015-2016).</p> <p>Complete road re-route in Long Term (10 – 20 year financial plan).</p>

Further Information

New uses for the rehabilitated road section will be determined through the Local Area Plan for Number One Beach (see next Action). Future uses for the existing roadway should:

- Focus on community access and recreation
- Be of a sacrificial nature, to allow recession of the sandy beach to progress unimpeded into the substantial transgressive dunes landward of the existing roadway.



2.4.16 Prepare Local Area Plan for Number One Beach, Seal Rocks

Activity	Actions	Performance Measure	Responsibility	
Prepare Local Area Plan for Number One Beach, Seal Rocks	<p>Prepare a Number One Beach, Seal Rocks Local Area Plan (LAP) (e.g. Plan of Management, Public Domain Plan etc.) to rationalise and improve community access and resolve conflicts of use. The Plan should address the following issues:</p> <ul style="list-style-type: none"> manage parking conflicts, including rationalisation, improved design of car park areas etc; improve management of stormwater runoff across Seal Rocks Road and parking areas; improve and formalise beach access and remediate informal paths; improve recreational facilities, for example, picnic areas and shade; manage provision of services and conflicts of use between the camp ground and the beach; rehabilitate Seal Rocks Road to a low key and low impact community use that can be sacrificial in the event of beach erosion (e.g. grassed picnic area etc); when rehabilitating Seal Rocks Road, manage soil creep and debris slides relating to stormwater runoff; and enhance environmental values of the precinct. 	LAP completed and approved. % of LAP implemented	GLC: Parks and Recreation; GLC Transport Assets; GLC Design and Investigation	
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes	
Key Direction 3 Objective 8 Strategy 8.1 Activity 8.1.2	Number One Beach, Seal Rocks	<p>External consultancy \$25,000 to prepare Local Area Plan.</p> <p>Additional funds will be needed to implement LAP</p> <p>Funding Option: NSW Coastal Management Program; Crown Lands Grants Program.</p>	Short term (2013-2017 Delivery Program)	

Further Information

This action should utilise the revised / extended hazard lines at Number One Beach (refer Action: Revise Hazard Lines Based on Geological Data).

Note that negotiations with NPWS and MEMA will be required to prepare and implement a local area plan.



2.4.17 Investigate Habitat Preservation Options

Further Information

None.



Activity	Actions	Performance Measure	Responsibility
Investigate Habitat Preservation Options (Translocation, Migration, etc)	<p>For important habitat remnants, determine translocation, facilitated migration or other feasible option to preserve the remnant, where possible. This may involve the following:</p> <ul style="list-style-type: none"> Combine coastal hazards mapping with ecological habitat / vegetation mapping* to identify key remnants at risk (e.g. littoral rainforest). Identify important flora/fauna species that, due to their limited distribution, will need to be translocated; Investigate trial methods for habitat re-establishment (e.g. for littoral rainforest, saltmarsh etc.) Consider protection of valuable habitats where natural migration is prevented (e.g. by back beach development) and alternative nearby habitat is not available; Prioritise rehabilitation requirements based upon the relative threat to distributions from coastal hazard impacts, to ensure lower risk distributions are protected and enhanced; Identify and protect buffers around important habitats that will enable migration in response to hazard impacts (for example, undisturbed land landward of littoral rainforest); and Update planning controls to allow for buffers, for migration of habitats with sea level rise. 	<p>An action plan to manage habitat is completed.</p> <p>Number of staff who know about the action plan.</p>	GLC: Natural Systems, Strategic Land Use Planning
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1	Littoral Rainforest remnants at Seven Mile Beach; Sandbar Beach, One Mile Beach and Burgess Beach.	<p>Staff time or external consultancy \$25,000 (*excluding habitat mapping).</p> <p>Funding Options: Hunter Local Land Services, Crown Lands or other relevant State grant funding programs.</p>	Short term (2013-2017 Delivery Program)

2.4.18 Remediation of Slope Instability

Activity	Actions	Performance Measure	Responsibility
Remediation of Slope Instability	Undertake actions to remediate rock fall and debris slide hazards at Boat Beach as per details provided in SMEC (2013), such as: <ul style="list-style-type: none"> install protective measures either side of the gabion wall and control surface water flow over the gabion wall on Kinka Road; and conduct further inspection of the stability of the slope. 	% complete of remediation of Debris Slides and Rock Fall at Boat Beach by 2025.	GLC: Transport Assets, with advice from GLC: Design and Investigations (refer Coastal Hazard Construction Checklist)
IPR Ref.	Locations	Cost / Resources / Funding Option	Time-frames
Key Direction 2 Objective 7 Strategy 7.1 Activity 7.1.2	Kinka Road, Gabion Road and Slope: <ul style="list-style-type: none"> Failure of the gabion wall and undermining of the pavement Damage to the Kinka Road and pavement and impacts on buried services in the roadway 	External consultancy, or Council works resources. Funding: Federal and State Government Emergency Management Funding; Disaster Relief Funding	Short term (2013-2017 Delivery Program)

Further Information

Investigation of slope instability on Kinka Road and recommendations for remediation were undertaken by SMEC (2013).

2.4.19 Combined Flood Studies

Activity	Actions	Performance Measure	Responsibility
Combined Flood Studies	Update or commence flood studies at all catchments that are impacted by coastal inundation (particularly catchments with development / assets at risk) to determine the combined impact of elevated ocean water levels and catchment rainfall and determine flood planning levels. For Blueys Beach, the action shall also include a Floodplain Risk Management Plan (FRMP), to incorporate a cost benefit and funding analysis to identify viable actions to manage the inundation risks.	FRMP for Southern Blueys Beach, inc. findings of Action 2.4.11, completed by 2020 Number of remaining studies funded, and % completed by 2025	GLC: Design and Investigation
IPR Ref.	Locations	Cost / Resources / Funding Option	Time-frames
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.2	Extreme Priority: Creek at southern end of Blueys Beach, incorporating findings from the re-assessment of potential for inundation in view of an improved sediment budget understanding as part of Action 2.4.11. High Priority Elizabeth Creek, on Elizabeth Beach Medium Priority: South One Mile Beach (particularly in relation to sea level rise influences).	\$50,000 per study, depending on size of catchment. Funding: NSW Floodplain Management Program.	Short term (2017-2021 Delivery Program) with Blueys study: completed by 2020.

Further Information

None



2.4.20 Monitor Inundation Levels

Activity	Actions	Performance Measure	Responsibility
Monitor Inundation Levels	<ul style="list-style-type: none"> Develop and deliver a program to monitor water levels, which may involve installation of water level recorder(s) along key creeks at risk from inundation. Water level data may be used to monitor trigger levels, and be combined with state-wide tidal, wave and rainfall data to assess flood risk. 	Number of water level recorders installed. Number of times data downloaded and processed.	GLC: Design and Investigations; GLC Natural Systems (to download data)
IPR Ref.	Locations	Cost / Resources / Funding Option	Time-frames
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.2	High Priority sites: Creek at southern end of Blueys Beach Elizabeth Creek, on Elizabeth Beach	Consultancy to establish program, purchase and install equipment Staff time to download and process data. Funding: NSW Floodplain Management Program.	Long term (10 year financial plan)

Further Information

In developing a program, consider:

- The need for one or more water level recorders to capture ocean and terrestrial influences along a creek;
- How the data will be downloaded, and if this can be linked to existing monitoring programs (e.g. physical download versus telemetry, and current programs being run by Council (e.g. water quality) and state (e.g. MHL); and
- The sampling frequency for the water level recorders, particularly where capturing wave motions (set up, run up, swash) may be useful when analysing inundation risk.

2.4.21 Materials and Design for Saltwater Intrusion

Activity	Actions	Performance Measure	Responsibility
Materials and Design for Saltwater Intrusion	Investigate appropriate designs and materials for services affected by saltwater (inundation, spray), such as stormwater, water and wastewater infrastructure. Update the Asset Management Plan or other appropriate Council Policy to provide for the use of designs and materials in asset replacement.	Investigation completed. % of materials used in delivery programs by 2025	GLC: Design and Investigation Provision of advice to Mid Coast Water for sewer and water.
IPR Ref.	Locations	Cost / Resources / Funding Option	Time-frames
Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1	Stormwater Water Sewer	Staff time or minor research consultancy (~\$5,000). Funding: Federal or State climate change adaptation programs.	Long term (10 year financial plan)

Further Information

None



2.4.22 Decision Support Tool for Managing Erosion Impacts to Heritage Assets

Further Information

None.



Activity	Actions	Performance Measure	Responsibility
<p>Decision Support Tool for Managing Erosion Impacts to Heritage Assets (Aboriginal and Non-Indigenous)</p>	<p>Develop a decision support tool (or similar) for managing known and unknown Aboriginal and other heritage items uncovered by coastal hazards. This action shall include:</p> <ul style="list-style-type: none"> close consultation with Local Aboriginal Groups, as well as NPWS and relevant officers of OEH and Hunter Local Land Services; mapping of known sites (such as from the Aboriginal Heritage Information Management System (AHIMS) database); mapping / cataloguing of previously unrecorded sites, when they are uncovered by erosion (confidentiality requirements for mapping / publicising sites shall be observed); determining the actions to take when sites are uncovered, which may include relocating the item (for example, as is conducted for burial sites), re-burying the item elsewhere (for example as is done for midden sites), or sacrificing the item or protecting the item (as is done for midden sites also); and providing clear direction as to the consultation and approvals required to undertake the remedial action. 	<p>A decision support tool has been created</p> <p>Number of times the tool has been referenced by responsible staff.</p> <p>Number of times the tool has been used, or</p>	<p>GLC: Parks and Recreation</p> <p>Natural Systems; GLC: Design and Investigation, Strategic Land Use Planning, GIS (to guide actions for affected heritage items)</p>
IPR Ref.	Locations	Cost / Resources / Funding Option	Timeframes
<p>Key Direction 1 Objective 3 Strategy 3.1 Activity 3.1.1</p> <p>Key Direction 3 Objective 13 Strategy 13.1 Activity 13.1.6</p>	<p>Action will cover Indigenous Heritage Items and Non-indigenous Heritage Items at all beaches.</p>	<p>Staff time.</p> <p>Funding Options: Crown, Hunter Local Land Services or other State agency grant funding program.</p>	<p>Long term (10 year financial plan)</p>

2.4.23 Community Use Actions

2.4.23.1 Manage Conflicts between Passive Recreation Users

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Manage conflicts between passive recreation users: Surfing	<ul style="list-style-type: none"> Permits required for Surfing Competitions from Council and the Marine Estate Management Authority (MEMA) for the Department of Primary Industries Port Stephens – Great Lakes Marine Park (PSGL Marine Park). Compliance activities. Note that sporting clubs (such as local boardriders clubs) are exempt from the Use of Council Reserves by Commercial Fitness Groups and Personal Trainers Policy. 	<ul style="list-style-type: none"> Council coordination of events across LGA, to ensure equity for surfers and beach users. Consider use of: <ul style="list-style-type: none"> – booking calendar (which could also be available online), – google mapping of activities (available online) and / or – event coordinator, who would provide a single overview of activities, guide applicants through the process, assist applicants with consents needed from other authorities (e.g. MEMA for surf permits), and issue codes of conduct. Require competition organisers to advertise their event in local newspaper prior to competition. Consultation with community to agree on acceptable number of events/year, and locations. Event advertising (to promote events and use of alternative beaches). Increased resources for compliance. Use permitting process to educate competitors about surfing etiquette (e.g. “code of conduct” provided with permit, to be issued to all competitors). Consider applying for National Surfing Reserve status for Blueys and Boomerang Beaches. 	GLC Parks and Recreation	<ul style="list-style-type: none"> Conflicts between local surfers and surfing competitions, at Boomerang, One Mile, Bennetts, Blueys Perception that too many surf permits have been issued (especially in Pacific Palms area). Unauthorised surfing competitions
Manage conflicts between passive recreation users: Dogs	<ul style="list-style-type: none"> Council’s Dogs on Beaches Policy. Designated areas (and times of day) when dogs permitted (including off-leash areas). Signage, Bag dispensers on main access tracks near bins. Compliance activities (Council rangers). 	<ul style="list-style-type: none"> Increased resources for compliance. Community education to reduce impacts of dogs, e.g. <ul style="list-style-type: none"> – 1 page “code of practise” for dog owners; (see Community Education action). Council meet and greet with dog owners. 	GLC Parks and Recreation, Waste Health and Regulatory	<ul style="list-style-type: none"> Dogs vs. environment, e.g. One Mile Beach

2.4.23.2 *Provide and Maintain Community Infrastructure*

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Provide and maintain community infrastructure (rec. facilities, BBQs, seating & shade, toilets, water stations etc)	<ul style="list-style-type: none"> Plans of Management (for some reserves). Council's Asset Management Plan. Council's annual Delivery Program. 	<ul style="list-style-type: none"> Conduct community survey to determine needs at beach locations. Prepare whole of LGA plan to determine priorities for new assets. To help determine priorities, study should collate inventory of what is present, and use outcomes of community survey also. The plan shall also consider coastal hazards mapping, to avoid intensifying risk. <p>Note: preceding Asset Management Plan actions to manage coastal hazards</p>	GLC Parks and Recreation	<ul style="list-style-type: none"> More facilities are always requested by the public. One Mile, Bennetts have an increasing amount of facilities. Provision of facilities is not done by a plan, but on an as needs, reactive basis (e.g. when complaints or requests are received). This is because the facilities are considered relatively inexpensive.
Manage illegal camping	<ul style="list-style-type: none"> Compliance activities and penalties by Council, Crown Lands, NPWS. Signage. Camping on Private Land Policy states camping is not permitted at any time on council controlled public lands, contravention of this may lead to prosecution. Formal campsite information on internet. 	<ul style="list-style-type: none"> Monitor to determine the extent of the problem, i.e. how often, where it is occurring, are there significant economic impacts to fee paying camp grounds? If there is a need (as identified through monitoring), consider creating locations for free camping; and fencing off non-suitable areas. Provide information to car/van rental companies about location of formal and /or free campsites, and legalities of illegal camping. Provide GLC free campsite information on social media sites. Increased resources for compliance. 	GLC Parks and Recreation, Waste Health and Regulatory	<ul style="list-style-type: none"> Opportunistic illegal overnight camping (e.g. wicked campers, winnebago, juicy rentals). May be at carparks, or 4WD access locations e.g. at Sandbar, Seven Mile Beach, Shelly Beach, Number One Beach,

2.4.23.3 Fire Management

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Reduce potential for risk to illegal campers from Hazard Reduction burns	<ul style="list-style-type: none"> Signage (not known if this makes note of risk of bushfire to illegal campers) Compliance activities by Council, Crown Lands, NPWS 	<ul style="list-style-type: none"> Education (signage, information to rentals) regarding risks from bushfire from use of informal sites (see Community Education action). Notices and notification (e.g. on radio, news etc.) prior to hazard reduction burns. Check high risk / common sites for campers prior to hazard reduction burns. Provide information to emergency services about location of common illegal campsites. During replacement of beach access infrastructure, consider use of non-flammable materials. 	GLC Parks and Recreation	<ul style="list-style-type: none"> Hazard reduction burns have threatened illegal campers, e.g. Seven Mile Beach National Park. Small risk of fire from illegal campers (e.g. Sandbar, Number One)
Fire Management	<ul style="list-style-type: none"> Hazard Reduction certificates. Bushfire Act. Asset Protection Zone maintenance and hazard assessment. "10-50" rule for clearing around property. 	<ul style="list-style-type: none"> Implement mosaic burning patterns through coastal scrub on beaches with Rural Fire Service assistance. Follow burn with chemical treatment of weed species. Encourage species diversity in dunal vegetation regeneration. 	GLC Parks and Recreation	<ul style="list-style-type: none"> Hazard reduction burns. Asset Protection Zone maintenance on Council and Crown Lands, NPWS lands. Fire management integrates with vegetation management.

2.4.23.4 Heritage Management

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Heritage Management	<ul style="list-style-type: none"> Existing NPWS legislation, POMs for Aboriginal Cultural heritage management. PSGL Marine Park Zoning Plan and Map. 	<ul style="list-style-type: none"> Engage with NPWS and local Worimi people to develop or augment management of known sites. See "Heritage Management Action" for managing sites uncovered by erosion or recession in future. 	GLC Parks and Recreation	<p>Aboriginal cultural heritage protection required at:</p> <ul style="list-style-type: none"> Nine Mile Beach, Forster Main to Burgess Beach including headlands and Pebbly and One Mile Beaches, Sandbar Beach, Seal Rocks Number One and Boat Beaches, Bennetts Beach – Hawks Nest and Yaccaba.

2.4.23.5 Permits for Commercial Activities

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
<p>Permits and leases for commercial and group activities</p>	<ul style="list-style-type: none"> • Development controls apply to SLSCs • Vehicles on Beaches Policy • Use of Council Reserves by Commercial Fitness Groups and Personal Trainers Policy, outlines provision of licences to qualified persons for 1 year on non-exclusive basis, with bookings for certain areas required, and max of 2 sessions in any one area. Policy does not apply to SLSCs. Would likely apply to surf schools. • Crown Land licences, POMs and Trusts (e.g. for some CPs) • Licences to operate caravan parks or camping ground from Council required, under <i>Local Government Act 1993</i>. • Permits from MEMA are required for commercial activities (including fishing); competitions including line fishing and spearfishing; hovercrafts, airboats and seaplanes; organised events including sporting or other activities; and research; in the PSGL Marine Park. 	<ul style="list-style-type: none"> • Consider licencing ocean haul fishing. Licencing should involve providing a 1 page code of practise, to educate users. • Investigate the number, type and areas covered by commercial activities versus community needs and impacts on the environment. • Consider changing commercial licence from Council to commercial operators to make clear that council is not liable for lack of income when beach is unusable after storm damage. 	<p>GLC Parks and Recreation</p>	<p>SLSCs Ocean haul fishing e.g. Jimmys Professional Fishers - Mullet run, Tuncurry Nine Mile, Seal Rocks Beaches, Bennetts and Yacaaba Heads. Surf schools Fitness groups Caravan Parks Other commercial operations – Stand Up Paddleboards etc.</p>

2.4.23.6 *Litter Management*

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Manage litter sources	<ul style="list-style-type: none"> The Coasts Catchments Initiative identified ways to reduce impacts of sediment, nutrients and faecal coliforms on Wallis, Smiths and Myall Lakes. Fed into the Water Quality Improvement Plan. Garbage collection and other works programs of Council, and strategic bin placement. Community education programs. DPI Fisheries initiatives (e.g. "take in, take out", for fishing by-products). The following projects funded by the Environmental Special Rate Levy: <ul style="list-style-type: none"> Structural Solutions for Urban Water Quality, Restoring our Urban Creeks, Water Quality Monitoring (Waterwatch), Stormwater Pollution Awareness, and Gravel Roads Best Practice Erosion Control. 	<ul style="list-style-type: none"> Investigate joining the Regional Marine Debris Monitoring Program (run by LLS). Identify key sites for regular monitoring and maintenance, and target waste bins at popular spots. Increase clean ups and maintenance of pollutant traps (e.g. GPTs, WSUD). Increase litter collections at high usage areas during peak times. Targeted education for key users (recreational fishers, commercial fishers, tourists, school children, surfers, SLSCs etc). Consider installation of stormwater pollutant trap devices at key sites (e.g. Burgess Beach). Coordinated clean up events following storms (e.g. Yagon to Yacaaba Head is known to be heavily polluted after big southerly seas, with plastics washed onto beach). 	GLC Parks and Recreation, GLC Waste, Regulatory and Health.	<p>Marine debris and litter</p> <ul style="list-style-type: none"> left on beach by users, especially after tourist influx periods washed up on beach from ocean. <p>Sites with known marine debris and littering issues:</p> <ul style="list-style-type: none"> Nine Mile Beach (marine debris), Forster Main (littering), Pebbly, One Mile, Burgess, Seven Mile, Elizabeth, Sandbar, Number One, Boat, Lighthouse, Treachery (marine debris), Bennetts. <p>Stormwater outlet pollution known to occur:</p> <ul style="list-style-type: none"> Forster Main Pebbly One Mile Burgess.
Manage impacts to sewer, water etc.	<ul style="list-style-type: none"> Currently managed by Mid Coast Water (MCW). 	<ul style="list-style-type: none"> In future, level of risk is dependent upon coastal erosion and recession with sea level rise. See Hazard Management Options for recommended vulnerability assessment. Vulnerability assessment by Mid Coast Water for coastal hazards, and monitoring, to determine consequence from impacts, and appropriate response (e.g. one small break in line can have significant impacts). 	GLC to discuss with MCW	<p>Overflows of the sewer or water system. Includes onsite water treatment outlet at Seven Mile Beach.</p>

2.4.24 Ecological Health Actions

2.4.24.1 Habitat Management

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
<p>Manage threats to existing ecological habitats (EECs, threatened species, etc)</p>	<ul style="list-style-type: none"> • Management of Illegal Removal of Vegetation from Council Controlled Reserves Policy sets down a sequence of actions to be taken in the event of reported/identified illegal damage to vegetation on Council managed land. • Reserve system – NPs, Crown Lands, GLC. • SEPP 26 Littoral Rainforest (and mapping). • Dunecare, Landcare and Coastcare, 15 voluntary organisations helped by Council with funding, equipment and advice. Involved in bush regeneration. • Following projects funded by the Environmental Special Rate Levy. <ul style="list-style-type: none"> – Healthy Lakes Program, – Biodiversity Conservation, – Vegetation Strategy. • <i>Threatened Species Conservation Act 1974</i> and <i>Environment Protection and Biodiversity Conservation Act 1999</i>, with associated mapping, recovery plans, and management responsibilities of Council, Crown Land and NPWS. • <i>Marine Estate Management Act 2014</i> with associated PSGL Marine Park Zoning Plan and Map and management responsibilities of MEMA. • POMs outline planting and watering. • Tree Preservation Orders. • Vegetation Mapping (in progress), currently on Hawks Nest / Tea Gardens and Wallis Lakes Wetlands. Regional vegetation mapping in collaboration with Hunter Councils Environment Division. • EMPs for the lakes (Wallis, Port Stephens/Myall Lakes, Smiths). • DCP landscaping buffer. 	<ul style="list-style-type: none"> • See <i>Investigate Habitat Preservation Options (Translocation, Migration, etc)</i> • See <i>Dune Management</i> action. • Education programs to help community identify valuable habitat areas, such as littoral rainforest, see <i>Community Education</i> action. • Resilience programs for Littoral Rainforest (reduction of weed threat). 	<p>GLC Natural Systems, Parks and Recreation</p>	<p>Known endangered species and habitats, e.g.</p> <ul style="list-style-type: none"> • Themada Grassland on seacliffs at Sandbar Beach (which supports endangered species). • Burgess Beach – threatened species.

Implementation Schedules

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Manage aquatic vegetation	<ul style="list-style-type: none"> PSGL Marine Park Zoning Plan and Map specifies different levels of protection within sanctuary, habitat protection, general use and special purpose zones accordingly, to conserve aquatic vegetation. Permits are required from MEMA for a variety of activities, including: commercial activities; collecting for commercial and private aquariums; competitions including line fishing and spearfishing; hovercrafts, airboats and seaplanes; traditional Indigenous fishing use; organised events including sporting or other activities; and research. MEMA allows hand collection only for sea lettuce (<i>Ulva lactuca</i>) and bait weed (<i>Enteromorpha intestinalis</i>) in habitat protection and general use zones of the PSGL Marine Park. Community Seagrass Monitoring. Recreational Fishing Trust – provides resources for improving saltmarsh resilience. Wollamba River Memorandum of Understanding for Water Quality and Rivercare Plans. Wallis Lake Wetlands Strategy. DPI Fisheries policies on seaweed harvesting. 	<ul style="list-style-type: none"> See <i>Community Education</i> action for recommended community education regarding impact of plastics on aquatic life. 	GLC Natural Systems, Parks and Recreation	<ul style="list-style-type: none"> Seaweed washed up on beaches – complaints from people to have removed
Manage aquatic habitats	<ul style="list-style-type: none"> PSGL Marine Park Zoning Plan and Map specifies different levels of protection within sanctuary, habitat protection, general use and special purpose zones accordingly, to conserve marine habitats and species. It also details the permissibility of shore and water-based recreational fishing of listed fish species using specified methods, and commercial fishing, within the various zones. Permits are required from MEMA for a variety of activities, including: commercial activities; collecting for commercial and private aquariums; competitions including line fishing and spearfishing; hovercrafts, airboats and seaplanes; traditional Indigenous fishing use; organised events including sporting or other activities; and research. Community Education programs(e.g. Project Aware) Monitoring programs (e.g. by LLS). 	<ul style="list-style-type: none"> Partner with LLS to enhance education and monitoring campaigns, targeted to key sites affected. May include signage at key sites. 	GLC Natural Systems, Parks and Recreation	<p>Intertidal – rocky shore habitat damage and over extraction, e.g. at:</p> <ul style="list-style-type: none"> Forster Main to Burgess Beach, including rock platforms between. Seven Mile Beach Elizabeth Beach (including adjacent rock platforms and rocky shores) Sandbar Beach Number One, Boat, Lighthouse at Seal Rocks.

2.4.24.2 Weed Control

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Manage weeds	<ul style="list-style-type: none"> • Bitou Threat Abatement Plan. • Dunecare, Landcare and Coastcare - 15 voluntary organisations helped by Council, involved in weed management. • Aerial spraying programs (NPWS / GLC collaboration). Council spraying program has been underway for past 7 years, annually collaborate with NPWS to make sure spraying programs complement each other. • Noxious weeds policy, which describes how Council will achieve its responsibilities under the <i>Noxious Weeds Act 1993</i> (and other related legislation). • Crown Lands, NPWS, Council weed management projects, works. • OEH provides grants for weed removal etc. in coastal reserves. 	<ul style="list-style-type: none"> • Collaboration between tenures (LG, Crown, NPWS), to take advantage of activities e.g. fire control, aerial spraying by one party is good opportunity to undertake action by other authority in adjacent areas of jurisdiction. Following fire is strategic opportunity to control bitou, and if not done, can be significant regeneration of bitou after fire. • Checklist for services, to have dunecare groups follow up. • Trials / pilot programs, e.g. biological control. (tip moth). • Improve biodiversity to dunal system through endemic plantings. • Develop a management plan for high risk areas for weeds, and access available funding programs. 	GLC Parks and Recreation, GLC Natural Systems	Bitou Bush; Weed invasion is a known issue at: <ul style="list-style-type: none"> • Nine Mile Beach: <i>Asparagus aethiopicus</i>, <i>Gloriosa superba</i>, <i>Opuntia sp.</i>, <i>Chrysanthemoides monilifera ssp. rotundata</i> • Pilot Hill to Second Head, Forster • Second Head to Bennetts Head, Forster • One Mile Beach, Burgess Beach, East Forster • South from Cape Hawke to Booti Hill, Seven Mile Beach • Booti Hill to Charlotte Head, Elizabeth Beach • Sandbar Beach • Number One Beach, Boat Beach, Lighthouse Beach, Treachery Beach, Seal Rocks • Bennetts Beach
Manage weeds in Littoral Rainforest from garden waste	<ul style="list-style-type: none"> • Landcare and Coastcare programs. 	<ul style="list-style-type: none"> • Education regarding dumping of garden (and other) waste in reserves. • Other weeds may also be opportunity to target after fire. 	GLC Natural Systems, GLC Parks and Recreation	<ul style="list-style-type: none"> • Littoral rainforest – Some small areas near urban development affected by weeds from local gardens.

2.4.24.3 *Pest Control*

Activity	Existing Actions	Possible New Actions	Responsibility	Locations/Examples
Pest animal control and dangerous wildlife	<ul style="list-style-type: none"> Feral Pest and Threatening Animal Policy aims to provide guidance in the management of feral (including pest) and threatening animals on Council owned and controlled land, including Community Land. Hawks Nest / Tea Gardens Endangered Koala Recovery Plan. GLC fox den gassing program. Fox control Threat Abatement Plan sites (managed by NPWS and / or LLS). NPWS programs. Council pest animal control programs. Use of community title "no domestic animals" conditions for (some) new developments. 	<ul style="list-style-type: none"> Community education on impacts of domestic animals (e.g. 1 page "code of practise" for dog owners); pest animal species. Develop a management plan for high risk areas for pests, and access available funding programs. Partner with NPWS for existing or new programs (e.g. at Seven Mile, Elizabeth, Lighthouse, Treachery etc). Continue funding to run long term fox den gassing program cross tenure (NPWS / GLC / Crown and Local Aboriginal Land Councils) Investigate a cross tenure Dingo management policy Investigate a cross tenure wild dog program. 	GLC Parks and Recreation, GLC Natural Systems	<p>Wild dogs / Dingos Foxes Rabbits</p> <p>Pests are known issues at:</p> <ul style="list-style-type: none"> Nine Mile Beach (foxes, rabbits) Pebbly Beach (foxes) One Mile Beach (foxes) Burgess Beach (foxes) Seven Mile Beach Elizabeth Beach Sandbar Beach Lighthouse, Treachery beaches at Seal Rocks Bennetts Beach

3 Pathway to Managing Future Risk

3.1 Approach to Managing Future Risks

As detailed during the Options Study (BMT WBM, 2015), the risk assessment outlined the level of risk to specific assets at the immediate, 2060 and 2100 timeframes. The Asset Risk Registers are provided in the Options Study (see Appendix A). Prioritising which risks to treat was based upon Council's (and the community's) tolerance to risk, as shown in Table 3-1. Extreme and high risks are considered intolerable, requiring treatment as a priority over lower levels of risk.

For coastal risks with long timeframes, a second prioritisation exists relating to the estimated timeframe of impact, as described in Table 3 2. Extreme and high risks at the present day require immediate treatment. However, risks identified as extreme or high by 2060 or later may still be considered tolerable in the present day. An option(s) to treat the future high / extreme risk has been described in the Asset Risk Registers, but a preferred action does not need to be selected until the risk becomes imminent. It is unlikely that action on these risks will be required over the life of this initial CZMP (5-10 years).

Identifying a management option(s) with a trigger for implementation at the present time enables Council and others to be prepared should an extreme or high risk present itself earlier than anticipated, but does not commit Council or others to a specific course of action. Reaching the trigger point shall indicate that the risk is imminent and a decision is necessary at that

time. This approach avoids costly, large-scale, difficult and / or unpalatable actions being implemented until it is certain that they are needed.

The time period between now and when a risk becomes certain can be used to increase information / data upon which to base future decisions and improve certainty regarding the likely impacts of coastal hazards (particularly sea level rise). This period may also see an improvement in management approaches and /or funding to treat particular risks.

A key part of the strategy for managing future risks is setting a trigger for action that allows enough time for Council, the community and stakeholders to select the preferred action, and gather the funds and approvals necessary to implement it. Appropriate trigger values for the coastal hazards are detailed in Table 3 3, Section 3.2.

Table 3-1 Risk Tolerance Scale

Risk Level	Action required	Tolerance
Extreme / High	Eliminate or Reduce the risk or Accept the risk provided residual risk level is understood	Intolerable
Medium	Reduce the risk or Accept the risk provided residual risk level is understood	Tolerable
Low	Accept the risk	Acceptable

Table 3-2 Prioritisation for Risk Treatment Based upon Estimated Timeframes

Timeframe for Extreme / High Risks	Treatment Approach
Present Day	<ul style="list-style-type: none"> • Implement no regrets actions • Implement site specific management actions as required
2060	<ul style="list-style-type: none"> • Implement no regrets actions • Identify potential management option(s)
2100	<ul style="list-style-type: none"> • Identify trigger for implementation, should the option(s) be required.

3.2 Trigger Points for Action

The majority of actions in this CZMP involve planning for future implementation of a more substantial action, as and when needed in the future.

An important element of planning for future action is setting a ‘trigger point’ for when the action is needed. A key strategy in this CZMP is appending Council’s Asset Management Plans (AMP) to include details of the coastal hazard and likely timeframe of impact for those assets that are shown to be potentially affected. The next element of this strategy is to determine an appropriate hazard management action, include the costs for the action within the asset replacement value, and implement the action when the asset is due for replacement.

However, there may be instances where the hazard impact may occur before scheduled asset replacement occurs. In this case, an alternative

‘trigger point’ is needed to flag when a hazard impact is imminent and asset replacement needs to be brought forward to avoid the hazard impact occurring.

Therefore the relevant AMP should also make note that hazard management action should occur either:

- When the asset is due for replacement (i.e. it is being replaced anyway); or
- When a ‘trigger point’ relating to the hazard is reached.

The trigger point needs to allow sufficient time for action to be taken, prior to a hazard impact occurring. Indeed there will be two triggers relating to the hazard: the first trigger will flag that the hazard is imminent and funds (and approvals etc) for asset replacement need to be set aside, the next trigger shall flag that asset replacement must commence, to avoid detrimental impact. Recommended trigger points for the various hazards are listed in Table 3-3, and explained in more detail below.

3.2.1 Recommended Trigger Points for Erosion and Recession Hazards

Recommended ‘trigger points’ for assets at risk from erosion or recession listed in Table 3-3 are described below.

- The first trigger point may be ‘when average sand volume in front of the asset is less than or equal to 250 m³ per metre length of beach (250 m³/m)’. Beach survey data (which should be collected as part of the Monitoring of Beach Volume action recommended in this CZMP) can be

used to calculate the cross-sectional area of sand in front of an asset, then multiplied by 1 m length of beach to give a volumetric value. 250 m³/m is recommended because this value has historically been adopted in NSW as the maximum potential storm demand that may occur in a 1 in 100 year storm (refer Gordon 1987, and later guidance from the NSW Government, e.g. former Coastline Management Manual, 1990).

- After the first ‘trigger point’, the second trigger point should flag the structural stability and safety of the asset, such as described by the zone of reduced foundation capacity (ZRFC). The ZRFC describes the geotechnical stability of the soil beneath a site in proximity to the eroded beach. As guided by Nielsen, *et al.* (1992), the ZRFC should be assessed by a suitably qualified geotechnical engineer, and calculated taking into account the soil type and substrate beneath the asset (i.e. ‘heterogeneous sand’ should not be assumed when calculating the ZRFC for use as a ‘trigger point’). The inspection should also include a certification of the safety of the asset and stability of the site.
- In some instances, the minimum 250 m³/m volume or ZRFC may already be breached at present. A suitably qualified geotechnical or structural engineer should assess the stability of the asset, and triggers for asset replacement set accordingly (e.g. the site may be assessed as stable for some time, or need action immediately).

3.2.2 Recommended Trigger Points for Wave Runup and Inundation Hazards

The ‘trigger point’ may relate to a frequency of inundation of a particular asset, and this will be site specific. For example, inundation or wave runup

through an amenities block may not be an issue if it occurs infrequently (e.g. yearly), but will become disruptive and dangerous should it occur regularly (e.g. weekly). Similarly, inundation of an electrical substation is unlikely to be tolerable even infrequently.

Again, two phases of the trigger should be set, and may both be related to inundation frequency. For example, the first ‘trigger point’ may be when inundation becomes a nuisance, or even the first occurrence of inundation; the second ‘trigger point’ may be when the frequency of inundation becomes disruptive or dangerous

Table 3-3 Recommended Trigger Points: Erosion, Recession and Inundation

Hazard	1. Planning Trigger: <i>Prepare funds etc for Action.</i>	2. Implementation Trigger: <i>Implement Action to avoid unacceptable impact.</i>
Erosion and Recession	Sand volume ≤ 250 m ³ /m, as measured from the asset in a seaward direction	Eroded beach face moves within ZRFC*, as specifically calculated for the site/asset
Inundation, wave runup	Frequency of inundation is a nuisance, (as determined on a site by site basis, e.g. 1/yr; 1/month etc)	Frequency of inundation is intolerable (i.e. disruptive, dangerous and / or costly, as determined on a site by site basis, e.g. 1/yr; 1/month etc)

* Note: ZRFC = zone of reduced foundation capacity.

3.2.3 Recommended Trigger Point for Storm Event Monitoring

Storm events may be an appropriate trigger for actions that involve monitoring, for example, to trigger:

- An inspection of beach accessways after a storm (for closure and maintenance);
- Moving a relocatable lifeguard tower off the beach before a storm; or
- Traffic management where a roadway is inundated by an adjacent stormwater outlet or creek during an ocean storm.

There is already very good measurement of ocean water levels, including tide, storm surge and sea level rise. The data is freely available online, such as the gauge network run by OEH through the Manly Hydraulics Laboratory (MHL). Similarly, the NSW offshore Waverider Buoy network managed by MHL is also excellent, and real time data is available freely online.

Council may use these existing resources to flag the occurrence of an ocean storm event. A coastal storm may be defined by:

- A significant wave height (H_s) of $\geq 3\text{m}$ (see You and Lord, 2008) at Crowdy Head, which is likely to occur once a year, or more during stormy periods; and / or
- An ocean water level (including tide) of 1.3 m AHD at Crowdy Head, being the approximate 1 in 1 year average recurrence interval (ARI) water level (MHL, 2011). Higher water levels may also be useful triggers,

depending on the asset, and are available from MHL (e.g. see MHL, 2011).

Crowdy Head has the nearest waverider buoy to the Great Lakes Coastline. Crowdy Head tidal gauge is also recommended to be used for monitoring purposes because it lies in the open ocean (unlike the Forster tidal gauge that is located within Wallis Lake).

Communication via Council lifeguards and the public will also be important for assessing sites affected by coastal storms.

For triggers that require prediction of storm events (e.g. for moving relocatable infrastructure before a storm), Council may use the Bureau of Meteorology (BOM) coastal storm warnings in combination with real time wave measurements, and tide prediction and measurements available from MHL.

Decision support tools to assist Council in deciding when to conduct monitoring of beach volumes or asset triggers (see Figure 3-2), or for checking damage to beach accessways (see Figure 3-1) are provided below.

Table 3-4 Recommended Trigger Points: Storm Events

Event	Pre-storm Trigger	Post-storm Trigger
Coastal Storm (i.e. large waves, tides)	<ul style="list-style-type: none"> When BOM issues a Coastal Storm Warning for the Mid North Coast; When $H_s \geq 3$ m at waverider buoys south or north of Crowdy Head (e.g. Sydney, Coffs Harbour); and/or When the predicted tide ≥ 1.3 m at Crowdy Head. 	<ul style="list-style-type: none"> When $H_s^* \geq 3$ m at Crowdy Head, and/or When ocean water level at Crowdy Head* ≥ 1.3 m AHD (~ = 1 yr ARI at present); or Based upon measured data available online at MHL

* Note: H_s or $HSIG$ = significant wave height; ARI = average recurrence interval; MHL = Manly Hydraulics Laboratory, see mhl.nsw.gov.au; BOM = Bureau of Meteorology, see bom.gov.au; Crowdy Head tidal gauge is recommended as it is in the open ocean (Forster tidal gauge is within Wallis Lake). Crowdy Head also has the closest waverider buoy to the Great Lakes coastline.

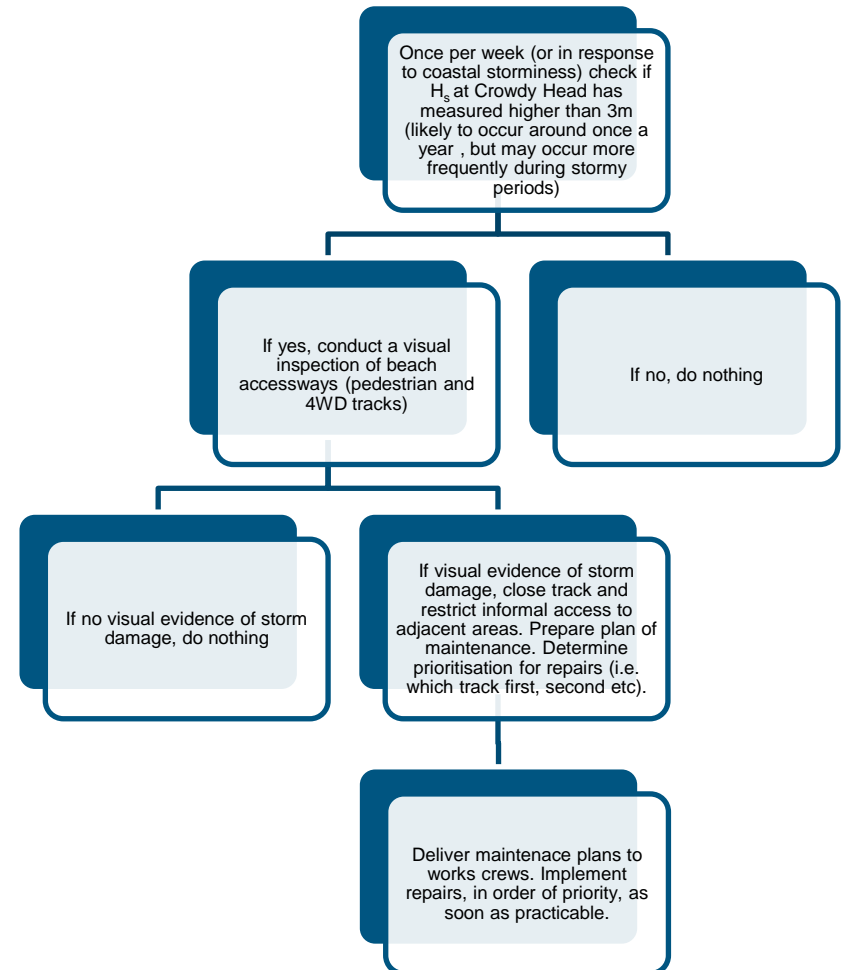


Figure 3-1 Recommended Approach to Monitoring Beach Accessways for Storm Damage

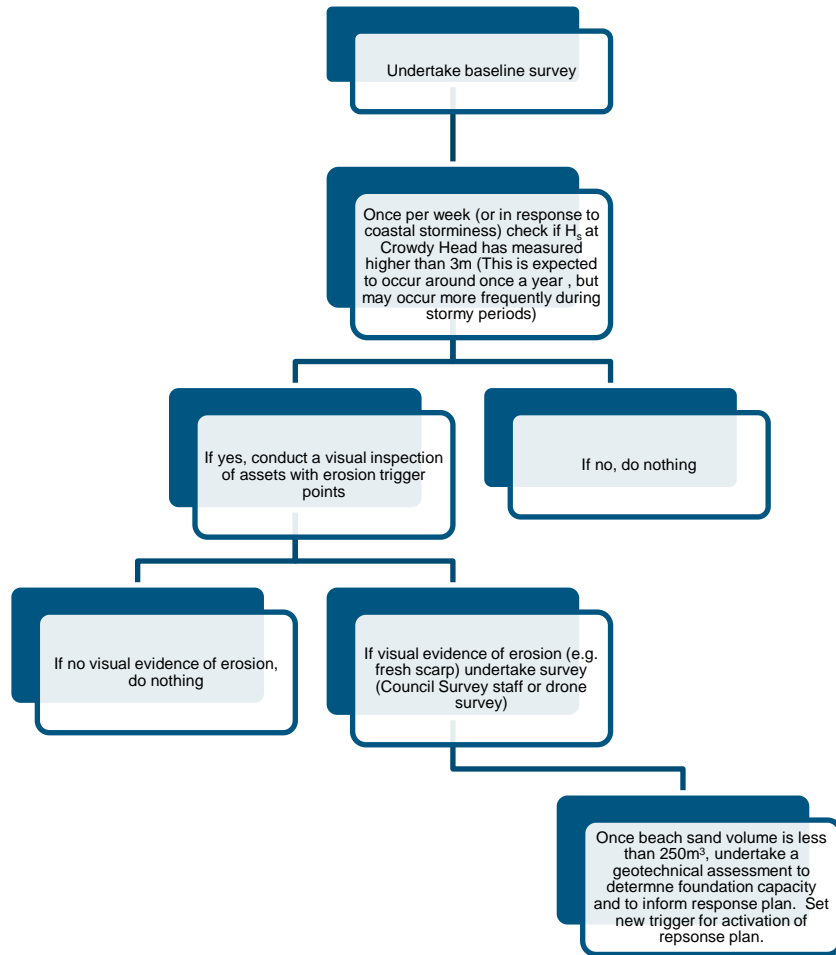


Figure 3-2 Recommended Approach to Monitoring Trigger Points for Assets, Beach Volumes

4 Monitoring, Evaluation and Review

The Great Lakes CZMP requires evaluation and reporting regarding the success of its implementation, and thus the success of managing existing and future coastal risks. Where implementation performance is sub-optimal, the evaluation process should identify contingencies to remedy the situation.

This CZMP is the first of many iterations of a coastal plan for the Great Lakes open coastline. Such Plans, and the studies that underpin them, should be revised every 5-10 years.

4.1 Internal Communication and Implementation Audit every 12 Months

The importance of internal communications within Council cannot be over emphasised in the success or otherwise of implementation of CZMPs. To support the integration of this CZMP with Council's day to day operations, it is recommended that 12 months after the CZMP is adopted, and henceforth at yearly intervals, key Council Staff responsible for its implementation, in partnership with the regional OEH Coastal representative, undertake an internal workshop to gauge the status of adoption of the CZMP and general understanding of its objectives through Council. The workshop would include a refresher of the CZMP contents, to reinvigorate existing staff and for new staff.

4.2 Annual Report: Linking Review of Implementation of CZMP Actions with the IPR Framework

Council delivers an Annual Report to document its progress in implementing the Delivery Program and Operational Plan activities over each financial year period. Performance measures are included for each action in the Operational Plan.

In the Implementation Action Plan of this CZMP, each action has been given a performance measure over a particular timeframe. This can be used to feed actions into Council's Delivery Program and Operational Plan or longer term Financial Plan. The performance measures shall also be used to gauge whether the actions have been implemented or not, which can then be reported in the Annual Report. This provides for a yearly evaluation of the implementation status of each action in the CZMP.

Where actions have not been included in the IPR Framework, a yearly evaluation of those CZMP actions by Council's Natural Resource Management Coastal Team is recommended.

If it is determined that an action has not being implemented in accordance with the nominated timeframe, then one or both of the following contingencies should be adopted:

- Determine the cause for the delay in implementation. If delays are funding based, then seek alternative sources of funding. If delays are resource-based, seek additional assistance from stakeholder agencies

and / or consider using an external consultancy to coordinate implementation of the action(s); and

- Modify and update the CZMP to reflect a timeframe for implementation of the action that is more achievable. The revised Plan would need to be endorsed by all relevant stakeholders and agencies responsible for implementation.

4.3 Revision of CZMP into the new CMP Format

The NSW Government is currently undertaking reforms of the Coastal Management Framework in NSW, including a new Coastal Management Bill which was passed in April 2016. While it is anticipated that these reforms will not be completed before this CZMP is certified, it will be necessary for this CZMP to be integrated into the Coastal Management Program (CMP) format (proposed in the new Act) by 2021.

The NSW Government has indicated that existing certified CZMPs will be able to be fast-tracked into the new framework, to avoid discarding the existing valid work and retain momentum for existing actions.

Given that a full revision of the regional coastal processes study is to be completed by 2020 as part of this plan (i.e. Action 2.4.11), it is likely that the CZMP will require a full revision, rather than simple fast-tracking, into the new CMP format by 2021.

4.3.1 Moving to the new CMP Format: Revised Risk Assessment and Success of CZMP Actions in Mitigating Risk

At the time that the CZMP is being revised into a CMP (~ 5 years), a review should be conducted to measure the performance of the CZMP in terms of actually managing and reducing the risks to the community associated with existing and future coastal hazards. That is, 'how has the Plan made a difference? Has the level of risk been reduced?'

The main mechanism for gauging whether the overall outcomes of the Plan have been achieved, or not, is to re-evaluate the risks through a follow-up risk reassessment process. As for the first risk assessment, all relevant mechanisms in place that assist with managing future risks and increasing Council's and the community's resilience should be included when assessing the level of risk. The likelihood of coastal risks will have also been updated as part of the Regional Coastal Processes Study (Action 2.4.11), and this should be fed into the revised risk assessment also.

There are two specific questions to be answered:

- Has the level of risk changed? (including for those risks in this plan that are currently assessed as low)?; and
- Have the extreme or high risks been adequately managed / mitigated? (i.e., has the level of risk been reduced to a tolerable level through management?).

If it is determined that the risks have not been adequately managed / mitigated; or that new intolerable risks have arisen, then the following actions should be undertaken in order to develop the new CMP:

- Review the implemented management strategies to identifying possible avenues for increasing the effectiveness of the strategy in managing the risks along the coastline (including new risks);
- Reconsider the urgency of management for key risks. For example, accommodating future changes may no longer be feasible, and upscaling from passive to active management may be needed, e.g. shifting from development controls to planned retreat, asset relocation etc; and.
- Review the potential effectiveness of actions that were recommended, but not implemented. Are such actions likely to be effective? If so, they should be included in the new CMP, and prioritised accordingly.

References

5 References

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Appendix A Great Lakes Coastal Zone Management Plan: Options Study

Table of Submissions on the CZMP**Appendix B Table of Submissions on the CZMP**

A total of 18 formal submissions were received during the exhibition period from 2 April 2015 to 15 May 2015. Of these, over 80% came from Pacific Palms beachfront residents, with most of the remainder from One Mile Beach area. In spite of Council trying to elicit submissions from the broader coastal community, this has not been demonstrated in the responses. Two submissions were received from NSW Department of Primary Industries (Marine Estate Management Authority & DPI Crown Lands).

Note: Matters raised in submissions to the Draft Great Lakes Coastal Management Plan often repeat the questions and concerns raised within submissions to the Draft Great Lakes Coastal Zone Management Plan: Options Study. For the purposes of transparency and completeness, these submissions have been documented within this table and responses provided.

The following table provides a summary of public submissions on particular management themes. It is a condensed view of concerns and suggestions across these themes as they appeared in each submission. Respondent numbers however, do not provide a statistical measure of significance in each case, as this was not a controlled survey.

Abbreviations:

Worley Parsons Report: "Boomerang Beach and Blueys Beach Coastal Processes and Hazard Definition Study", Worley Parsons, July 2011

SMEC Report: "Great Lakes Coastal Hazards Study", SMEC, October 2013

GPR Investigation: "Ground Penetrating Radar Investigation of Blueys and Boomerang Beaches", BMT WBM, June 2014

Coastal Hazard Revision: "Bedrock Based Coastal Hazard Revision for Blueys and Boomerang Beach", BMT WBM, June 2014

(Draft) Options Study: (Draft) "Great Lakes Coastal Zone Management Plan: Options Study", BMT WBM, March 2015

(Draft) CZMP: (Draft) "Great Lakes Coastal Zone Management Plan", BMT WBM, March 2015

LEP 2014: Great Lakes Local Environment Plan 2014

(Draft) DCP: (Draft) Great Lakes Development Control Plan 2014

Table of Submissions on the CZMP

Theme 1: Coastal Processes - The Science		
Submission	Response	Document/Action
<p>(5 Submissions) Reliance upon the Worley Parsons report (2010) to determine hazard lines in CZMP with no additional research is unsatisfactory.</p> <p>Council has made no attempt to in any way update the Worley Parsons report or take into account other available information. That is not legally acceptable.</p> <p>Council is proceeding with the CZMP based on flawed data, that is not evidence based and ignores expert advice and peer reviews regarding:</p> <ul style="list-style-type: none"> • Council has failed to obtain the additional data recommended by Worley Parsons in 2010. • Council processing of the CZMP is not consistent or equitable – with different criteria, including laser survey data, utilised for other Great Lakes beaches but not for Boomerang & Blueys. • The draft CZMP uses superseded 2007 IPCC sea level rise predictions. • Sea level rise was not determined at requisite standard - predict sea level rise using an evidence-based approach and applying reasonable projections to local conditions (rocky headlands). • The report does not take into account DECCW Photogrammetry (1956 to 2013 OEHL photogrammetry profiles) • Council has not collected the other data which Worley Parsons advised was required back in 2010 for decision making being directional wave data, pre and post storm beach profiling, bathymetric survey, aerial photography and subsequent photogrammetry. 	<p>These comments were also addressed in the Summary of Submissions to Options Study:</p> <p>The content and recommendations of the Worley Parsons Report and the SMEC Report were used to inform preparation of the Draft Options Study.</p> <p>In response to community concerns regarding the 'desktop study' nature of the Worley Parsons report, Council commissioned two additional research studies to clarify subsurface conditions at Boomerang Beach and Blueys Beach: the GPR Investigation and the Coastal Hazard Revision (BMT WBM, 2013). These studies also informed preparation of the Options Study and subsequent Draft CZMP.</p> <p>All of the identified documents have been subject to peer review and endorsed by Great Lakes Council and the NSW Office of Environment & Heritage (OEHL). They have been endorsed as being of industry standard, compliant with relevant legislative and guideline requirements.</p> <p>Regarding specific concerns:</p> <ul style="list-style-type: none"> • Data acquisition recommended by Worley Parsons suggested future improvements to data collection. It is not construed to mean the Report is deficient without it. • LiDAR contours were utilised in both the Worley Parsons Report and the subsequent GPR Reports. • The Guidelines for Preparing Coastal Zone Management Plans (CZMP) (OEHL, 2010) require councils to adopt sea level rise projections that are 'widely accepted by competent scientific opinion'. • The science underpinning Council's Sea Level Rise Policy has been validated in a report by NSW Chief Scientist & Engineer. Revision to sea level rise projections as well as 	<p><i>Concerns raised regarding the validity of the hazard studies are addressed in Section 1.5 of the GL CZMP.</i></p> <p><i>No further action at this time.</i></p>

Table of Submissions on the CZMP

Theme 1: Coastal Processes - The Science		
	<p>monitoring will be incorporated within the formal CZMP revision cycle over a 5 - 10 year period.</p> <ul style="list-style-type: none"> Analysis was based on almost 60 years of air photo record. Photogrammetry is rectified to be consistent with established state survey marks and vegetation is taken into account when calculating volumes. Consequently, the standard of the resulting photogrammetry time series analysis is consistent with industry standards. 	
<p>(7 submissions) Given the stability of Bluey's and Boomerang Beaches one would conclude no threat exists to our physical land nor the need for development restrictions on future development outside those contained in the existing planning controls.</p> <p>Why are Council projecting coastal risks and implementing actions and planning controls for 2060 and 2100?</p>	<p>If this current state of zero accretion persists sea level rise will still drive coastal recession and erosion at Boomerang/Blueys.</p> <p>Management plans are intended to make recommendations for action and implementation over a 5-10 year period only, and therefore later options being considered are not 'set in stone'. Over longer timeframes it is expected that options will be refined in the light of monitoring and new technology, as an implementation date approaches.</p> <p>However, similar to flooding and bushfire, Council as a public agency is also required to undertake assessment of current and future risks to public and private assets.</p> <p>For the purposes of public assets the planning horizon is accepted as being 50 to 100 years. The Building Code of Australia also requires Council to assess buildings with an anticipated design life of 50 years.</p> <p>Given the long term projections being considered, Council has also committed to regular and periodic review of coastal hazards and their management to ensure the most up to date information is being used to inform actions and recommendations on public and private lands.</p>	<p><i>Council continue its commitment to ongoing monitoring, review and revision of coastal hazard information and management practices.</i></p> <p><i>The first revision of coastal processes and hazards shall occur prior to 2020.</i></p>
<p>(1 Submission) Council is aware that the Coastal Panel</p>	<p>Council has great respect for all members of the Coastal Panel</p>	<p><i>Concerns raised regarding the</i></p>

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Theme 1: Coastal Processes - The Science		
<p>Chairman came to the beaches and the Council in 2015. The Chairman is expert in Blueys and Boomerang Beaches, having studied them in detail since at least 1985. The clear views expressed by the Chairman of the Coastal Panel were that:</p> <ul style="list-style-type: none"> the Worley Parsons Report was effectively a desktop study due to limited funding and required review; the Worley Parsons Report does not provide sufficient detail on matters such as underlying strata and sources of sediment; and concurrence that Worley Parsons has failed to address at all the documented accretion within the embayment. In particular, we refer to the meeting at the Council on 10 March 2015 attended by Chairman Angus Gordon and Mr P Watson from OEH, together with Council and community representatives. 	<p>as well as coastal professionals within OEH. Angus Gordon has confirmed the following position after the 10 March 2015 meeting (summarised):</p> <ul style="list-style-type: none"> Most issues identified with the Worley Parsons Report appear to have been addressed with additional geotechnical investigation undertaken in 2014. Other matters including monitoring, slope stability, inundation and applicability of the Bruun Rule have been scheduled for revision by 2020. Councils need to act on the best information available and this is recognised in the CZMP. BBRG does not seem to appreciate the inherent flexibility in the CZMP process to adapt and improve. The current CZMP represents the commencement of an ongoing improvement process. Use of planning provisions and other actions should wait until the CZMP is certified. A Section 149 (5) Certificate can be used to inform the public of coastal hazard information prior to CZMP certification. 	<p><i>validity of the hazard studies are addressed in Section 1.5 of GL CZMP.</i></p> <p><i>Council has resolved to defer the introduction of coastal management actions including planning controls until certification of the CZMP has been completed.</i></p> <p><i>No further action at this time.</i></p>
<p>(1 Submission) Claim that Angus Gordon and Phil Watson disendorsed the Worley Parsons Report and subsequent CZMP.</p>	<p>See above for Angus Gordon's position. Phil Watson of OEH also provided the following summary of the meeting of 10 March 2015, which is now claimed to have disendorsed the Worley Parsons Report:</p> <ul style="list-style-type: none"> Divergence in recollection of the meeting of 10 March 2015. Considerable effort expended by OEH to explain fundamentals of hazard definition for planning purposes. Level of uncertainty in coastal management is consistent with other fields of science and engineering. This does not negate the value of the work to date or make it unsuitable for planning and management actions. Models used for hazard definition are over 20 years old but remain best practice for hazard definition and planning purposes. It was broadly agreed at the March meeting that if other 	<p><i>Concerns raised regarding the validity of the hazard studies are addressed in Section 1.5 of GL CZMP.</i></p> <p><i>Council has resolved to defer the introduction of coastal management actions including planning controls until certification of the CZMP has been completed.</i></p> <p><i>No further action at this time.</i></p>

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Theme 1: Coastal Processes - The Science		
	<i>independent</i> consultants were asked to re-do the Worley Parsons Study, it would be highly unlikely to result in a significantly different outcome.	
(1 Submission) Lack of compliance with 6-Stage process of Coastline Management Manual 1990. Worley Parsons Report does not satisfy Stage 2: Preparation of Coastal Processes & Hazard Definition Study.	<p>The Coastline Management Manual, 1990 is no longer a current reference for the CZMP preparation process. Contentions regarding the Worley Parsons Study and additional geotechnical investigation were dealt with in a Report to Council's Strategic Committee on 6 October 2015: Public Submissions to the Draft Options Study.</p> <p>The Worley Parsons Report and subsequent geotechnical work has been confirmed by OEH as sufficient to inform the preparation of a CZMP under the current: <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010).</p>	<p><i>Concerns raised regarding the validity of the hazard studies are addressed in Section 1.5 of GL CZMP.</i></p> <p><i>No further action at this time.</i></p>
(1 Submission) The Guidelines for Preparing Coastal Zone Management Plans clearly state that the basis for developing management actions is an understanding of the behaviour of the natural systems. The degree of understanding of the natural coastal system must be compatible with the information needs for making a decision under a CZMP. This standard has not been achieved for Blueys or Boomerang Beach.	<p>All identified documents have been subject to peer review and endorsed by Great Lakes Council and the NSW Office of Environment & Heritage (OEH). They have been endorsed as being of industry standard, compliant with relevant legislative and guideline requirements.</p> <p>Consequently, the Worley Parsons Report and geotechnical reports have been confirmed by OEH as sufficient to inform the preparation of a CZMP under the current: <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010).</p>	<p><i>Concerns raised regarding the validity of the hazard studies are addressed in Section 1.5 of GL CZMP.</i></p> <p><i>No further action at this time.</i></p>

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Theme 2: Community Engagement – People and Process		
Submission	Response	Document/Action
(10 Submissions) Council failed to take into account our submission to the Options Study in February. All of these matters are still relevant and to be included in the objection to the CZMP document.	<p>Options Study submissions were considered in preparation of Draft CZMP prior to the public exhibition period in April - May 2015.</p> <p>A comprehensive report was provided to Council's Strategic Committee on 6 October 2015 (ref. above). They also form part of the final Options Study tabled for adoption at that meeting. Similarly, this submission table is to be annexed to the final CZMP document prior to Council's adoption.</p>	<i>Council will continue to consider all submissions through the finalisation of the current CZMP projects and in future review programs.</i>
(7 Submissions) Lack of consideration of previous submissions to Worley Parsons report and continued contempt for matters raised within submissions of Boomerang and Blueys Beach Group submissions.	<p>These comments were also addressed in the Summary of Submissions to the Options Study:</p> <p>Council acknowledges that direct responses to the submissions (Worley Parsons Report) were not provided. This is usual procedure with such engineering studies. Submissions were nonetheless, taken into account and reflected in the preparation of the Draft Options Study.</p> <p>It is a matter of record that Council has undertaken detailed consultation with OEH and the Coastal Panel, peer review and additional geotechnical investigations of Boomerang and Blueys Beaches. This has been in direct response to consultation and submissions (including those of the BBBG).</p> <p>The information contained within the submissions tables, associated Council reports and the CZMP (incl. the Options Study), acknowledges such submissions and endeavours to outline a more comprehensive program of public consultation and engagement for future projects.</p>	<p><i>Council will continue to consider all submissions through the finalisation of the current CZMP projects and in future programs.</i></p> <p><i>Establishment of Coastal Stakeholder Groups is an important action that will expedite necessary community involvement, ensuring a permanent communication interface.</i></p>
(5 Submissions) Council has failed to engage with Boomerang & Bluey's Beach communities, particularly beachfront and business people significantly affected by Council's planned and potential actions.	Council officers have ensured that the Draft Coastal Zone Management Plan and other associated planning instruments were subject to an extended public exhibition.	<i>Council supports establishment of Coastal Stakeholder Groups to better coordinate stakeholder and agency involvement.</i>

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Theme 2: Community Engagement – People and Process		
	<p>Additional advertisements were placed in local papers and letters were sent to property owners within the coastal planning areas and surrounding communities. Letters are sent to property owners at their nominated postal address to ensure non-residents receive appropriate notification. Further details of all activities undertaken can be found in the CZMP report.</p> <p>Council is keen to initiate ongoing active management through Coastal Stakeholder Groups. Council continues, with the support and guidance of OEH to review and enhance its community engagement strategies.</p> <p>New methods of communicating information to affected landholders and the wider community will be developed by Council and OEH.</p> <p>Residents are also invited to "Have your Say" on current applications and projects via the new Council website at www.greatlakes.nsw.gov.au.</p>	<p><i>Ongoing community education/engagement is recommended in Community Education, Section 2.4.13 of the CZMP.</i></p>
(3 Submissions) Thanks for information, meetings and Drop-In Sessions.	<p>Council is keen to continue to engage with representatives of all community groups and stakeholders particularly on the basis of beach user/stakeholders groups.</p>	<p><i>Ongoing community education/engagement is recommended in Community Education, Section 2.4.13 of the CZMP.</i></p>
(6 Submission) Concerned copies of all reports not distributed to everyone affected.	<p>These comments were also addressed in the Summary of Submissions to Options Study:</p> <p>Community advised via media that coastal reports and meeting papers were available in the Forster and Tea Gardens District Offices, the Pacific Palms Library and on Council's web site during exhibition. These documents continue to be available on the Council website.</p> <p>Council officers ensured that over 1,500 land owners were</p>	<p><i>Establishment of Coastal Stakeholder Groups is an important action that will expedite necessary community involvement, ensuring a permanent communication interface.</i></p>

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Theme 2: Community Engagement – People and Process		
	<p>notified of the public exhibition and community engagement program for the Draft Coastal Zone Management Plan and other planning instruments.</p> <p>Distribution of full copies of these documents and associated exhibition materials is cost prohibitive for Council. The publicly exhibited documents are still available on Council's website www.greatlakes.nsw.gov.au.</p>	<i>No further action at this time.</i>
(16 Submissions) Exhibition period wasn't long enough. Community engagement has been inadequate.	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>An extensive community engagement program was undertaken which included media releases, local advertising, direct mail and public information sessions. The public exhibition period of over 8 weeks was also in excess of the minimum 3 week requirement of OEH and the 28 days required by the Department of Planning & Environment for the planning instruments.</p> <p>The publicly exhibited documents were available at Council's Forster and Tea Gardens District Offices and the Pacific Palms Library throughout the exhibition and are still available on Council's website www.greatlakes.nsw.gov.au.</p> <p>All late submissions have been considered and documented within submission summary tables. Individuals that have made submissions will be updated on progress of the CZMP and advised of opportunities for involvement in option planning and implementation in the future.</p>	<p><i>Council supports establishment of Coastal Stakeholder Groups to better coordinate stakeholder and agency involvement.</i></p> <p><i>No further action at this time.</i></p>
(1 Submission) Further consultation & effective communication required.	<p>Ongoing education and engagement with the community is a recommended action of the CZMP.</p> <p>Individuals that attended community information sessions or made a submission will continue to be advised of opportunities for involvement.</p>	<i>Council continue its commitment to engage with the community and affected land owners during the regular review of studies, management plans and planning instruments.</i>

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Theme 2: Community Engagement – People and Process		
	<p>New and effective methods of communicating information to affected landholders and the wider community are continually trialled by Council with varied success.</p> <p>All residents are invited to "Have your Say" on current applications and projects via the new Council website at www.greatlakes.nsw.gov.au</p>	<p><i>Establishment of Coastal Stakeholder Groups is an important action that will expedite necessary community involvement, ensuring a permanent communication interface.</i></p>
<p>(3 Submissions) Insufficient time has been given to the progressive implementation of the CZMP as the public are only included at the conclusion of the process.</p> <p>There are still too many unknowns to proceed. Council should engage in real consultation and work with owners to achieve long term protection of private and public assets.</p> <p>For the CZMP process to be successful consideration of potential hazards, likely solutions and a study of the economic and social benefits of defending both public and private assets is required as part of a holistic process.</p>	<p>Council has committed to regular and periodic review of coastal risks and their management. This is facilitated primarily through the Coastal Zone Management Plan.</p> <p>The document also provides an implementation Plan for the next 5 to 10 years and Council has determined that wherever possible, 'no regrets' actions are to be implemented at this time.</p> <p>It is anticipated that as critical points are reached - either in terms of an event, policy decision or funding allocation these would be reflected in Council documents including but not limited to: coastal zone management plans, local environmental plans, development control plans, corporate delivery and operational plans.</p> <p>All of these are public documents, subject to public engagement processes where community input and participation are encouraged.</p>	<p><i>Council continue its commitment to engage with the community and affected land owners as new information becomes available, as well as during the regular review cycle of 5 - 10 years.</i></p>

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Theme 3: Coastal Management - Options and Risk Management		
Submission	Response	Document/Action
(6 Submissions) Council's actions regarding beachfront properties have destroyed property values and also reduced Council's rate revenue from these properties.	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Council is obliged to act reasonably on available information and has a legal duty to make this public in a timely fashion. There is no role for Council to selectively restrict access to information affecting beachfront properties, or to have oversight of market values.</p> <p>Past rates were set on the basis of property value and rate pegging requirements which are largely outside of the control of Council. Rates are unlikely to be a contributing or determining factor for the establishment of any future funding requirements for coastal management including protection measures.</p>	<p><i>Establishment of Coastal Stakeholder Groups is supported as a means to better coordinate stakeholder and agency involvement in a cost sharing scheme.</i></p> <p><i>No further action at this time.</i></p>
(1 Submission) The options presented are too simple and a complete list of management options combined with cost benefit analyses is necessary.	<p>These comments were also addressed in the Summary of Submissions to Options Study:</p> <p>A full list of options for Great Lakes beaches was detailed and assessed in Section 4.3 & Table 4.4 of the Options Study. Initial options will be modified and linked to other asset sets as the plan is developed further. This will include government agencies and utilities.</p> <p>As this is a whole-of-LGA coast plan, the options refer specifically to asset types, rather than focusing on individual beaches. Thorough treatment of asset types, combinations of options will be developed and implemented for specific beaches.</p> <p>Most options identified for early action within the CZMP are 'no regrets' options that may be applied separately or in combination as required within the next 5 to 10 years.</p>	<p><i>Review technology, options and assumptions in 1st Revision, scheduled prior to 2020. Detailed analysis for South Boomerang. Priority list - additional investigation and adaptation planning.</i></p> <p><i>Council identifies the need for additional cost benefit analyses, funding models and mechanisms in future programs of review in conjunction with management options.</i></p>
(1 Submission) The cost benefit analysis is too simplistic and not appropriate for the making of long term decisions. The value of existing houses and the protection dunes provide to	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p>	<p><i>Council identifies the need for additional benefit cost analysis, funding models and mechanisms</i></p>

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Theme 3: Coastal Management - Options and Risk Management		
<p>other non-beachfront homes have been underestimated.</p>	<p>Economic analysis in the CZMP Options Study aimed for initial option separation based on relative benefit not absolute accuracy.</p> <p>Development of a detailed economic funding model will be progressed with the coastal zone management plan and subsequent review programs, in conjunction and consultation with OEH.</p>	<p><i>in future programs of review in conjunction with management options.</i></p> <p><i>Economic Impacts: Refer Tables 2.3 & 2.4 of the Options Study.</i></p> <p><i>Dune Management: Refer Section 2.4.10 of the CZMP and Appendix D-24 of the Options Study.</i></p>
<p>(8 Submissions) Jimmy's Beach is not included in Council's Great Lakes Beaches CZMP. This is significant, as Jimmy's Beach is the only NSW government designated coastal erosion 'hot spot' in the Great Lakes Council area – and there is no apparent reason for other beaches in Great Lakes to have CZMPs.</p> <p>The Jimmy's Beach CZMP simply recommends continuing Council and government funding for erosion management and 'sand nourishment'.</p> <p>In comparison the draft Great Lakes (Beaches) CZMP proposes draconian coastal controls to beaches that are not 'hot spots' and beaches that were not adversely impacted by previous events or the April storms.</p>	<p>Jimmy's Beach has been the subject of a renourishment program and separate CZMP for some time. Due to its demonstrated situation of active erosion, Jimmy's Beach has also been subject to separate ongoing funding negotiations for a similar period. Actions, mechanisms and responses currently required at Jimmy's Beach are not yet necessary at any of the beaches subject to the Great Lakes Beach CZMP.</p> <p>Other actions endorsed for Jimmy's Beach such as dune management, restricted beach access points, development controls and community engagement are consistent to those applied to Boomerang/Bluey's and all other Beaches identified in the SMEC Report and subsequent CZMP.</p> <p>Early actions and measures recommended within the both CZMP's are 'no regrets' actions wherever possible and considered to be the most appropriate social, environmental and economic measures implemented at this time.</p>	<p><i>Council continue its commitment to engage with the community and affected land owners as new information regarding hazards becomes available and during the regular review of studies, management plans and planning instruments.</i></p>
<p>(1 Submission) Why does Council continue to allow vehicle access to the "road" running parallel to north Boomerang Beach? This situation has the potential for a serious vehicle-to-vehicle or vehicle-to-pedestrian accident. The "road"</p>	<p>Noted. Beach and reserve access is a matter identified within the draft CZMP.</p> <p>Conversion of the existing vehicular access on the Boomerang Beach reserve to a shared emergency vehicle/path/cycleway is</p>	<p><i>Options for closure and/or restricted access for emergency vehicles over the Boomerang Beach reserve are to be</i></p>

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Theme 3: Coastal Management - Options and Risk Management		
should be closed to vehicles by way of a boom gate to allow emergency vehicles only.	now under consideration.	<i>developed in the first CZMP Review Cycle.</i>
(1 Submission) Stop overnight campers at Number 1 Beach, Seal Rocks car park.	Noted. Free-camping or overnight camping within car parks and reserves in the Great Lakes local government area is a broad issue for strategic consideration by Council.	<i>Council develop options for "free camping" and adapt within the CZMP review program.</i>
(1 Submission) Tables & chairs at Number 1 Beach, Seal Rocks should be removed.	Noted. Recreational infrastructure on beaches is a matter identified within the CZMP.	<i>Options for management of infrastructure continue to be considered by Council.</i>
(1 Submission) Caravan park at Number 1 Beach, Seal Rocks needs to provide more on-site visitor parking.	Noted. Seal Rocks Caravan Park is no longer under the control or management of Great Lakes Council. However, management of traffic and parking around Number 1 Beach is a matter that will be dealt with in conjunction with the local community.	<i>Council develop traffic management options and adapt within the CZMP review program.</i>
(1 Submission) It is acknowledged by all parties that in a severe event it is likely that defence of private and public assets would be funded as a 'natural disaster' by Federal, State and private funding.	<p>It is generally not possible to undertake protection works at short notice with pre-emptive application of 'disaster' funding. Disaster relief may be provided, post-event to assist people to stabilise or demolish assets depending on the level of damage. However, compensation for loss of private assets would not be equitable or sustainable on a state-wide basis and therefore would be highly unlikely.</p> <p>Council has a central role in coastal hazard identification and management planning to reduce the exposure of life and property to coastal risk. In doing so, Council is aiming to provide guidance on the location, design and construction of new assets so that they avoid damage or are able to withstand forces associated with coastal erosion and/or inundation.</p>	<i>No further action at this time.</i>
(1 Submission) There appear to be anomalies in the CZMP Options Study e.g. South Boomerang Car Park at risk in 2100 yet adjacent houses identified at extreme/immediate risk.	Risk levels are a product of probability and consequence. The lower risk levels accorded the Car Park are because there is much lower consequence compared to private houses. It is less expensive (per m ²) for a car park to be written off than a house.	<i>No further action at this time.</i>
(1 Submission) The CZMP is adding to property owner uncertainty by still openly canvassing all options from retreat to defence and then applying planning measures that would	These comments were also addressed in the Summary of Submissions to Options Study.	<i>Council identifies the need for additional cost benefit analyses, funding models and mechanisms</i>

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Theme 3: Coastal Management - Options and Risk Management		
<p>be suitable for retreat, when it is obvious that Boomerang and Blueys Beaches are unlikely to represent a retreat scenario when financial and social modelling is complete.</p>	<p>A full list of options for Great Lakes beaches was detailed and assessed in Section 4.3 & Table 4.4 of the GL CZMP Options Study. Initial options will be modified and linked to other asset sets as the plan is developed further (Note: need to include government agencies and utilities).</p> <p>As this is a whole-of-LGA coast plan, the options refer specifically to asset types, rather than focusing on individual beaches. Thorough treatment of asset types, combinations of options will be implemented to address the challenges of particular beaches.</p> <p>Early options identified in the CZMP are generally 'no regrets' actions that may be applied separately or in combination as required within the next 5 to 10 years.</p> <p>Development of a detailed economic funding model will be progressed with the coastal zone management plan and subsequent review programs, in conjunction and consultation with OEH.</p>	<p><i>in future programs of review in conjunction with management options.</i></p> <p><i>Further economic analysis required of options in future review programs.</i></p>
<p>(2 Submissions) Urgently request that Council:</p> <ul style="list-style-type: none"> • Complete economic study of defence options and when these may be required; • Lobby with other Councils that this is both a national and natural disaster planning issue; and • Seek funding solutions and mechanisms with state and federal governments and affected private property owners. 	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>The Options Study provides a cost benefit analysis for South Boomerang Beach which aims to give a relative measure of available options for this location. One recommendation is for a more detailed economic and funding model to be developed for options to treat the immediate coastal erosion risk at southern Boomerang Beach.</p> <p>Development of a detailed economic funding model will be progressed with the coastal zone management plan and subsequent review programs, in conjunction and consultation with OEH.</p>	<p><i>Develop funding model consistent with NSW Coastal Protection Service Charge Guidelines.</i></p> <p><i>Further economic analysis required of options in future review programs.</i></p> <p><i>Council will continue to lobby at state & federal levels. A Coastal Stakeholder Group is supported as a means of coordinating effort</i></p>

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Theme 3: Coastal Management - Options and Risk Management		
	A national approach to coastal management, including a common methodology for valuing coastal assets and services, is regarded as essential in equitably targeting investment along the entire coastline.	<i>to achieve these things.</i>
<p>(1 Submission) The Coastline Management Manual 1990 Worley Parsons in Section 1.2 of their Report set out a 6 stage process which includes as Stage 2: Preparation of a Coastal processes and Hazard Definition Study identifying the type, nature and significance of the various coastal processes and hazards affecting the area.</p> <p>It is our submission that the Worley Parsons Report does not satisfy Stage 2 and would not allow Council to proceed to Stage 6.</p> <p>We understand the Chairman of the Coastal Panel agrees.</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>The six stage process refers to Figure 3.1 of the superseded <i>Coastline Management Manual</i>, 1990. The current reference document, <i>Guidelines for Preparing Coastal Zone Management Plans</i> is also soon to be replaced. Nevertheless, recognised coastal experts within OEH and independent peer review support the position that the coastal hazard definition work completed for Boomerang and Blueys Beaches, including additional ground penetrating radar investigation and hazard line revision is quite adequate to inform this CZMP. There would be no technical impediment to the certification of this CZMP relying on the current level of information. The Chairman of the NSW Coastal Panel is now satisfied with the additional investigation work.</p>	<i>No further action at this time.</i>
<p>(1 Submission) We are very concerned that the recent CZMP and current Planning control drafts are entirely predicated on, and in response to, future sea level rises projected by the IPCC.</p> <p>However, Council has maintained their adoption of a projected sea level rise of 0.4m by 2050 and 0.9m by 2100 as a result of projected Global Warming/Climate Change and have used these projections to predict Recession Lines and position a ZRFC through Newman Ave beach front properties, in response.</p> <p>In regard to the predicted levels of sea level rise from global warming, the previous CZMP and these proposed Planning</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>All of the identified documents have been subject to peer review and endorsed by Great Lakes Council and the NSW Office of Environment & Heritage (OEH). They have been endorsed as being of industry standard, compliant with relevant legislative and guideline requirements.</p> <p>The <i>Guidelines for Preparing Coastal Zone Management Plans</i> (OEH, 2010) require councils to adopt sea level rise projections that are 'widely accepted by competent scientific opinion'. Gosford Council is therefore free to apply its own aversion to risk.</p>	<i>No further action at this time.</i>

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<p>Control drafts have adopted the current IPCC worst case scenarios being 0.4m by 2050 and 0.9m by 2100.</p> <p>I believe the mean values also propagated by the IPCC are 0.2m by 2050 and 0.5m by 2100, and these I also believe are currently adopted for planning purposes by many agencies.</p> <p>In fact, I believe that Gosford Council earlier this year adopted these mean values or similar in their Coastal Management Planning.</p>	<p>The science underpinning Council's Sea Level Rise Policy has been validated in a report by NSW Chief Scientist & Engineer. Revision to sea level rise projections as well as monitoring will be incorporated within the formal CZMP revision scheduled to occur over the next 5 years.</p>	
<p>(1 Submission) The forecast Erosion/Recession Lines projected in 2060 and 2100 and the resultant positioning of the Zone of Reduced Foundation Capacity (ZRFC) will impact" upon our property (and all along the Newman Ave beachfront and Boomerang Beach beachfront) adversely.</p> <p>Less extreme sea level rise projections should be applied. Council need to be mindful that positioning of the ZRFC in a way which prevents reasonable improvements to properties may bring multiple challenges by owners which could lead to confusing and inconsistent approvals. I hope the control plans determined for these properties are mindful of achieving outcomes that everyone can live with.</p>	<p>Similar comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Sea level rise and climate change generally, are currently tracking at the 'extreme' levels once regarded as very conservative. The science underpinning Council's Sea Level Rise Policy has been validated in a report by NSW Chief Scientist & Engineer. Revision to sea level rise projections as well as monitoring will be incorporated within the formal CZMP revision scheduled to occur over the next 5 years.</p> <p>Within the DCP and development assessment framework Council will endeavour to maximise opportunity for property improvements consistent with the identified coastal hazards affecting a particular lot. This includes renovation of existing structures to prolong their useful life and the siting of additions/extensions to avoid future hazards.</p>	<p><i>No further action at this time.</i></p>
<p>(1 Submission) This CZMP process is flawed because an effective data collection should have been carried out and reasonable responses, if any, determined before making the draft CZMP. This is effectively a plan to make a CZMP – recognising that not enough data has been collected. However, a plan to make a plan is not a valid basis under the</p>	<p>Similar comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Determination of coastal hazards (erosion/recession) has been based on almost 60 years of photographic data used in photogrammetry. Photographic monitoring will continue roughly every 3 - 5 years or following significant events. This will be</p>	<p><i>Establishment of Coastal Stakeholder Groups is supported as a means to better coordinate stakeholder and agency involvement in a cost sharing scheme.</i></p>

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Theme 3: Coastal Management - Options and Risk Management		
<p>Coastal Protection Act.</p> <p>The Implementation Schedules of Section 2.4.11 is very discriminatory in relation to Southern Boomerang Beach.</p> <ul style="list-style-type: none"> • Conduct a detailed investigation (business case, economic modelling and develop a funding model) to select the preferred action to address the immediate risk from erosion to private property and public land at the southern end of Boomerang Beach. • Investigation must consider impacts upon whole of Boomerang Beach. • Immediately set a 'trigger point' to flag when the risk of erosion to properties is imminent, prior to an option being selected. An appropriate 'trigger' may be the zone of reduced foundation capacity as calculated by a suitably qualified geotechnical engineer specifically for the southern properties. • Monitor the trigger as part of the Monitoring of Sand Volumes Action. • Conduct ongoing engagement with the local community, including but not limited to the foreshore residents when selecting a preferred option. <p>These 'Select Actions' are unreasonable compared to Jimmy's Beach – where a designated 'hot spot' draft CZMP simply recommends continuing Council and government funding for erosion management and 'sand nourishment'.</p> <p>These 'Select Actions' are discriminatory, particularly as the stable accreting Boomerang & Blueys dunes are 10 to 15m above sea level – whereas other CZMP beach areas including Tuncurry, One Mile Beach, Tiona and Hawks Nest are close to sea level and no 'Select Actions' apply.</p>	<p>coordinated by OEH and the community will be kept informed of up to date beach trends.</p> <p>Hazard definition work and development of this CZMP has been consistent with the standards expected for the initiation this ongoing coastal adaptation process. Trends and projections will consequently be revised as required as part of a 5 - 10 year revision cycle, with the first revision scheduled to occur before 2020.</p> <p>LEP 2014 mapping amendments will not be introduced until after this first version of the CZMP is certified by the Minister.</p> <p>Specific concerns:</p> <ul style="list-style-type: none"> • Additional economic analysis and funding model design is a priority action for specific areas including South Boomerang Beach. • South Boomerang Beach is at current risk from an extreme ocean storm from a critical quadrant. North Boomerang is generally at less risk, for which other options will be developed. It is responsible and timely to consider a funding model and establish the level of commitment required by all beneficiaries, including Council. • Physical trigger points will be established with local residents to allow ongoing monitoring and alert timely response. • Council supports the establishment of Coastal Stakeholder Groups which will include a wider social catchment, state agencies as well as utility providers. This will facilitate ongoing community engagement sharing a high level of technical information with residents 'at the coal face'. <p>Jimmys Beach, as an erosion 'hotspot' is already subject to real and present danger as evidenced by recent storms. The same standards of hazard identification and response including pragmatic moderation of development opportunity also exist at Jimmys Beach.</p>	<p><i>Continue to explore the concept of Coastal Stakeholder Groups with details of representation, responsibility, charter and insurance matters.</i></p>

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Theme 3: Coastal Management - Options and Risk Management		
<p>Council is unreasonably targeting Boomerang & Blueys based on a desktop study and ignoring the available data. This is not lawful.</p> <p>We identified our concerns about the different approach being used for other Great Lakes beaches in our 19 February 2013 submission. No action has been taken by Council for over 2 years to respond to the submission and obtain / apply the same approach for Blueys & Boomerang.</p>	<p>Recent photogrammetry at Boomerang and Blueys Beaches has further supported the original Worley Parsons assumption that the beaches are neither receding or accreting.</p> <p>Council is proposing responsible actions that have been developed with the understanding that significant losses could occur at South Boomerang in the event of an extreme coastal storm. Other beaches and associated assets are prioritised in implementation schedules that effectively identify the level of risk and appropriate response.</p> <p>The methodology has been consistent across all beaches it is the level of risk as well as specific assets and options that vary.</p>	
<p>(1 Submission) Council is proceeding on a basis which is legally incorrect because:</p> <ol style="list-style-type: none"> 1. the Worley Parsons desktop study is not to the requisite standard; 2. the Council has applied different standards to different beaches which is impermissible; 3. Worley Parsons and Council have failed to have regard to relevant data known to them including: <ol style="list-style-type: none"> a) Blueys and Boomerang Beach are accreting; b) photogrammetric and other data referred to above which now extends from 1956 to 2013; c) laser survey data if this was collected or obtained by SMEC; 4. Council has not collected the other data which Worley Parsons advised was required back in 2010 for decision making being directional wave data, pre and post storm beach profiling, bathymetric survey, aerial photography and subsequent photogrammetry. In particular, the additional photogrammetric data from 2006 to 2013 prepared by the State Government has not been considered by Worley Parsons, the Council or any other 	<p>Similar comments were also addressed in the Summary of Submissions to Options Study.</p> <ol style="list-style-type: none"> 1. In response to community concerns regarding the 'desktop study' nature of the Worley Parsons report, Council commissioned two additional research studies to clarify subsurface conditions at Boomerang Beach and Blueys Beach: the GPR Investigation and the Coastal Hazard Revision (both BMT WBM 2013 – Coastal Hazard Revision). 2. The methodology has been consistent across all beaches. It is the level of risk as well specific assets and options that vary. 3. Subsequent work including the CZMP - Options Study has been based on relevant information available at the time. <ol style="list-style-type: none"> a) Most recent photogrammetry measuring beach volumes shows that the minor accretionary trend has now stalled and the beaches are 'balanced' in the short term. b) Analysis was based on almost 60 years of air photo record. Photogrammetry is rectified to be consistent with established state survey marks and vegetation is taken into account when calculating volumes. 	<p><i>No further action at this time.</i></p>

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<p>expert for the purposes of these proposed new planning instruments;</p> <p>5. Council is using sea level rise data from 2007 based on Council policy rather than applying current predictions to the known local conditions, including the fact that the beaches are accreting.</p>	<p>Consequently, the standard of the resulting photogrammetry time series analysis is consistent with industry standards.</p> <p>c) LiDAR data was sourced from NSW Land & Property Information, a government agency.</p> <p>4. Updated information has been utilised as part of the SMEC Study and also considered in the review provided in the Options Study. Improvements to monitoring and access to directional data will be undertaken as part of the first revisions cycle. Only minor & gradual variation of much of this data would be expected in response to ENSO cycling.</p> <p>5. The beaches are currently balanced with no dominant erosion or accretion. At present accretion cannot offset SLR effects. The science underpinning Council's Sea Level Rise Policy has been validated in a report by NSW Chief Scientist & Engineer. Revision to sea level rise projections as well as monitoring will be incorporated within the formal CZMP revision scheduled to occur over the next 5 years.</p>	
<p>(5 Submissions) Preparation of CZMP should precede planning decisions and rely on evidence-based data.</p> <p>These decisions may change over time and therefore any CZMP will need to be flexible to cater for this.</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Councils throughout New South Wales are in the process of addressing and co-ordinating available information on coastal risks in accordance with OEH and Department of Planning & Environment requirements.</p> <p>The creation of management plans and planning instruments is not undertaken until the appropriate evidence-based technical studies have been completed.</p> <p>Areas and assets at high or extreme risk within the nominated planning periods require a response to avoid unnecessary exposure of life and property. Legal advice supports introduction of planning controls to be implemented now and refined with subsequent CZMP revisions.</p>	<p><i>Council continue its commitment to the on-going review and revision of coastal hazard identification and management in a transparent and inclusive manner.</i></p> <p><i>Council continue to lobby state and federal government for strategic guidance on these matters.</i></p>
<p>(1 Submission) The only NSW government designated 'hot</p>	<p>Jimmys Beach responses have been developed over many</p>	<p><i>Council supports establishment</i></p>

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<p>spot' in Great Lakes is Jimmy's Beach – as evidenced by the recent severe storms. This draft CZMP requires compliance with applicable requirements, transparent funding arrangements and genuine community consultations.</p> <p>The Great Lakes CZMP, and particularly Boomerang & Blueys sections, should be deferred pending compliance with relevant obligations and gathering reliable data including comprehensive coastal monitoring, evidence based analysis, genuine community consultations; and a detailed social and economic analysis of the costs and benefits of beaches and coastal management on the total Great Lakes community.</p>	<p>years due to the real and present risk to property. Similarly, the actions developed for the remainder of Great Lakes beaches have been commensurate with both the probability and consequence of a particular hazard.</p> <p>There is no reason, given the additional geotechnical effort invested made in Boomerang/Blueys Beaches, to treat the area any differently in terms of methodology to other beaches. Options and priorities are developed that are consistent with the beach locations and assets at risk (probability & consequence).</p>	<p><i>of Coastal Stakeholder Groups to better coordinate information sharing and general stakeholder and agency involvement.</i></p> <p><i>No further action at this time.</i></p>

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Theme 4: Land Use Planning - LEP and DCP		
Submission	Response	Document/Action
<p>(11 Submissions) Council has not acted in good faith. We reserve our right to take legal action against Council should the unwanted measures be retained in the LEP, CZMP and associated documents.</p> <p>We hold Council responsible for all damages and losses caused arising from Council's actions, and lack of action, in respect of all issues raised in this and past submissions.</p>	<p>Similar comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Council has continually strived to work in 'good faith' through open and transparent disclosure of coastal management information in accordance with all relevant legislative requirements and guideline documents.</p> <p>The identification of coastal hazards within the Great Lakes has been undertaken using the same methodology as used in the management of coastal erosion 'hotspots'. Only once hazard studies have been undertaken, exhibited, endorsed by OEH, are they adopted by Council and made into legislation by the Department of Planning & Environment.</p> <p>Apprehension and response by Council to emerging risk is considered necessary and reasonable by coastal experts including OEH and the NSW Coastal Council. There is no latitude for Council to selectively restrict access to information affecting beachfront properties or their market value.</p>	<p><i>Council supports establishment of Coastal Stakeholder Groups to better coordinate stakeholder and agency involvement.</i></p> <p><i>Open and transparent communication of hazards in public and legal documents.</i></p> <p><i>No further action at this time.</i></p>
<p>(2 Submissions) Non-compliance with requirements of the Coastal Protection Act and Guidelines for Preparing Coastal Zone Management Plans means that Council will not have the benefit of the good faith defence in Section 733 of the Local Government Act.</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>The Guidelines for Preparing Coastal Zone Management Plans (CZMP) (OEH, 2013) require councils to adopt sea level rise projections that are 'widely accepted by competent scientific opinion'.</p> <p>The science underpinning Council's Sea Level Rise Policy has been validated in report by NSW Chief Scientist & Engineer. Revision to sea level rise projections as well as monitoring will be incorporated within the first revision of coastal processes to be completed by 2020.</p>	<p><i>Council supports establishment of Coastal Stakeholder Groups to better coordinate stakeholder and agency involvement.</i></p> <p><i>Open and transparent communication of hazards in public and legal documents.</i></p> <p><i>No further action at this time.</i></p>

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	<p>Council has also continually strived to work in 'good faith' through open and transparent disclosure of coastal management information in accordance with all relevant legislative requirements and guideline documents.</p> <p>Protection under Section 733 of the Local Government Act 1993 is reinforced when reasoned action supports risk management.</p>	
<p>(10 Submission) Premature gazettal of Boomerang & Blueys Coastal Risk Planning Maps in the LEP 2014, before appropriate evidence based studies.</p> <p>Boomerang and Blueys Beaches are not a NSW "hot spot" and the discriminatory decision to single them out for study and coastal management was flawed given stability of these beaches.</p> <p>Council should remove unsubstantiated Boomerang and Blueys hazard lines from the LEP and planning controls, pending proper evidence based research.</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study:</p> <p>The identification of coastal hazards within the Great Lakes has been undertaken with the same methodology as used in the identification of 'hot spots'. Only once hazard studies have been undertaken, exhibited, endorsed by OEHL, are they adopted by Council for use in coastal risk management.</p> <p>If other, independent consultants were to re-do the hazard definition work for Boomerang/Blueys it is highly unlikely that results would be significantly different. This was reflected in the minor modifications associated with the additional geotechnical investigation for the beaches.</p> <p>The Coastal Hazard Study and additional geotechnical investigation for Boomerang/Blueys Beaches have confirmed that some areas of Boomerang Beach are currently at risk of erosion from an extreme ocean storm.</p>	<p><i>Refer to the GPR Investigation and the Coastal Hazard Revision (BMT WBM,2014)</i></p> <p><i>No further action at this time.</i></p>
<p>(1 Submission) The Gateway requires State and Commonwealth public authorities to be consulted but no advice has been sought.</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Public agency consultation was undertaken concurrently with public exhibition in accordance with the Environmental Planning & Assessment Act 1979. Public agency comments are included in the submission tables and the CZMP documents amended in accordance with these comments.</p>	<p><i>No further action at this time.</i></p>
<p>(11 Submissions) Suggestions of planned retreat or any other</p>	<p>These comments were also addressed in the Summary of</p>	<p><i>Council continue to consider the</i></p>

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<p>'forced action' would bring significant damage to reputation and desirability of owning or visiting properties at Boomerang and Blueys Beaches.</p> <p>Council needs to take action by implementing measures to help preserve beaches, and property owners should be given the opportunity to take their own measures to safeguard their house, not be forced into something by Council.</p>	<p>Submissions to Options Study:</p> <p>Provisions within Clause 7.4 Coastal Planning regarding the "relocation, modification or removal of the development" are standard provisions from the Standard Principle Instrument LEP. Council is providing additional management and development options within the CZMP and DCP which are aimed at facilitating the long term occupation and enjoyment of beachfront public and private land.</p> <p>Private protection initiatives are guided by the Coastal Protection Amendment Act 2012 and its regulations. The approval authority for such works is the NSW Coastal Panel. There is currently no opportunity to embark on one-off protection initiatives without considering other landholders.</p> <p>Council is keen to continue to engage with affected land owners and communities to ensure that when more constructive or material actions are undertaken in the future, they are appropriate in terms of location, hazard, the asset being impacted, funding options and the environmental factors relevant at that time.</p>	<p><i>impacts of coastal risks now and in the future in order to provide for reasonable occupation of beachfront land.</i></p> <p><i>Council continue its commitment to engage with the community and affected land owners as new information regarding hazards becomes available and during the regular review of studies, management plans and planning instruments.</i></p>
<p>(10 Submissions) Coastal planning area mapping only captures beachfront properties and not lower land behind.</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Erosion/recession hazard defines the Coastal Planning Area. Coastal inundation risks are only critical in low areas such as Elizabeth Creek, Elizabeth Beach and Ampat Place, Blueys Beach.</p> <p>Several areas are also identified on the Flood Planning Area maps in Great Lakes Local Environmental Plan 2014 ("LEP 2014") and in certain circumstances these hazards have the potential to overlap.</p>	<p><i>Undertake detailed investigations of coastal inundation, stormwater and flooding in critical locations as resources permit.</i></p> <p><i>Funding will be sought through OEH grants to undertake this work.</i></p>
<p>(12 Submissions) All property at risk and time frames relevant to each risk should be identified as part of a 'zone'</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p>	<p><i>Council supports establishment of Coastal Stakeholder Groups to better coordinate stakeholder</i></p>

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on a map within the LEP.	<p>The variable nature of coastal risks is reflected within this CZMP in the establishment of prioritised actions.</p> <p>Council is unable to differentiate levels of risk within the LEP 2014 Coastal Risk Planning Area mapping at this time. However, Council is endeavouring to provide additional guidance within the Draft DCP on development requirements in different locations as a result of the variation between exposures to coastal risk over a 50 year planning period.</p> <p>Amended draft objectives and controls in the DCP were prepared in response to community concerns and endorsed for exhibition at the Strategic Committee meeting on 6 October 2015.</p>	<p><i>and agency involvement.</i></p> <p><i>Council continue to pursue clarification of development objectives and controls within the DCP to assist with sustainable development within coastal planning areas.</i></p>
(14 Submissions) National or at least state level coordination is required to ensure transparent and equitable outcomes.	<p>These comments were also addressed in the Summary of Submissions to Options Study:</p> <p>A national approach to coastal management, including a common methodology for valuing coastal assets and services, is regarded as essential in effectively targeting investment.</p>	<p><i>Council supports establishment of Coastal Stakeholder Groups to better coordinate stakeholder and agency involvement.</i></p> <p><i>Council will continue to lobby at state and federal levels for better methodologies.</i></p>
(2 Submissions) Is there a an 88b covenant condition requiring owner to review coastal stability conditions for continued occupancy and possibly demolish building if the outcome is unsatisfactory.	<p>This draft condition was requested by Council in one instance, several years ago and was subsequently modified in consultation with the owner. Despite this, it is noted that Council does have a legal obligation to require the demolition and removal of unsafe structures under the Local Government Act 1993. This obligation applies irrespective of whether the structure has been damaged by coastal risks, floods or other reasons.</p> <p>Council is keen to provide flexibility and additional guidance within the DCP so that development within the coastal risk planning area is designed and built to respond to these risks,</p>	<p><i>Council continue to pursue clarification of development objectives and controls within the DCP to provide for adaptive development within coastal planning areas.</i></p>

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	<p>rather than relying on legal controls and mechanisms.</p> <p>Amended draft objectives and controls in the DCP were prepared in response to community concerns and endorsed for exhibition at the Strategic Committee meeting on 6 October 2015.</p>	
<p>(2 Submissions) GLC previously introduced development conditions requiring setbacks from ocean front boundaries and enhanced foundations for new structures.</p> <p>Future planning and building controls adopted by Council need to balance reasonable permissible development, public interest and balanced future projections.</p>	<p>Council is continuing to explore all options for management of coastal risks on private property.</p> <p>To this extent, Council is keen to provide flexibility and additional guidance within the DCP so that development that occurs within the coastal risk planning area is designed and built to accommodate and respond to these risks, rather than relying on legal controls and mechanisms.</p> <p>Amended draft objectives and controls in the DCP were prepared in response to community concerns and endorsed for exhibition at the Strategic Committee meeting on 6 October 2015.</p>	<p><i>Council continue to pursue clarification of development objectives and controls within the DCP to provide for adaptive development within coastal planning areas</i></p>
<p>(2 Submissions) I must question the accuracy of the hazard lines in the identification of land at risk. The number of variables (such as vegetation and underlying rock) used to arrive at a result and the number of assumptions made is such that it is not truly possible to arrive at a definitive result.</p>	<p>The coastal risk planning area mapping is based on a joint probability of continued recession combined with an extreme ocean storm at the end of the recession. These areas also take the zone of reduced foundation capacity into account.</p> <p>In subsequent reviews OEH and Council will seek advice on improving the representation of joint probability. Vegetation is (conservatively) disregarded as it only has a marginal benefit during the peak of an ocean storm. Value of vegetation lies in its ability to trap and retain sand as a reserve for future storms.</p> <p>Additional geotechnical work to investigate subsurface conditions is recommended in specific areas by the Coastal Zone Management Plan.</p>	<p><i>Council continue its commitment to ongoing review and revision of coastal hazard studies, management plans and planning instruments to ensure the best-available information is provided to land owners and the wider community.</i></p>

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Theme 4: Land Use Planning - LEP and DCP		
(1 Submission) Why use 2060 planning horizon?	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>Great Lakes Council utilises a rolling 50 year timeframe for planning purposes, hence the use of 2060. This will be revised regularly in association with the program of review and revision of coastal hazard studies and management plans.</p> <p>Council opted not to use the 2100 benchmark due to increased levels of uncertainty with longer term projections with regards to coastal processes and sea level rise.</p>	<p><i>Council continue its commitment to ongoing review and revision of coastal hazard studies, management plans and planning instruments to ensure the best-available information is provided to land owners and the wider community.</i></p>
<p>(2 Submission) It is suggested that the DCP be reviewed:</p> <ul style="list-style-type: none"> • 'refurbishment' being classified as an 'addition' requires clarification; • existing buildings are located on and in the ZRFC - do provisions apply to new buildings only; • regulations regarding removal of buildings as a 'trigger' need clarification; and • distinction between Jimmy's Beach and other beaches is required. 	<p>These comments were also addressed in the Summary of Submissions to Options Study.</p> <p>The Coastal Risk Planning Area provisions in the amended DCP will aim to clarify requirements on land within a coastal risk planning area, particularly in response to the range of risks that may apply to certain areas.</p> <p>To this extent, Council is keen to provide flexibility and additional guidance within the DCP so that development that occurs within the coastal risk planning area is designed and built to these risks, rather than relying on legal controls and mechanisms.</p> <p>Amended draft objectives and controls in the DCP were prepared in response to community concerns and endorsed for exhibition at the Strategic Committee meeting on 6 October 2015.</p>	<p><i>Council continue to pursue clarification of development objectives and controls within the DCP to provide for adaptive development within coastal planning areas</i></p>
(1 Submission) The Implementation Schedules also include the following significant amendments to the DCP to include 'Controls to Coastal Risks' which are discriminatory, unnecessary and draconian.	<p>The amended draft development control plans adopted for exhibition at the Strategic Committee meeting on 6 October 2015 removed all references and requirements relating to trigger points.</p>	<p><i>Council continue to pursue clarification of development objectives and controls within the DCP to provide for adaptive development within coastal</i></p>

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<p>DCP Controls are rejected due to lack of an evidence based process and Council cannot impose draconian planning restrictions without having gathered and taken into account the requisite data under the Coastal Protection Act and planning regime.</p>	<p>However, there is a need to develop a better understanding of trigger points and thresholds in developing a coherent coastal adaptation pathway. This is part of the language and methodology of adaptation and needs to be clarified for the general community. For example in a general sense, trigger points need to be identified in strategic planning to allow appropriate mobilisation time to meet an expected hazard. This meaning does not relate to a particular property. Similarly trigger points may be identified for the initiation of protection works due to the time required for funding and construction.</p> <p>Council has prepared the amended draft development control plan with the view to assisting land owners and assessment officers to determine how development within coastal planning areas can be designed and built to accommodate and respond to erosion or inundation hazards, rather than relying on legal controls and mechanisms.</p> <p>Council is also committed to the recommendation that the DCP should continue to be amended as new hazards information is made available, approaches to controlling development and coastal risks are improved, and feedback from the community and council regarding the practicality of implementing the DCP provisions is gathered.</p>	<p><i>planning areas.</i></p>
<p>(1 Submission) The planning provisions are not consistent with the Planning Circular 2014 regarding S149 Coastal Hazard Notations which indicates that:</p> <p>"A study of coastal hazards, and any policy or instrument based on that study; need to be seen as a point-in-time assessment."</p> <p>'Current exposure to a coastal hazard' refers to a situation where land is identified, through an adopted evidence-based study, as being exposed to the hazard at the time the study</p>	<p>These comments were also addressed in the Summary of Submissions to Options Study:</p> <p>The content and recommendations of the Worley Parsons, Report and the SMEC Report were used to inform preparation of the Draft Options Study.</p> <p>In response to community concerns regarding the 'desktop study' nature of the Worley Parsons report, Council commissioned two additional research studies to clarify</p>	<p><i>Concerns raised regarding the validity of the hazard studies are addressed in Section 1.5 of the CZMP.</i></p> <p><i>No further action at this time.</i></p>

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<p>was prepared."</p> <p>Council is relying on the Worley Parsons report which is not evidence based because it uses false assumptions and is a desk top study.</p> <p>Therefore Council has not used information to the requisite standard and the Planning Proposal to amend LEP 2014 should delete the unsubstantiated Clause 7.4 Coastal Risk Planning Maps for Boomerang and Blueys beaches.</p>	<p>subsurface conditions at Boomerang Beach and Blueys Beach: GPR Investigation and the Coastal Hazard Revision (BMT WBM 2014).</p> <p>All of the identified documents have been subject to peer review and endorsed by Great Lakes Council and OEH. They have been identified as being of industry standard, compliant with relevant legislative and guideline requirements and have informed the coastal planning areas documented within the CZMP and Planning Proposal - Coastal Planning Areas.</p>	
<p>(1 Submission) The DCP should remain in its current form with any coastal management changes deferred for GLC and community consideration after completion of proper evidence based CZMP processes and consultations.</p>	<p>The existing "Sea Level Rise and Coastal Erosion" section of the DCP is considered to be out-of-date and does not provide guidance to land owners or assessors on the range of options available to redevelop or improve existing dwellings on private land affected by a coastal planning area.</p> <p>To this extent, Council is keen to provide flexibility and additional guidance within the DCP so that development that occurs within the coastal planning area is designed and built to accommodate and respond to hazards.</p> <p>Amended draft objectives and controls for the DCP were prepared in response to community concerns and endorsed for exhibition at the Strategic Committee meeting on 6 October 2015. These are expected to be exhibited during October and November of 2015.</p>	<p><i>Council continue to pursue clarification of development objectives and controls within the DCP to provide for adaptive development within coastal planning areas.</i></p>

Marine Estate Management Submission	Response
References to Marine Park Authority must be replaced with Marine Estate Management Authority.	Amended Options Study & CZMP.
References to the Port Stephens - Great Lakes Marine Park must be replaced with Department of Primary Industries - Port Stephens - Great Lakes Marine Park or DPI (Marine Parks)	Amended Options Study & CZMP.

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Marine Estate Management Submission	Response
References to the Marine Parks Act 1997 must be replaced with the Marine Estate Management Act 2014.	Amended Options Study.
Table 1-1 references that Great Lakes Beaches will be covered by the CZMP and whether they are within the PSGLMP. The table and PSGLMP has no context and this should be provided.	Amended Options Study & CZMP.
The options should identify how they may impact on the marine environment, the objective and purposes of the marine park and how they protect the ecological values outlined in the report.	Amended Options Study.
Pages 31 and 34 - 'natural assets' does not include a reference to the PSGLMP	Amended Options Study.
Page 44 describes ecological values, but does not consider inter-relationship between values for the 'coast' and adjoining marine environment.	Amended Options Study.
Tables from Page 49 onwards do not account for roles and responsibilities of PSGLMP/Fisheries staff and should also outline all activities that Marine Parks grants permission for in addition to surfing.	Amended Options Study & CZMP.
<p>The document should note that in addition to the coastal reforms, a Marine Estuary Strategy for all coast and estuary waters of NSW is being prepared.</p> <p>A threat and risk assessment will determine the social, economic and environmental benefits and stressors of the marine estate. This will probably include spatial zoning coupled with CAR principles.</p> <p>Upon completion of the Marine Estuary Strategy each marine park will be reviewed in line with the Marine Estate Management Act 2014.</p>	Noted.
NSW community values associated with the marine estate are available at www.marine.nsw.gov.au/key-initiatives/marine-estate-community-survey .	Noted.
Terrestrial information is very thorough and will assist in future decision making.	Noted.

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Department of Primary Industries - Crown Lands Submission	Response
Crown Lands and other land managers such as Reserve Trusts hold responsibilities over land and water for a number of works provided for within this CZMP. Those managers should be identified within the CZMP and their concurrence obtained for individual actions within the CZMP.	Noted - for future revision of CZMP
Collaborative approaches should be investigated where a number of agencies have a jurisdictional interest in management or planning matters (e.g. compliance), or coastal hazard options.	Noted.
Crown Lands authorisation must be obtained where works occur over Crown managed Land, and in some cases Land Owner's Consent may still be required where Crown land is under other management arrangements.	Noted.
Crown Lands is to be consulted in relation to zoning, development and on-ground works issues where the works are on or adjacent to Crown Land. Relevant references to be included in the CZMP.	Noted - subject to consultation & future CZMP revision.
Options in relation to Commercial Fishing should be deferred to the relevant State Government agency, to ensure consistency with State wide policies, programs or guidelines.	Noted.
Spatial Data - Crown Land status to be identified in relation to all Crown land classes and Reserve types, including vacant and unidentified Crown land.	Noted.
<p>Reserve Management</p> <ol style="list-style-type: none"> 1. Approach is supported: i.e. strategic and rationalised approach to basic numbers of well-serviced and accessible pedestrian accesses in resilient locations rather than on demand of local users (e.g. too closely spaced) contributing to local destabilisation of dunes and increased 'edge' effects. Reduce numbers of access ways or redesign where possible. Tracks over Crown managed land to be authorised. Engage with Crown Lands where track closures occur over Crown managed land. 2. Establish a multi-agency approach with the aim of avoiding adverse impacts, from Sandbar/Smiths Lake 4WD use, on surrounding high conservation ecosystems and vulnerable landscapes. 3. Ecological Health Actions additions: <ol style="list-style-type: none"> a) .“Manage threatened habitats in a hierarchy for protection where biosecurity issues exist or emerge e.g. Myrtle Rust having the potential to affect areas of EECs such as Littoral Rainforest or those containing Melaleuca quinquenervia.” b) “Monitor future risks associated with potential climate change effects and migrating pest species e.g. Cane Toads” c) “Implement Threat Abatement Plans and Species Recovery Plans” d) Monitor for other potential pest species management issues e.g. Indian Myna. e) Add possible new actions “all works will apply best practice and seek relevant authorisations” 	Noted - subject to consultation and future CZMP revision.

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Department of Primary Industries - Crown Lands Submission	Response
<p>4. Suggest, to value add to the comprehensive program promoted:</p> <ol style="list-style-type: none"> a) Desktop research to provide an understanding of those ecosystem requirements including threats, impacts per threat, risks, recovery potential, recovery trajectory and establish 'reference patches' elsewhere, based on similar patch attributes. This will help inform objectives relating to monitoring and future management requirements. b) Relationship of the patch to and within regional and sub-regional corridors. 	
<p>Asset Classes</p> <ol style="list-style-type: none"> 1. Dunes and Dune vegetation - Crown Lands notes that these assets are at High/Extreme risk. Crown Lands must be involved in management option decisions over dune vegetation, on Crown managed land. Works may require Crown Lands' authorisation. Works to be done in accordance with Best Practice and coordinated across agencies to minimise risks and increase opportunities for long term success, including monitoring. 2. Littoral Rainforest - One Mile and Seven Mile beach remnants for present day and 2060 are noted as high/extreme risk. Crown Lands to be involved in any management decisions over Littoral Rainforest on Crown managed land. Current priorities might include mapping condition, seed collection, rehabilitation works, weed control to improve resilience and expand any potential 'migration' opportunities. 3. Boat Beach ramp on Crown land - 2060 impacts. Council currently manages. 4. Tourist Parks - Forster Main, land around the Tiona Caravan Park, and Seal Rocks Number One. Issues where erosion/recession might affect cabins, campgrounds or associated infrastructure will impact Crown Lands. Future impacts will be compounded in areas where there is no Crown Land available to relocate lost services or assets. Early advice as to potential relocation requirements should be provided to Crown Lands. 5. Cape Hawke and Hawkes Nest Surf Life Saving Clubs (SLSCs) are on Council managed Crown Land. Crown Land is to be consulted in relation to changes to SLSCs or the Reserves they occupy. 6. Road access to the Seal Rocks Caravan Park is acknowledged as priority project. 	Noted.
<p>Planning</p> <ol style="list-style-type: none"> 1. Great Lakes Council, CZMP related Development Control and Planning measures must not adversely affect Crown Land. New development building and safety controls are to be confined to within the boundaries of freehold tenure. Impacts from current and future re-enforced beachfront structures must not adversely impact Crown Land. 2. Crown Lands' authorisation must be sought for implementation actions on Crown land and a statement to this effect should be expressed explicitly in CZMP documents. 3. Ensure that impacts on Crown land are assessed and adverse impacts are avoided where rezoning or retreat buffers are being planned. Where advantageous biodiversity buffers are being planned over 	Noted.

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<p>Crown managed land, Crown Lands must be consulted in planning decisions.</p> <p>4. DCP controls for Coastal Risks:</p> <ul style="list-style-type: none"> a) do not adversely impact Crown Land or waterways (adjacent or otherwise) b) buffers/offsets for buildings are wholly contained within the subject parcel. c) Floor level - ensure drainage designs with elevated flooring and piers/footings do not adversely affect Crown Land by way of altered or exacerbated hydrological effects. d) migration of development does not adversely impact Crown land or waterways (adjacent or otherwise). Mapping Crown Lands in areas of retreat will aid identifying risks. Geotech solutions and access to sites for placement of geotech by way of authorisation where over/on Crown Land. e) Where Crown public roads are proposed to be formed for public use these roads must be transferred to Council per s151 Roads Act. 	
<p>Discussion regarding funding commitments is limited and CZMP requires clearer discussion on mechanisms to determine public and private contribution to deliver options presented in the CZMP.</p>	Noted.
<p>Impacts on adjoining land from protection structures to be considered. Crown lands must not be adversely affected such as by scour or edge effects. All impacts must be assessed over the beach scape including impacts on any Threatened Species, in-fauna or Aboriginal Cultural Heritage.</p>	Noted.
<p>DPI NSW is leading a state-wide program over the use of public land by Commercial Fishery - Ocean Haul Fishing and this should be noted in the document by adding: "GLC to collaborate with lead State Government Department/s in relation to managing OHF compliance matters."</p>	Noted - consultation & future CZMP revision



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