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COUNCIL NOTICES

BELLINGEN SHIRE COUNCIL
COASTAL PROTECTION ACT 1979
SECT 55H

Gazettal and commencement of Coastal Zone Management Plans

Bellingen Shire Council with the certification of the Minister for the Environment, have prepared and adopted the Bellingen Shire Coastal Zone Management Plan in accordance with section 55 of the *Coastal Protection Act 1979*.

The Bellingen Shire CZMP can be accessed at Council's webpage www.bellingen.nsw.gov.au

LIZ JEREMY, General Manager, Bellingen Shire Council, 33-39 Hyde Street, Bellingen NSW 2454



"Where will our knowledge take you?"



Bellingen Coastal Zone Management Plan
Final Report
May, 2017

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Bellingen Coastal Zone Management Plan – Final Report

Prepared for: Bellingen Shire Council

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

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Document Control Sheet

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<p>Synopsis: This plan forms the companion document to the Bellingen Shire Coastal Zone Management Study, and presents implementation details for the recommended management actions for treating risks from erosion, recession and coastal inundation within the Bellingen Shire open coastal zone, and coastal inundation of the Bellinger Kalang Rivers Estuary. The management actions target those assets with immediate 'intolerable' level risk from coastal hazards, with potential management options for assets with intolerable risk up to 2100 also detailed for use, if and when required.</p>		

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DISTRIBUTION

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Introduction

1 Introduction

1.1 Purpose and Context of the Bellingen Coastal Zone Management Plan

Bellingen Shire is nestled between Coffs Harbour City and Nambucca Shire Local Government Areas, located approximately 400 km north of Sydney, and 360 km south of Brisbane. The Bellingen Local Government Area (LGA) coastline extends from Oyster Creek in the south to Tuckers Rocks in the north, including the northern end of North Valla Beach, Hungry Head Beach, North Hungry Head Beach and North Beach.

The Bellingen coastline is subject to a variety of coastal processes that generate hazards on the shoreline, including periodic erosion during storms and inundation during high ocean water levels which may inundate back beach areas via the Bellinger Kalang River Estuary and other smaller creeks. With the realisation of sea level rise projections, the shoreline is expected to recede landward and coastal inundation will be enhanced relative to current conditions. In contrast to much of NSW coastline, the majority of Bellingen's shores are undeveloped, with the exception of low key recreational facilities. Much of the coastal zone is retained in public ownership within the Bellingen Coast Regional Crown Reserve. This affords the coast unique natural values that may also provide greater resilience to existing coastal processes and the impacts of future sea level rise.

Bellingen Shire Council (herein referred to as Council) has resolved to prepare a Coastal Zone Management Plan (CZMP) to formally manage the risks from coastal hazards to valuable land and assets at present and in the future, and to preserve the unique natural values of the Bellingen coastline. The *Bellingen Coastal Zone Management Study* (CZMS) was completed by BMT WBM in 2014(a) to assist in the development of this CZMP, forming the companion document to this CZMP.

Much of the land covered by this CZMP is within the coastal Crown reserve system. The *Belling Coast Regional Crown Reserve* (the RCR) is a strategic reservation covering all coastal Crown land in the Bellingen LGA. A Key component of RCR is the *Bellinger Head State Park*¹. The main corporate Crown reserve management bodies (trusts) pertinent to the CZMP include the *Bellinger Heads State Park Trust*² and the *NSW Crown Holiday Park Trust*³. **Council needs to work in close partnerships with Department of Industry - Lands (Dol – Lands) and the relevant Trusts to best achieve the management objectives and strategies proposed in this Plan.**

Other key coastal stakeholders to be included in the ongoing process of plan implementation include the Urunga Surf Life Saving Club; the North Beach Surf Life Saving Club; the North Beach Community Alliance; the Urunga Amateur Fishing Club; and community members.

¹ The *Bellingen Coast Regional Crown Reserve* and the *Bellinger Head State Park* are subject to Bellingen Coast Regional Crown Reserve Plan of Management.

² Note the *Bellinger Heads State Park Trust* is managed under Lands Administration Ministerial Corporation/Bellingen Shire Council Partnership

³ Note the *NSW Crown Holiday Parks Trust* is responsible for Holiday Parks at Mylestom, Urunga and Hungry Head and subject

Introduction

1.1.1 Scope of a Coastal Zone Management Plan

The *Coastal Protection Act 1979* and its associated *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013) specify the minimum requirements for Coastal Zone Management Plans in NSW. In accordance with NSW legislation, CZMPs aim to address the impacts of coastal hazards upon assets and land, which may include social, physical, ecological or economic assets. The actions within the CZMP then specifically target reducing, eliminating or mitigating the likelihood and/or consequence of the major hazards that may threaten coastal assets.

The Bellingen CZMP satisfies the minimum requirements of the *Coastal Protection Act 1979* and associated CZMP Guidelines, and thus may be adopted by Council and if required, certified by the Minister of the Environment. Details of how the minimum requirements have been met in this Bellingen CZMP (and supporting documents) are summarised in Appendix A. The Bellingen CZMP has also been prepared in accordance with the *NSW Coastal Policy 1997*, and other legislation and guidelines applicable to managing the coastal zone of NSW, as summarised in Appendix A.

To this end, development of the Bellingen CZMP included the following elements.

- **Identification and mapping of the extent of coastal hazards, at present and at 2050 and 2100 with sea level rise**, for the open coast environment. This provides the technical basis for the CZMP. The major coastal hazards are beach erosion, shoreline recession and coastal inundation, and their identification and mapping is documented in the *Bellingen Coastal Processes and Hazards Definition Study* (BMT WBM, 2012). This plan only considers in detail the coastal inundation hazard to the open coast shoreline (i.e. the beaches) and the small coastal waterbodies of Oyster and Dalhousie Creeks. The coastal inundation hazard to the Bellinger and Kalang River Estuary have also been identified and mapped in the *Draft Bellingen Shire Estuary Inundation Mapping* study (2014b).
- **A Risk Assessment to determine the level of risk to land, assets and values from coastal hazards**. The risk assessment process has determined the priority aspects of Bellingen's coastal zone at risk from coastal hazards (land, values, assets) that require management through the CZMP process. The legislative and planning context of coastal zone planning and therefore the risk assessment is documented in Appendix A of the CZMS. Details of the risk assessment, which was conducted in accordance with the ISO 31000:2009 Australian Standard, are also provided in the CZMS (see Section 2). Details regarding the risk assessment for the Bellinger and Kalang River Estuary are found in *Draft Bellingen Shire Estuary Inundation Mapping* study (BMT WBM, 2014b).
- **Analysis and selection of feasible and practical management options to manage the coastal risks, from the present to 2100**. Management options were assessed in the companion CZMS, in terms of their ability to address risks at Bellingen, and their associated costs and benefit(s). The implementation schedule provided in Section 2.2 of this CZMP outlines how to implement the preferred management actions (i.e. specific actions, responsibilities, costs and timeframes). Also included are high level actions to the address coastal risk to the Bellinger and Kalang River Estuary, based on the outcomes of the *Draft Bellingen Shire Estuary Inundation Mapping* study (2014b) and *Bellingen and Kalang Rivers estuary Action Plan – Sea Level Rise* (2014c).

Introduction

At Bellingen, the majority of land fringing the open coastline is undeveloped and in public ownership. Considering that such an area is the focus of this Plan, it significantly changes the nature of the document (in comparisons to other CZMPs), i.e. undeveloped lands are far more resilient to the impacts of coastal hazards, particularly relating to sea level rise, as nature can be left to run its course. This is unlike those coastal areas that are developed and for which local communities must determine whether to relocate, protect, abandon or otherwise manage a range of existing public and private assets.

Therefore, a key objective of this Coastal Zone Management Plan is to preserve the undeveloped, natural and publicly owned coastal land in the Bellingen LGA, as this is the basis for effective adaptation to coastal hazards in the future.

Community use aspects are also an important component of CZMPs under NSW legislation, where not already managed through other processes. At Bellingen, beach access and amenity and recreational requirements of the coastal zone are already managed through the *Bellingen Coast Regional Crown Reserve*, administered by NSW DoI Lands. The management actions in this CZMP therefore target coastal risks, however some consideration to beach access and amenity associated with coastal risk is provided.

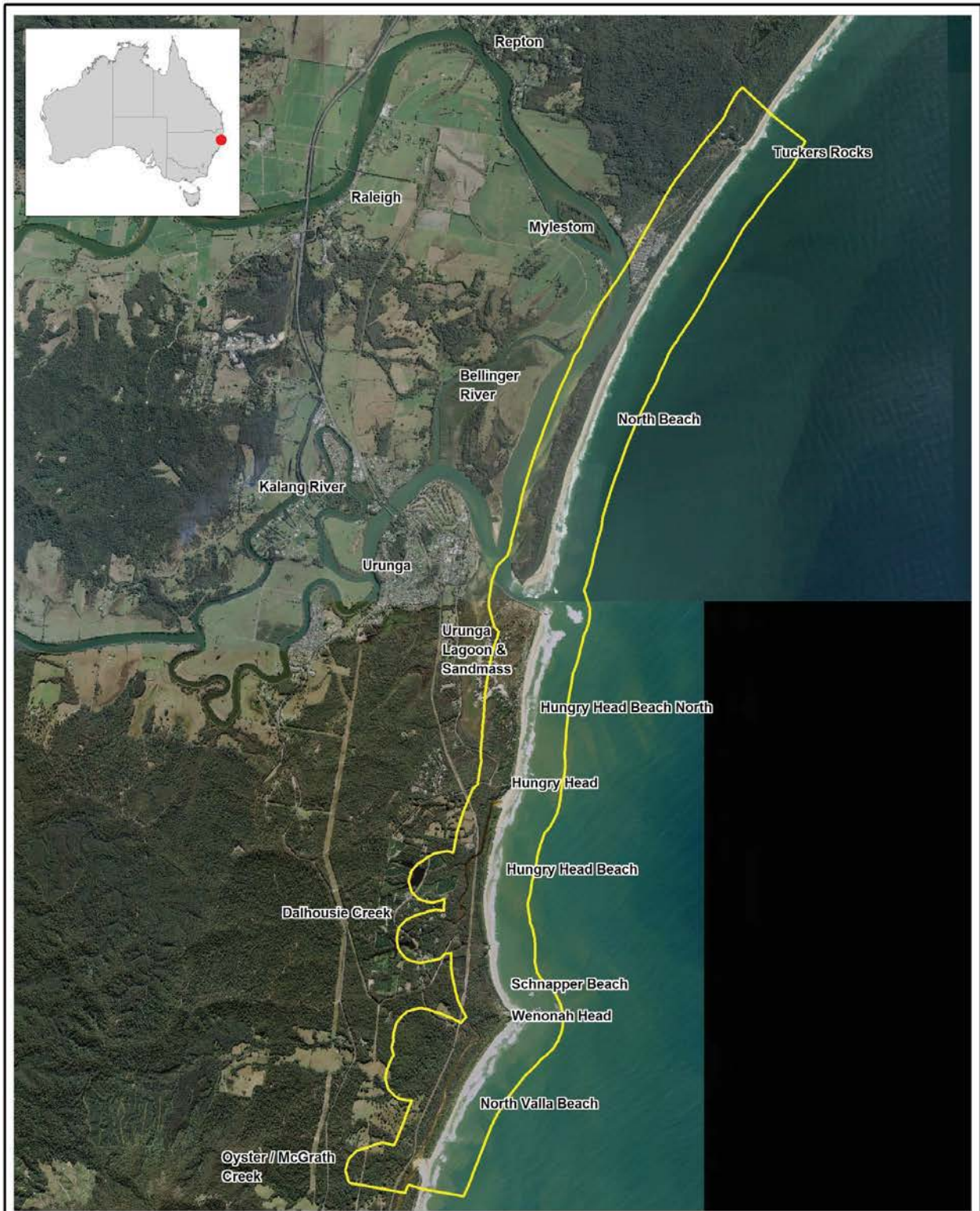
Furthermore, while management actions may relate to the impact of coastal hazards on environment / ecology, economics and other related aspects, the CZMP does not specifically address all of those matters in the study region. That is, the actions recommended by the CZMP may not directly relate to local considerations such as improving ecological habitats or expanding recreational facilities, unless the actions are incidentally associated with reducing coastal risk.

The CZMP is focussed on the land potentially affected by coastal hazards and the land that may be influenced by Council and other stakeholders through potential management actions. Strategies implemented through the CZMP will also be considerate of any impacts upon the submarine coastal zone (i.e. below sea level).

As previously noted, although no specific coastal inundation hazard and risk assessment for the Bellinger and Kalang Rivers Estuary was undertaken as part of this Plan, this issue was addressed in parallel to the development of this CZMP (see BMT WBM, 2014b and 2014c). These estuary specific studies identify various strategies for managing risks to the built environment / assets and ecological habitats which are highly relevant to the management of Bellingen's Coastal Zone. While the intent of both studies is indeed aligned with this direction of this Plan, those two documents were not completed in time to be integrated in any level of detail within this CZMP. Therefore, high level actions addressing coastal inundation risks to the Bellinger and Kalang River Estuary are provided only. The relevant land managers should refer back to the various estuary studies for additional supporting detail.

1.1.2 Study Area

The Bellingen Shire coastline comprises three long beach compartments, namely: the northern end of North Valla Beach (north from Oyster Creek to Wenonah Head); Schnapper Beach and Hungry Head Beach (extending from Wenonah Head to Hungry Head); and North Beach extending north to Tuckers Rocks, including the Bellinger Kalang Estuary River mouth and training walls.



Title:
Bellingen Coastal Zone Management Plan Study Area

Figure:
1-1

Rev:
A

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.



0 1.25 2.5km
 Approx. Scale



Filepath : File

Introduction

Smaller coastal creek entrances are also located along the Bellingen coastline, including Oyster Creek (on North Valla Beach) and Dalhousie Creek (on Hungry Head Beach), which are both intermittently open and closed to the ocean. The focus study area of this Plan is illustrated in Figure 1-1. The Bellingen and Kalang Rivers Estuary is also a significant feature within Bellingen coastal zone.

Actions relating to this estuary environment are included in this Plan at a high level only, as the two estuary inundation studies that address coastal inundation hazard risk to this area (i.e. BMT WBM, 2014b and 2014c) were not completed in time for detailed integration within this Plan.

The majority of Bellingen Shire's open coast shoreline is undeveloped and natural, making it unique in northern NSW. Significant lengths of this coastline lie within the Bellingen Coast Regional Crown Reserve. The nearest urban centre to the coast is Urunga. The small coastal village of Mylestom, located on the northern arm of the Bellinger River, is the closest development to an ocean beach. Communities in the Bellingen Shire use the open coast beaches and the Bellinger Kalang River Estuary for a range of recreation pursuits including walking, surfing, sightseeing, swimming and fishing, amongst others.

The Bellingen Coast Regional Crown Reserve ('the RCR) combines 133 parcels of Crown land extending out to the 3 nautical mile state limit along the coastline of Bellingen LGA into a single management unit administered by DoI - Lands. The Bellinger Heads State Park is a significant component of the RCR, extending from Mylestom to Hungry Head and including Mylestom Spit, Urunga Lagoon and Urunga Sand Mass. In partnership, Council and DoI – Lands manage the affairs of the Bellinger Heads State Park Trust, which is the statutory body responsible for managing the State Park.

The Urunga Heads Holiday Park, North Beach Holiday Park and Hungry Head Cabins are also located within the RCR. The NSW Crown Holiday Parks Trust is the body responsible for the above mentioned Holiday Parks.

Management responsibilities within the RCR are therefore shared between DoI - Lands, Bellingen Shire Council and the associated Trusts (refer to Bellingen Coastal Regional Crown Reserve Plan of Management (LPMA, 2010), for further details relating to governance within the Reserve). Being a largely undeveloped coastline, facilities at Bellingen's beaches are low key, such as minor car parks, picnic areas and barbeques, and two Surf Life Saving Clubs offering volunteer lifesaving patrol services (Urunga SLSC at Hungry Head and the North Beach SLSC at the Mylestom access to North Beach).

Future growth of the region will place most pressure on the coastline in terms of recreational facilities and public access. Therefore management of the coastline will need to balance the demands for public access, recreation and associated facilities with the potential for coastal hazards at the immediate, 2050 and 2100 timeframes.

Introduction**1.2 Coastal Hazards Managed by this Plan**

The major coastal hazards that threaten the Bellingen coastal zone include:

- **Beach erosion** that occurs during a short term storm event or series of events in close succession. Erosion of beaches is typically balanced by recovery during non-storm periods, as the previously eroded sand is moved back onshore;
- **Long term shoreline recession** that occurs due a sediment deficit which can be exacerbated by man-made structures (e.g. river training walls), and future sea level rise; and
- **Coastal inundation** that occurs during high tides combined with storms, and will increase in the future due to sea level rise relative to present day conditions. Coastal inundation of back beach areas can occur directly via coastal creeks and estuaries, or through wave runup and overtopping of the crest of frontal dunes and sea defence structures.

These hazards were defined by BMT WBM (2012) for Bellingen's coastal zone for the present day and future timeframes up to 2100. A more rigorous assessment of coastal inundation hazard for the Bellingen and Kalang River Estuary was defined in BMT WBM (2014b). The suite of actions designed to manage these hazards are provided in Section 2.2.

1.3 Risk Based Approach to Preparation of this Coastal Zone Management Plan

A risk based framework is a robust methodology for dealing with consequences that are uncertain or have limited data, or for impacts with uncertain timeframes. This approach is therefore particularly applicable to the impacts from coastal hazards and predicted sea level rise, where there is considerable uncertainty regarding when and if impacts will manifest. Decisions made today are likely to have ramifications for up to 100 years or more (depending on the type and scale of development), and so consideration of an extended timeframe is essential, even though risks may not manifest for several decades. Indeed the NSW Government's CZMP Guidelines require consideration of future timeframes of 2050 and 2100.

The Risk Assessment process utilised for the Bellingen CZMP was adapted from the Australian Standard Risk Management Principles and Guidelines (AS/NZS ISO 31000:2009), as presented schematically in Figure 1-2 and described in detail in the CZMS. The use of a risk-based approach for managing coastal hazards is a requirement of the latest CZMP guidelines (OEH, 2013), and accords with current international best practice for natural resource management.

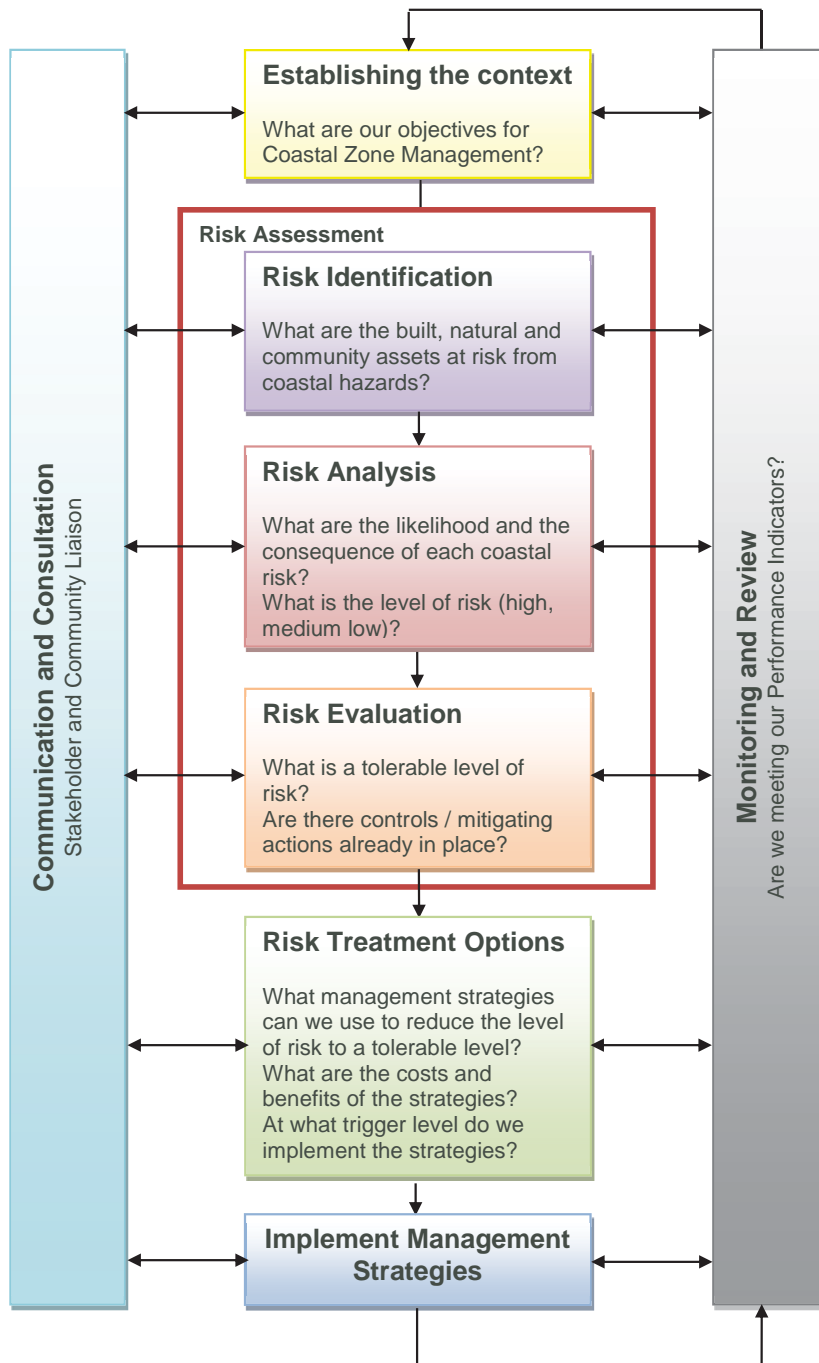


Figure 1-2 Risk Management Framework (ISO 31000:2009) adapted to Coastal Zone Management

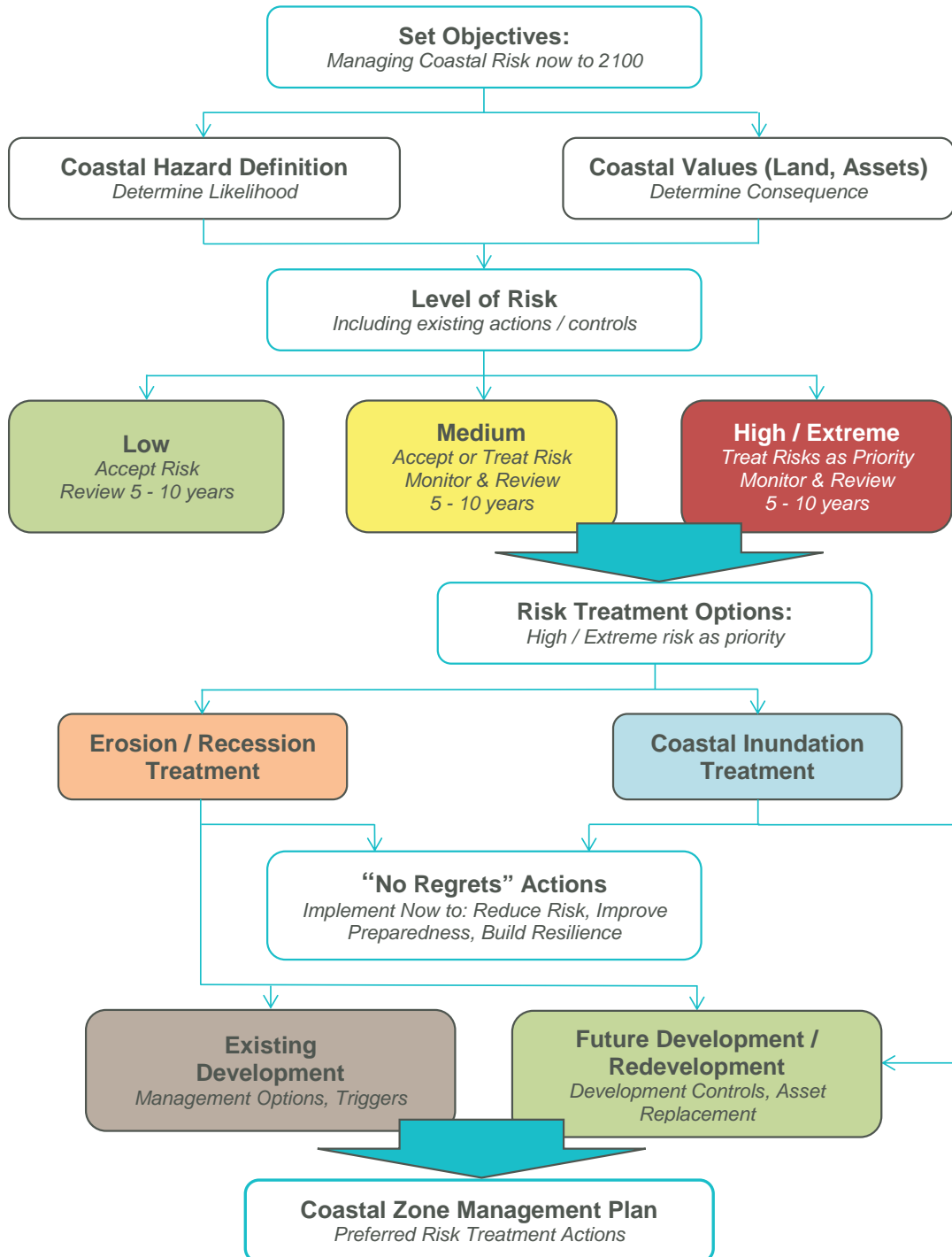


Figure 1-3 Bellingen Coastal Zone Management Plan Structure

Introduction

The process undertaken to develop this Bellingen CZMP is illustrated in Figure 1-3. Through the risk process, coastal hazards are assessed in terms of their *likelihood* and *consequence*, as these two elements determine the level of risk. The *likelihood* of erosion / recession and coastal inundation at the immediate, 2050, 2100 timeframes were determined in the *Bellingen Coastal Processes and Hazards Definition Study* (BMT WBM, 2012) and *Draft Bellingen Shire Estuary Inundation Study* (2014b)

The *consequence* of the risks relates to the impact of coastal hazards upon land and existing and future assets, including the aesthetic, recreational, ecological and economic values associated with the coastal zone. Consequence was assessed and combined with likelihood to determine the level of risk as part of the CZMS (Section 2.3). The level of risk was documented and mapped in the CZMS.

Extreme and high risks were considered intolerable, requiring treatment as a priority, medium risks were considered tolerable, to be treated where resources are available, and low risks were deemed acceptable requiring monitoring only (see Table 1-1).

Table 1-1 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

The need for management action as part of this CZMP was also prioritised based on the estimated timing for the coastal hazards, i.e. immediate, 2050 or 2100 timeframes. As detailed in Table 1-2, present day high risks must be treated as a priority. For high risks not expected to occur until 2050 or 2100, a management option(s) is identified along with a trigger for implementing the option, but there may be no need to implement these options over the life of the plan (i.e. 10 years). Identifying a management option(s) with a trigger for implementation at the present time enables Council and others to be prepared should a risk present itself earlier than anticipated, but does not commit Council / others to such a decision until monitoring indicates the risk is certainly going to occur and a decision is necessary. Such an approach avoids costly, large-scale, difficult and / or unpalatable actions being implemented until it is certain that they are needed.

Table 1-2 Prioritisation of Risk Treatment Based upon Expected Timeframe

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
2050	<ul style="list-style-type: none"> Identify trigger for action. Implement “no regrets” actions Identify potential management option(s) for implementation if the trigger is reached.
2100	

As risks associated with Future Development are different from those to Existing Development, different management approaches are required. Figure 1-4 provides a conceptual framework for application of coastal management tools.

For **Future Development**, the management approaches are as follows:

- **Avoid** the risk, by not permitting vulnerable developments within high-risk areas (to be considered over the full design life of the development);
- **Accommodate** the risk by including provisions that reduce the consequence of impacts (e.g. having minimum floor levels to reduce property damage resulting from future coastal inundation); or
- **Accept** the risk where appropriate to the level of risk over the design life of the development.

Existing Development is typically much harder to manage as works and infrastructure are already in place. Options include:

- **Protect** existing coastal development (private or public) from erosion and recession and / or coastal inundation and overtopping. Protection may comprise hard coastal defence structures (e.g. seawalls, groynes, offshore breakwaters or reefs, artificial headlands) or soft engineering measures (e.g. beach nourishment). As some protection works can cause impacts to adjacent areas ('offsite impacts'), the decision to implement a 'protect' option must consider all potential impacts;
- **Retreat** development, which is a 'no defence' approach that aims to preserve beach / shoreline amenity by allowing natural retreat of the foreshore alignment due to coastal processes, particularly future sea level rise. The options for existing development involve relocating or sacrificing infrastructure, public assets or private property, if and when impacts occur. The retreat option may include compensation to private property owners for a depreciation in land use value, where feasible and appropriate; and
- **Accommodate** the risk, which aims to retrofit (or redevelop) existing infrastructure, public assets and private property in a manner that minimises damage and other losses from potential impacts (e.g. stronger foundations).

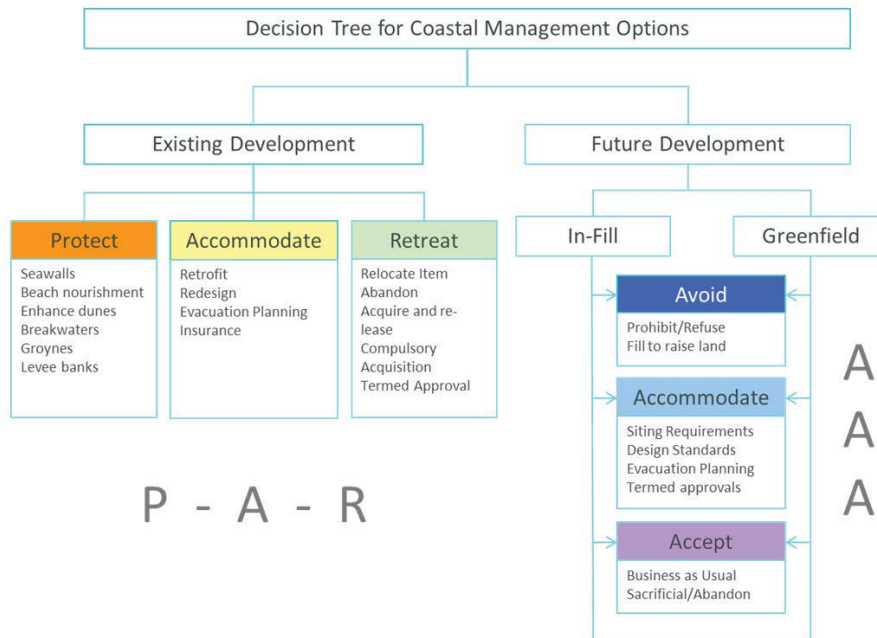


Figure 1-4 Conceptual Framework for Application of Coastal Management Options

For *existing development*, it is essential to identify ‘trigger points’ for future action rather than recommending immediate management action. This approach ensures the management option and associated resources are not utilised until it is absolutely necessary to do so. Triggers may be a distance from an erosion escarpment, a frequency of inundation or water level, or the asset’s existing replacement cycle.

Setting a trigger point is not an excuse to “do nothing”, or undertake no coastal management action. Planning controls, “no regrets” actions and preliminary investigations must still be undertaken to effectively reduce the scale and cost of risk treatment required in the future.

No Regrets Actions are activities that can be implemented now to improve the resilience and preparedness for coastal risks, further information (including approvals) for a larger scale option, and / or prolong the need for more substantial and costly actions without limiting the ability to change a management approach and without negative long term impact should risks change in the future.

This CZMP details how the recommended management options (risk treatments) shall be implemented (costs, timeframes, resources) and funded. Ongoing monitoring and review of both the risks and management options is also detailed.

Introduction**1.3.1 Structure of the Coastal Zone Management Plan Documents**

Detailed technical analysis of coastal processes and hazards was provided in the Bellingen Coastal Processes and Hazards Definition Study (BMT WBM, 2012), and a brief summary of this information is provided in the CZMS (BMT WBM, 2014).

The risk assessment process and documentation of the development of management options is detailed in the CZMS, including the:

- Legislative requirement and context for preparation of a CZMP and managing the coastal zone;
- Risk assessment framework and its implementation for this CZMP; and
- Management options which are available to treat erosion and recession, coastal inundation to existing and future development, as well as Bellingen Shire's natural assets.

The information provided in this CZMP continues directly from the CZMS to support the treatment of assets and land at risk from coastal hazards, as follows:

- Recommended actions and implementation details are given in Section 2.2;
- Mechanisms for evaluating the effectiveness and success of at CZMP are discussed in Section 3; and
- Details of how this plan meets the minimum legislative requirements for CZMP preparation, in Appendix A
- Details for emergency action to provide safe beach access following storms, is provided in the Bellingen Emergency Action Sub Plan, in Appendix D.
- A register of assets at risk from present day and future hazards, and the recommended management strategies plus accompanying triggers for implementation, in Appendix B.

1.4 Community Consultation and Engagement

The development of a Coastal Zone Management Plan requires the involvement of stakeholders and the community who utilise the coastline in many different ways, including state agencies, other stakeholders groups, community groups and residents, all who may be directly or indirectly affected. Consultation is necessary to ensure that the plan is acceptable to the local community, within financial and technical constraints. Consultation activities conducted as part of the CZMP process, in chronological order, is as follows.

- Information was posted on Council's website about the CZMP, including contact details.
- A survey on community values and issues regarding the coastal zone was prepared:
 - Community had the opportunity to complete an online version of this survey, via a link on the Councils website
 - A wide range of identified stakeholders were provided this survey, via email and mail-out.
 - There were 31 responses to the community survey (in 5 in hard copy and 26 online / via email), and the results were used in understanding the issues and deriving options to

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manage coastal hazards in the CZMP. A summary of the findings of the community survey is provided in Appendix C of the CZMS.

- A Risk Assessment and Management Options Workshop was held internally at Council offices involving key representatives from the various internal departments of Council, as well as relevant NSW Government agencies and other key stakeholders. This technical workshop involved an assessment of the risk from coastal hazards, collation of details on existing management actions being undertaken or deemed successful in the past, and a discussion of new management options and the likely practicality for Council and others to implement such options. The workshop provided guidance on the type(s) of management options that were likely to be effective and practical for Council and others to implement.
- Draft iterations of the CZMS and CZMP were placed on public exhibition through advertisement in the local Bellingen, Dorrigo and Coffs Harbour newspapers and on Council's website. Hard copies of the draft documents were made available at the Bellingen, Urunga and Dorrigo libraries for public viewing. All key stakeholders and relevant agencies were notified of each exhibition period by email including web links to access the draft documents on the Council website. Frequent follow up phone calls were made to agencies by Council regarding consultation when deemed necessary.
- The draft coastal zone management study was placed on public exhibition in June 2014 for a period of three weeks, to ensure that the community were well informed of the potential management approaches. Feedback gathered about the community acceptability for the options formed an important consideration in selecting the implementation action included within this CZMP.
- The final stage of consultation was to place the draft CZMP on public exhibition in September 2014, to provide community and stakeholders with a final opportunity to provide feedback. Comments received from this process have been noted and incorporated into this final CZMP document, as appropriate.
- **Implementation of this CZMP will require close consultation with the Bellinger Heads State Park Trust and the NSW Crown Holiday Parks Trust, along with other key stakeholders including the Urunga Surf Life Saving Club, the North Beach Surf Life Saving Club, the North Beach Community Alliance, the Urunga Amateur Fishing Club and community members.**

2 Implementation Tables

2.1 Implementation Action Plan: Existing and Future Risks

Implementation details have been provided in the tables in Section 2.2 for recommended actions that require implementation over the next 5-10 years (i.e. until the Plan's next review).

Management actions are grouped according to their strategy type, namely 'Asset Management – BSC Owned Assets', 'Beach Access and Use Management', 'Community Education', 'Dune and Habitat Management', 'Further Studies including Precinct Planning', 'Monitoring', 'Non-Council Asset Management' and 'Planning and Development Controls'. Key strategies for specific locations have been mapped in concert with the risk mapping for 2100, in Section 2.3 (refer to Appendix C for complete set of risk maps for Bellingen Shires open coast, and BMT WBM (2014b) for coastal inundation risk maps relating to the Bellinger Kalang River Estuary). As required, further details for each management option can be found within the CZMS (refer Section 4 and Appendix E of the CZMS).

For future intolerable risks (2050, 2100), where necessary, an option(s) and accompanying trigger for implementation of the option(s) have been provided within the Asset Risk Register database. These details need only be utilised should a trigger be reached (see Appendix B).

As part of the actions to be undertaken, a detailed monitoring program that prescribes regular cross-checking of trigger levels has been prepared. This will ensure Council keeps track of the need to implement action for existing or future risks. The monitoring program also enables collection of data to review the risk analysis at the next review of the Plan document.

Implementation tables for the management actions have been collated within the following broad groupings in Table 2-1 that relate to either the departments of Council or external state agencies and other external stakeholders. There are a total of 27 actions within the plan.

2.1.1 Plan Funding

Potential funding programs or sources for each of the alphabetically listed strategy groups are provided in Table 2-1.

Table 2-1 Strategies, Actions and Potential Funding Sources

Strategy Group	Actions	Potential Funding Sources
Asset Management – BSC Owned Assets	AM.1 to AM.4	<ul style="list-style-type: none"> • Council's routine asset maintenance and works program • NSW Government's Coastal Management Program • State and Federal Government Grants (especially climate change adaptation and resilience building funds) • Relevant State agencies asset management programs (where applicable) • Revenue generated through hire, rental or other commercial partnerships (e.g. SLSCs).

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Strategy Group	Actions	Potential Funding Sources
Beach Access and Use Management	BA.1 to BA.3	<ul style="list-style-type: none"> • NSW Government’s Coastal Management Program • Council’s parks and reserves maintenance and works program • North Coast Local Land Services / DoI Lands / State Government assisted dune care programs
Community Education	CE.1 & CE.2	<ul style="list-style-type: none"> • Council’s annual community education and participation programs • State and Federal Government Grants (especially climate change adaptation and resilience building funds)
Dune and Habitat Management	DH1 to DH.4	<ul style="list-style-type: none"> • NSW Government’s Coastal Management Program • Council’s parks and reserves maintenance and works program • North Coast Local Land Services / DoI Lands / State Government assisted dune care or weed control programs
Further Studies including Precinct Planning	FS.1 to FS.6	<ul style="list-style-type: none"> • Council annual operational budget / works program • NSW Government’s Coastal Management Program • State and Federal Government Grants (especially climate change adaptation and resilience building funds) • Federal and State Government Emergency Management Funding • NRM funding programs (especially relating to habitat and or heritage management)
Monitoring	MO.1 to MO.4	<ul style="list-style-type: none"> • NSW Government’s Coastal Management Program • State and Federal Government Grants (especially climate change adaptation and resilience building funds) • Council’s routine monitoring and works program (especially survey department)
Non-Council Asset Management	NC.1	<ul style="list-style-type: none"> • Relevant State agencies’ asset management programs
Planning and Development Controls	PD.1 to PD.4	<ul style="list-style-type: none"> • Council planning department

2.1.2 Triggers for Implementation

It is apparent from the risk assessment that some intolerable risks are not expected to eventuate until 2050 or 2100. In this case, implementing a management action now, particularly where the option is difficult or costly, may be premature and cannot account for the uncertainty of when or to what extent the hazard may actually eventuate in the future.

While a decision regarding future intent is necessary at the present timeframe for intolerable risks, the action may not require implementation for many years. Fisk and Kay (2010) provide a method for setting triggers for climate change adaptation actions along a time continuum. The trigger points are set to flag the ‘level of acceptable change’ where more aggressive or decisive actions must be implemented in order to avoid an undesirable impact. The trigger setting method is demonstrated in Figure 2-1.

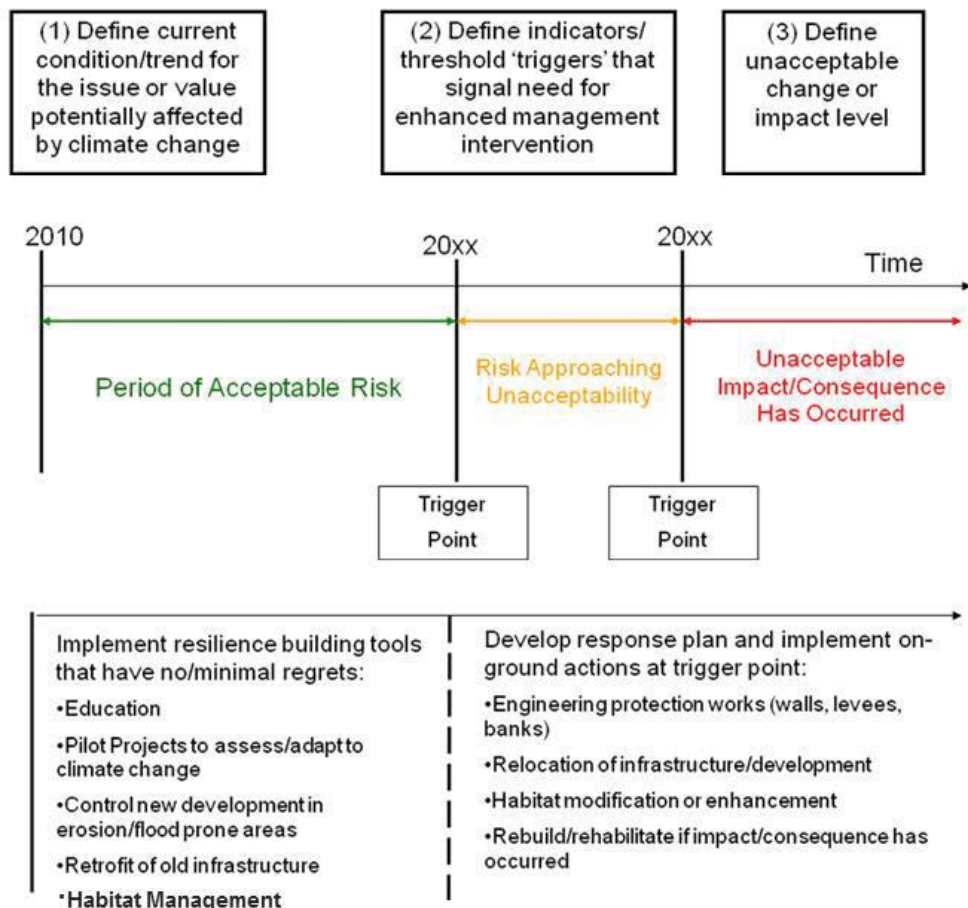


Figure 2-1 Continuum Model for Climate Change Adaptation Action (Fisk & Kay, 2010)

Implementation Tables

Unlike flooding or coastal inundation risks which may occur at any time, recession and permanent inundation tends to occur over years with preceding events giving warning of the approaching threat. Such time warnings can be used to advantage for implementing management options, particularly where the action may be costly or difficult for community to accept or implement.

A triggered approach avoids actions being implemented until it becomes necessary, with time in the interim to improve data regarding the impact, source funding and prepare approvals, designs etc. It also recognises that some hazard or climate change impacts may not eventuate. If this is the case, then the community has not been unnecessarily burdened by having to adopt costly management responses.

Triggers and timeframes associated with a suite of management actions are detailed in the risk registers (see Appendix B).

2.2 Coastal Zone Management Action Implementation Tables

Implementation details for the various management strategy schemes are detailed in Table 2-3 to Table 2-10. Within each table, the applicable location(s), timing / trigger, priority for implementation, responsibilities (lead and support), estimated costs and resources required, and proceeding (or related) actions are outlined for each management action. Further information or reference to detail contained in associated reports are also provided. A brief summary of the priority coastal zone management actions is provided in Table 2-3 below.

Table 2-2 Overview of Priority Coastal Zone Management Actions

Strategy Group	Key Actions	Action Summary
Asset Management (AM: BSC Owned; NC: Non-Council)	AM.1	<ul style="list-style-type: none"> Update Council's Asset Management Plan with coastal hazard information, to ensure cost effective and appropriate asset management in coastal zone
	NC.1	<ul style="list-style-type: none"> Provide hazard mapping to Australian Rail Track Corporation
Beach Access and Use Management	BA.2	<ul style="list-style-type: none"> Ensure safe beach access is maintained, which may require accesses to be re-contoured following storm activity
Dune and Habitat Management	DH1	<ul style="list-style-type: none"> Continue, improve and extend dune rehabilitation and weed removal efforts
	DH.4	<ul style="list-style-type: none"> Manage sea level rise threat to high value natural habitats, including estuarine habitats
Further Studies including Precinct Planning	FS.1	<ul style="list-style-type: none"> Conduct geotechnical investigation to improve hazard definition at Hungry Head and Wenonah Head, as both areas have high value community assets located adjacent to (and potentially on) bedrock
	FS.3	<ul style="list-style-type: none"> Conduct precinct planning for Hungry Head and Wenonah Head, following outcomes of the geotechnical investigation(s)
	FS.5	<ul style="list-style-type: none"> Undertake an estuary foreshore erosion study at Mylestom Spit, to address long term risks associated with combined estuary and beach recession hazards

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Strategy Group	Key Actions	Action Summary
Monitoring	MO.1	<ul style="list-style-type: none"> • Conduct regular topographic beach surveys at targeted locations
	MO.2	<ul style="list-style-type: none"> • Collect LiDAR topographic data across all beach and estuary foreshore locations
	MO.3	<ul style="list-style-type: none"> • Monitor beach access conditions, particularly after storms
Planning and Development Controls	PD.1	<ul style="list-style-type: none"> • Prepare internal checklist, guideline or policy to guide Council officers to consider hazard zones and timeframes when building structures / facilities in the coastal zone (for which Council is the consent authority, REF required only).
	PD.2	<ul style="list-style-type: none"> • Conduct internal training to ensure that coastal zone management is properly integrated into Council's operations
	PD.3	<ul style="list-style-type: none"> • Incorporate coastal inundation into Council's Floodplain Risk Management Plan

2.2.1 Asset Management (AM) – BSC Owned Assets

Table 2-3 Asset Management Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
AM.1	Update Council's Asset Management Plan to include the <i>likelihood</i> and <i>timeframe</i> for coastal hazard impact, and type of impact (i.e. erosion or inundation) for Council owned assets. Prioritisation and maintenance scheduling of asset management programs should then be reconsidered based on the timeframe and type of hazard exposure. Note that Councils Asset Management Plan should also be updated with coastal hazard impact information for the Bellingier and Kalang River Estuary, as provided in the <i>Draft Bellingen Estuary Inundation Mapping</i> study (BMT WBM, 2014b).	All Council built assets at risk. (refer to Asset Risk Register listing water services, roads, car parks, public buildings)	1	2015, or as soon as practical	BSC	Staff time only Internal costs estimated at \$15,000 (but subject to review)	Nil	See CZMS: Asset Man't Planning Option (BMT WBM, 2014a); & Estuary Inundation Mapping Study (BMT WBM, 2014b)
AM.2	Link Monitoring outcomes for triggers (see Action M.2 & M.1) back to Asset Management Plan, by recording the measured distance between each asset and erosion escarpment (and date) compared with trigger distance, to ensure triggers are regularly checked and any action required is undertaken accordingly. This could be also reported in a State of Environment Reports or other relevant forum, as needed by Council.	All Council assets at immediate to 2050 high / extreme risk (refer to Asset Risk Register)	2	After monitoring events (see M0.1)	BSC	Staff time only.	MO.1, MO.2	See CZMS: Asset Man't Planning & Monitoring Option (BMT WBM, 2014a)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
AM.3	<p>Conduct audit for high / extreme risk assets:</p> <ul style="list-style-type: none"> Investigate site constraints for relocation as a first option, then consider: redesign to replace assets in existing location; ability to use a relocatable structure; or accept loss of the asset ('manage to fail'). Record the replacement option "relocate", "redesign/retrofit", "relocate", "manage to fail" in Asset Management Plan (note that for Wenonah Head, Hungry Head and North Beach recreational areas, replacement options will be determined through the relevant Precinct Planning - see Action FS.2, FS.3, & FS.4) <p>Important considerations for the audit include:</p> <ul style="list-style-type: none"> Management actions for adjacent land that may be affected by the option (particularly for potential/protection options at Wenonah Head and Hungry Head, where adjacent land will experience accelerated erosion) The availability of adequate land (area and type) for relocation (notably for the recreational facilities at Wenonah Head and Hungry Head) The lifespan of the asset compared with expected hazard impact (e.g. lifeguard tower or 25 year lifespan may be accepted in the 2050 hazard zone) The need for proximity to the coast (e.g. a lifeguard tower) Depth to bedrock to provide foundation to mitigate erosion (see Action FS.1) The entire network link (e.g. roadways) The ability and cost to provide the same service from a relocatable structure, as opposed to a permanent structure The cost of the structure, such that damage can be accepted and a replacement built 	All Council assets at high to extreme risks by 2050.	2	As soon as practical. Implement preferred action when asset replacement is due OR when trigger for hazard is reached	BSC	Staff time only. Requires geotechnical consultancy to assess foundation capacity / depth to bedrock for specific sites (see Action FS.1) Following this, internal costs up to \$10,000 per site are estimated	AM.1, FS.1	See CZMS: Audit of Existing Assets Option (BMT WBM, 2014a) & Estuary Inundation Mapping Study (BMT WBM, 2014b)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
AM.4	<p>Prior to the precinct planning for Wenonah Head, accept the risk of erosion to Schnapper Beach road over the immediate term.</p> <p>If damage does occur prior to the precinct plan, the roadway must not be protected with ad hoc works (e.g. dumping of rock). Instead, the damaged section of road should be relocated immediately landwards following damage, to provide safe beach access until the precinct plan is complete.</p> <p>Following completion of the Wenonah Head precinct plan, update the management intent for this road accordingly (see Action FS.3).</p>	<ul style="list-style-type: none"> Schnapper Beach Road at Wenonah Head 	1	<p>2015</p> <p>Initially record this action in Council's Asset Management Plan, then upgrade with the Precinct Planning outcomes on its completion (see FS.2)</p>	BSC	<p>\$35,000 for relocation road section at risk in immediate hazard zone (if required before precinct planning for Wenonah Head, see FS.3)</p>	Nil	<p>See CZMS: Asset Man't Planning, Redesign / Retrofit & Relocate Options (BMT WBM, 2014a)</p>

¹ Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).



2.2.2 Beach Access and Use Management (BA)

Table 2-4 Beach Access and Use Management Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd ²	Preceding Actions	Further Info
BA.1	<p>Rationalise, maintain and improve beach access ways (pedestrian and 4WD), to provide quality and safe public access onto beaches, while protecting beach and dune condition.</p> <p>Improve dune health and resilience to erosion by rationalising the occurrences of superfluous / ad hoc access points and constructing / improving and maintaining adequate ground cover and dune fencing.</p> <p>Beach access can be improved through use of appropriate materials for ground cover. There is much community support for maintaining the low key nature of the existing beach facilities, thus upgraded board and chain materials may be appropriate. New versatile materials are becoming available that should be considered for all beach access ways, particularly where the following is desired:</p> <ul style="list-style-type: none"> • Wheel chair access; and / or • 4WD beach access. <p>This action may be combined with upgrading lookout facilities (e.g. North Beach) to be wheelchair accessible, resources permitting (\$1,400 per square metre).</p> <p>Refer also to the Surf Life Saving NSW Coastal Public Safety Risk Assessment Report for the Bellingen LGA and integrate associated options regarding formalisation, consolidation or validation of existing access ways.</p>	<ul style="list-style-type: none"> • Wenonah Head / Schnapper Beach • Hungry Head Beach • North Hungry Head Beach • North Beach 	2	Short term (1-3 years)	BHSPT, NSWCHPT, NSWCLS, BSC	<p>Staff time (or minor consultancy of say \$20K) to conduct investigation and / or develop specific improvement plan.</p> <p>The cost of physical works will depend on the outcome of the investigation.</p> <p>Cost estimates of up to \$10,000 per beach access and \$70,000 (maximum) for a high quality beach viewing platform with wheelchair access are provided as guidance.</p>	FS.2, FS.3, FS.4	See CZMS: Beach Access Man't Option (BMT WBM, 2014a); & Draft Coastal Public Safety Risk Assessment: SLS (2014)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd ²	Preceding Actions	Further Info
BA.2	Re-contour unsafe beach access conditions resulting from storm activity, and remediate associated beach access infrastructure (paths / fences) when they become degraded. The requisite for such works will be identified through beach monitoring (see Action MO.3).	<ul style="list-style-type: none"> Wenonah Head / Schnapper Beach Hungry Head Beach North Hungry Head Beach North Beach 	1	On an 'as needs' basis	BHSPT, NSWCHPT, BSC	Staff time, plus up to \$5,000 - \$10,000 per episode (costs dependent on scale of works required). Potential source of funds is the Public Reserves Management Fund, with applications subject to a competitive process.	Nil	See: Emergency Action Sub-Plan (Appendix D) & CZMS Beach Scraping Option (BMT WBM, 2014a)
BA.3	As appropriate, the relevant land manager will refer to the Draft Surf Life Saving NSW Coastal Public Safety Risk Assessment Report for the Bellingen LGA to integrate recommendations in this report for additional public rescue equipment at key locations.	Various	2	When appropriate funding becomes available	BSC, BHSPT, NSWCHPT, NSWLS, NPWS Support Role: Dol Lands	Unknown. Refer to the Coastal Public Safety Risk Assessment: SLS (2014), for further details	Nil	See: Draft Coastal Public Safety Risk Assessment: SLS (2014)

¹Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).



2.2.3 Community Education (CE)

Table 2-5 Community Education Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities	Resources Req'd	Preceding Actions	Further Info
CE.1	<p>Prepare and implement an ongoing community education program to inform the community about coastal risks.</p> <p>The risk approach is a useful way of expressing to community both likelihood and consequence from coastal hazards. This approach assists the community to make their own decisions based on how they perceive the risk from coastal hazards over the likely timeframes of impact (i.e. present to 2100).</p> <p>Education now will assist the community to understand how Council may need to respond to coastal hazards now and in the future, and prepare the community to accept and implement future actions.</p> <p>Education regarding coastal risks and intended management responses should be repeated frequently (e.g. 1 – 2 yearly), with the program incorporating improved information as it becomes available. In particular, it will be valuable to provide ongoing feedback regarding the changing nature (better, worse) of the different risks.</p>	At various location across the LGA	2	Short term	<p>BSC, CHSPT, NSWCHPT</p> <p>Support Role: <i>Dol - Lands</i></p>	<p>Staff time only.</p> <p>Internal costs of \$20,000 - \$40,000 per year (plus \$10,000 - \$20,000 for minor consultancy if required).</p>	Nil	<p>See CZMS: Community Education Option (BMT, WBM, 2014a); & Estuary Inundation Mapping Study (BMT, WBM, 2014b)</p>



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
CE.2	Use the beach monitoring photo database (resulting from Action MO.4) as a tool for educating the community about coastal hazard and risks over time. The photo history of shoreline change can be used to show how beaches respond to coastal processes at various time scales (single storms, seasons, long term due to sea level rise). The database should be made available via Council's website. Selected photos should also be used in community education programs and/or displayed through education signage at the beach. Accessible visual evidence of shoreline change, including due to sea level rise (expected in future) is intended to help community accept tough management decisions in the future (see also Action CE.1).	<ul style="list-style-type: none"> Wenonah Head / Schnapper Beach Hungry Head 	2	Short term	BSC, BHSPT, NSWCHPT	Staff time, plus minor costs of \$10,000 - \$15,000 for signage etc.	MO.4	See CZMS: Community Education & Monitoring Option (BMT WBM, 2014a)
CE.3	As appropriate, the relevant land manager(s) will refer to the Surf Life Saving NSW Coastal Public Safety Risk Assessment Report for the Bellingen LGA to integrate recommendations in this report for the enhancement of aquatic and recreational safety signage at key locations.	<ul style="list-style-type: none"> Wenonah Head / Schnapper Beach Hungry Head Beach North Hungry Head Beach North Beach 	2	As funding becomes available	BSC, BHSPT, NSWCHPT, NSWLS, NPWS <i>Support Role: Dol - Lands</i>	Assuming five new signs are required, an indicative cost of \$15,000 is estimated. Refer to the Coastal Public Safety Risk Assessment: BSC for more details.	Nil	See: Draft Coastal Public Safety Risk Assessment: SLS (2014)

¹Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWLS).



2.2.4 Dune and Habitat Management (DH)

Table 2-6 Dune and Habitat Management Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
DH.1	Work with existing and/or establish new formal dune care programs, to undertake dune rehabilitation and weed removal across the LGA, including priority beach locations. This action must be undertaken in combination with any beach scraping works (see Action BA.2) to reduce the loss of sand from the beach system by wind.	<ul style="list-style-type: none"> Wenonah Head / Schnapper Beach (recreational area) Hungry Head (SLSC area) North Beach (Spit Neck to SLSC) North Hungry Head Beach (fronting Urunga Sandmass) Mylestom Spit (Estuary entrance to Spit Neck) Remaining lengths of coastal dunes 	1 1 1 2 2 3	2015, or when funding becomes available	BHSPT, NSWCHPT, BSC Support Role: Dol Lands	\$20,000 to \$40,000 over one to two years. Possible sources of funds are the Public Reserves Management Fund with applications subject to a competitive process.	Nil	See CZMS: Dune Man't Option (BMT WBM, 2014a)
DH.2	Unless recommendation from the estuary erosion study suggests otherwise (see FS.5), undertake vegetation rehabilitation of the lower Belling River Estuary southern shoreline (targeting the narrow section of Mylestom Spit neck) to improve the health of the riparian zone and help stabilise the banks.	<ul style="list-style-type: none"> Belling Estuary foreshore at the Mylestom Spit neck 	2	2015, or when funding becomes available	BHSPT, BSC	Costs for works estimated at \$650 per day for team of two bush regenerators (weed control and revegetation planting), plus \$15 per planting. Possible sources of funds as above (see Action DH.1)	FS.5	See CZMS: Dune Man't Option (BMT WBM, 2014a)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
DH.3	<p>Undertake assessment of all EEC's and important habitat within the coastal erosion and recession hazard zones and determine priority management strategy, which may include:</p> <ul style="list-style-type: none"> • Rehabilitation • Creation of buffer zones, to enable migration in response to hazard impact • Translocation of important species if they are unable/unlikely to withstand increasing coastal hazard pressures <p>Following this, implement the appropriate habitat management/rehabilitation strategy.</p>	<p>All locations with EEC's and important habitats, including:</p> <ul style="list-style-type: none"> • North Valla Beach <i>(including Oyster Creek)</i> • Schnapper Beach • Hungry Head Beach <i>(including Dalhousie Creek)</i> • Hungry Head • North Hungry Head <i>(and backing Urunga Lagoon / Sandmass)</i> • North Beach, <i>(including Mylestom Spit)</i> • Tucker Rocks <i>(including the unnamed creek)</i> 	2	Short to medium term (1-5 years)	BSC, BHSPT, NSWCHPT, NPWS	Staff time, or consultancy of say \$50,000.	Nil	See CZMS: Habitat Man't Option (BMT WBM, 2014a)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
DH.4	<p>Manage the threat of sea level rise to the High Value Natural Assets in the riparian, floodplain and estuarine reaches of the Bellingen and Kalang River Estuaries, as detailed in the <i>Draft Bellingen Shire Estuary Inundation Mapping</i> (BMT WBM, 2014b) and <i>Bellingen and Kalang Rivers Estuary Action Plan – Sea Level Rise</i> (BMT WBM, 2014b).</p> <p>High value communities most at risk from sea level rise, as identified in these reports, include:</p> <ul style="list-style-type: none"> • Tidal / Near-Tidal Wetlands • Riparian Corridor • Floodplain Habitats • Littoral Rainforest 	Various estuarine floodplain and riparian locations	1	Ongoing	BSC, BHSPT, NSWCHPT, NPWS <i>In consultation with DoI Lands</i>	Unknown	Nil	See Estuary Inundation Mapping Study (BMT WBM, 2014b); & Estuary Action Plan SLR (2014c)

¹Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (DoI - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).



2.2.5 Further Studies including Precinct Planning (FS)

Table 2-7 Further Studies (including Precinct Planning) Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
FS.1	<p>Conduct geotechnical assessments to determine the depth to bedrock on coastal fringing land adjacent the rocky headland / bluff locations where built infrastructure is at risk of erosion and recession (i.e. Hungry Head and Wenonah Headlands).</p> <p>Field investigations should focus on determining geologically stable areas (i.e. areas that are not susceptible to erosion / recession and thus potentially suitable for asset relocation), as well as coastal fringing substrates that may provide suitable foundation capacity to reduce erosion hazard (e.g. bedrock buried beneath the dunes).</p> <p>The outcomes will feed into the subsequent Precinct Planning for both locations (see Actions FS.2, FS.4).</p> <p>The geotechnical study(s) should be used to refine existing hazard lines, or else be used to constrain the hazard zones in future revisions of the hazard study.</p>	<ul style="list-style-type: none"> Hungry Head (SLSC precinct) Wenonah Head / Schnapper Beach (Fishing Club precinct) 	<p>1</p> <p>2</p>	<p>2015 or as soon as funding available (e.g. through NSW Coastal Program or other relevant sources)</p>	BSC, BHSPT, NSWCHPT	<p>Geotechnical consultancy up to \$30,000 per location.</p> <p>\$10,000 to update hazard lines based on geotechnical information (if required prior to future revision of the hazard study).</p>	Nil	<p>See CZMS: Section 4.2 (incl. Fig 4-1 & 4-2); & Geotech Bedrock Study Option (BMT, WBM, 2014a)</p>



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Implementation Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
FS.2	<p>Following Action FS.1, develop a Precinct Plan for the Wenonah Head / Schnapper Beach (Fishing Club) area, primarily including the Schnapper Beach Road and associated beach access / fishing club community facilities.</p> <p>Using the geotechnical information from FS.1, the precinct planning should determine which medium to long term strategies are feasible, including:</p> <ul style="list-style-type: none"> Relocate (medium term & long term options); Redesign / Retrofit; Protect; or Sacrifice / Manage to Fail <p>Consultation with key stakeholders is required as part of the precinct planning processes, including Dol - Lands, the local aboriginal community (who have a Native Title Claim 98/15 on the area, which is subject to ongoing negotiations), Urunga Anglers Club and the Wenonah Head Dunecare (noting the latter two maintain the current public / recreational facilities in the area).</p> <p>Consideration for social, economic and environmental benefits / constraints of all options needs to also be considered.</p> <p>See also <i>Action AM.3.</i></p>	<ul style="list-style-type: none"> Schnapper Beach / Wenonah Head 	2	Short term (1 - 3 years)	BSC <i>In consultation with Dol Lands</i>	Staff time only (using information in CZMS), or consultancy at approximately \$30,000.	AM.1, FS.1	See CZMS: Section 4.2.2 (incl. Fig 4-1); & Integration of CZM Planning in Council, Asset Man't Planning, Geotech Bedrock Study, Relocate, Redesign / Retrofit, Seawall & Sacrifice Land / Assets Options (BMT, WBM, 2014a)



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Implementation Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
FS.3	<p>Following FS.1, develop a Precinct Plan for the Hungry Head / Urunga SLSC precinct including the SLSC, beach loop road and beach access facilities.</p> <p>Note this is required <i>only</i> if the geotechnical investigation (FS.1) identifies the coastal infrastructure to be at risk from coastal erosion and recession.</p> <p>Risk management options to be investigated include:</p> <ul style="list-style-type: none"> Relocate (preferred option, although this option may be constrained by local topography and presence of EECs); Redesign / Retrofit; or Protect. <p>Consideration for social, economic and environmental benefits / constraints of all options needs to also be considered.</p> <p>Discussions need to be undertaken with key stakeholders as part of the precinct planning processes, including the Bellingen Head State Park Trust and the local community.</p> <p>See also <i>Action AM.3</i></p>	<ul style="list-style-type: none"> Hungry Head (proper) 	1 (or 3, depending on Geotech study outcome)	Short term (1 - 3 years, following completion of the Geotechnical Investigation; see FS.1)	BSC, BHSPT, NSWCHPT <i>In consultation with Dol Lands</i>	Staff time only (using information in CZMS), or consultancy at approximately \$30,000.	AM.1, FS.1	See CZMS: Section 4.2.3 (incl. Fig 4-2); & Integration of CZM Planning in Council, Asset Man't Planning, Geotech Bedrock Study, Relocate, Redesign / Retrofit and Seawall Options (BMT, WBM, 2014a)



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Implementation Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
FS.4	<p>Develop a Precinct Plan for the North Beach / Mylestom SLSC area, to facilitate relocation of the SLSC and associated facilities landward over time and prior to medium-long term recession impacts.</p> <p>As the sandy beach is to be managed by allowing natural retreat, future development or works on the SLSC site should occur landward of the current building footprint. Protection of the existing assets shall be avoided, with new facilities built landward instead.</p> <p>Opportunities to improve public facilities should also form part of the precinct plan, such as upgrading lookout / beach access infrastructure to become wheelchair friendly.</p> <p>Discussion needs to be undertaken with key stakeholders as part of the precinct planning processes, including the Bellingen Head State Park Trust and the local community.</p> <p>See also Action AM.3.</p>	<ul style="list-style-type: none"> North Beach 	2	1 - 5 years (prior to commencement of SLSC upgrade planning)	BSC, BHSPT <i>In consultation with DoI Lands</i>	Staff time only (using information in CZMS), or consultancy at approximately \$30,000.	AM.1, AM.2, PD.1	See CZMS: Section 4.2.5 (incl. Fig 4-3); & Integration of CZM Planning in Council, Asset Man't Planning, Relocate, Redesign/ Retrofit & Beach Access Man't Options (BMT WBM, 2014a)



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Implementation Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
FS.5	<p>Undertake site specific estuary erosion study for lower Bellingen River Estuary, which focuses on:</p> <ul style="list-style-type: none"> (a) Determining the cause(s) of long term estuary recession occurring at the Mylestom Spit 'neck' (i.e. a few hundred metres downstream of Mylestom tidal swimming pool); and (b) Formulating management options to treat the estuary recession issue. <p>Managing the estuary recession at this location is required to reduce the future risk of the Spit becoming breached at this location, primarily driven by beach retreat (on North Beach side) from sea level rise.</p> <p>Specifically, this study should assess the following:</p> <ul style="list-style-type: none"> • Geomorphic history of Mylestom Spit and lower Bellingen River Estuary, including the estuary channel and shoreline evolution; • Channel hydrodynamics and sediment transport within the lower estuary; • Formation and behaviour of Mylestom Spit dunes (south of Mylestom tidal pool), including the transport of wind-blown sediments from the Spit into the estuary, and subsequent waterborne transport back into the ocean, and changes to this system resulting from human activities, such as dune stabilisation works; • Possible causes of the bank erosion/estuary recession at the Spit's 'neck', including natural channel migration and human pressures (e.g. upstream bank stabilisation works, disruption to the natural dune-estuary-beach sediment transport system etc.); and <p><i>continued overleaf</i></p>	<ul style="list-style-type: none"> • Bellingen River Estuary / Mylestom Spit 	1	1 - 3 years (or as soon as funding available, e.g. through the NSW Coast and Estuary Program; or at least during the revision of the estuary management plan)	BSC, BHSPT	Consultancy up to \$60,000.	Nil	See CZMS: Section 4.2.5.1 (incl. Fig 4-3 & 4-4); & Habitat Man't Option (BMT WBM, 2014a)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
FS.5 (cont)	<ul style="list-style-type: none"> Potential remediation works (soft and hard engineering solutions) to reduce estuary recession at the Spit's neck (but considering also the potential transfer of erosion problems from such works along the estuary channel). <p>The study should recommend an appropriate program of works to remediate erosion or otherwise support natural functioning of the sediment system.</p>	As above	As above	As above	As above	As above	As above	As above
FS.6	<p>Develop a decision framework for managing Aboriginal and Non-Indigenous Heritage Items and Places affected by coastal hazards, in close consultation with NPWS, Local Aboriginal Groups and Historical Societies.</p> <p>The decision framework would include what actions are necessary when currently buried (and unknown) sites are uncovered due to erosion. This may include relocating the item (for example, as conducted for burial sites), re-burying the item elsewhere (for example, as may be suitable for middens sites), sacrificing the item or protecting the items (again, as possibly suitable for middens).</p>	<ul style="list-style-type: none"> All beaches and estuary / creeks locations 	3	1 - 5 years Implementation of the Framework is then only triggered once heritage items are uncovered or seriously threatened by future coastal erosion	BSC, NPWS, BHSPT, LALC <i>In consultation with Dol Lands</i>	Staff time or minor consultancy (\$20,000), if required. Grant funding may be available through the National Trust or similar.	Nil	See CZMS: Heritage Man't Option (BMT WBM, 2014a)

¹Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).



2.2.6 Monitoring (MO)

Table 2-8 Monitoring Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
MO.1	<p>Survey the beach in cross section at regular profiles along the beach.</p> <p>Survey profiles should be established at 50 or 100 m intervals along the beach, with the survey occurring along a line perpendicular to the beach. Priority survey profiles include those sited in front of Council foreshore assets (e.g. roads, surf clubs) and environmentally sensitive areas.</p> <p>Preferably, the cross sections should align with the existing photogrammetric profiles at the beaches (where available), to enable the new data to be assessed in context with the historical data.</p> <p>Installation of survey mark / poles should be considered for key locations (Council foreshore assets, e.g. roads, surf clubs or geomorphological features of interest e.g. Mylestom Spit neck), to facilitate consistent and easy repeat of coincident survey lines. Survey poles may also provide a useful visual tool for the community, showing the constantly changing width of the beach over time (see Action MO.4). Therefore selection of sites should be undertaken in combination with selection of sites for Action MO.4</p> <p><i>Refer to TASMARC Survey Instructions – Levelling (2012) for guidance on beach survey methods (see CZMS References)</i></p>	<ul style="list-style-type: none"> Wenonah Head / Schnapper Beach (<i>Fishing Club Precinct</i>) Hungry Head (SLSC <i>Precinct</i>) North Beach (SLSC <i>Precinct</i>) All other beach locations 	<p>1</p> <p>1</p> <p>2</p> <p>3</p>	<p>Priority monitoring should occur immediately after major storm events (i.e. Hs > 4-5 m)</p> <p>Resources permitting, beach surveys should occur every 6-12 months.</p>	BSC, BHSPT	<p>Staff time only (internal costs of about \$20,000, but will vary depending on number of profiles, and frequency of surveys).</p>	<p>MO.4 for installation of survey poles.</p>	<p>See CZMS: Monitoring Option (BMT WBM, 2014a)</p>



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Implementation Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
MO.2	Lobby NSW Government for frequent collection of high resolution aerial laser survey (ALS) of beach and estuary foreshores, and extending inland along the coastal corridor. If NSW Government is unable to assist, Council should pursue collaboration with neighbouring councils and other stakeholders to collect ALS data. The data shall be used by Council to monitor beach volume change and escarpment position over time. This information will be easy comparable with the existing photogrammetric and surveyed beach profiles (see Action MO. 1). ALS should be collected at low tide and under dry climatic conditions, to maximise the land area captured, such as low tide beaches and low lying creek/estuarine areas.	<ul style="list-style-type: none"> All beaches and assets 	1	As soon as practical. Repeat every 2-3 years	BSC	If pursued by Council, approximately \$50,000 - \$100,000 (note the bulk of these costs are associated with mobilising the survey equipment, thus good potential exists for extending coverage and sharing expenses with other interested government bodies, e.g. adjacent Councils, State Govt agencies).	Nil.	See CZMS: Monitoring Option (BMT WBM, 2014a)
MO.3	Monitor beach access ways annually and after major storm events, to provide beach access maintenance, and closure and remediation of unsafe access ways (e.g. large dune scarp after storms).	<ul style="list-style-type: none"> Schnapper Beach, Hungry Head, North Hungry Head Beach, North Beach 	1	2015. Repeat annually and after major storm events (i.e. Hs > 4-5 m)	BSC, SLSC, BHSPT, NSWCHPT <i>In consultation with Dol Lands</i>	Staff time to conduct investigation (internal costs of \$5,000 per year).	Nil	See CZMS Monitoring Option (BMT WBM, 2014a); & Emergency Action Sub-Plan (Appendix D)



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Implementation Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
MO.4	Implement community based educational photo monitoring program of local beach conditions. Monitoring sites should have visible survey markers for ongoing reference, which could include existing structures (e.g. Hungry Head watch tower; Wenonah Head shelter), or else as signage that is clearly visible from the designated photograph site (to be determined). The monitoring sites should align with the beach survey locations (see Action MO.1). Photos should be taken from the same location and aspect on a yearly basis at least, but ideally twice yearly (winter, summer) and after storms to document the impacts to the beach / dune systems of both seasons and storm bites. This data should then be used for community education purposes (see Action CE.2).	<ul style="list-style-type: none"> Wenonah Head / Schnapper Beach, Hungry Head 	2	2015, or as soon as practical. Repeat twice a year and after storms.	BSC, BHSPT, NSWCHPT <i>In consultation with Dol Lands</i>	Staff time, possibly minor cost for signage: \$5,000 - \$10,000 per year.	Action MO.1	See CZMS: Monitoring Option (BMT WBM, 2014a)
MO.5	Set up habitat response to sea level rise monitoring sites, as specified in the <i>Draft Bellingen Shire Estuary Inundation Mapping</i> (BMT WBM, 2014b), and implement a monitoring program as specified. Refer also to the <i>Bellingen and Kalang Rivers Estuary Action Plan – Sea Level Rise</i> (BMT WBM, 2014c) for details regarding targeted ecological monitoring recommendations.	<ul style="list-style-type: none"> Various estuary locations (see supporting documents for details) 	2	Ongoing	BSC, BHSPT, NSWCHPT <i>In consultation with Dol Lands</i>	Unknown	Nil	Estuary Mapping Study (BMT WBM, 2014b); & Estuary Action Plan SLR (2014c)

¹Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).



2.2.7 Non-Council Asset Management (NC)

Table 2-9 Non-Council Asset Management Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities ¹	Resources Req'd	Preceding Actions	Further Info
NC.1	Provide erosion and recession, and coastal inundation hazard mapping to Australian Rail Track Corporation (ARTC) for North Coast Railway line section at risk.	<ul style="list-style-type: none"> Oyster Creek Dalhouseie Creek Hungry Head Beach 	1	2015, or as soon as practical.	BSC	Staff time only.	Nil	

¹Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).



2.2.8 Planning and Development Controls (PD)

Table 2-10 Planning and Development Controls Action Tables

Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities	Resources Req'd	Preceding Actions	Further Info
PD.1	<p>Prepare an internal checklist, guideline or policy to facilitate the consideration of coastal hazard zones and timeframes by Council in the preparation or revision of:</p> <ul style="list-style-type: none"> Community & Crown Land Plans of Management; Masterplans; Review of Environmental Factors (REF) for works not requiring development consent; Planning instruments; At the early stages of planning new infrastructure and conducting strategic planning (e.g. designing new road networks, sewer networks etc.), i.e. prior to preparation of development applications; and Any other works not requiring development consent of assessment. <p>This guideline should include:</p> <ul style="list-style-type: none"> Derivation of a setback line seaward of which development should be avoided for long term structures. An appropriate setback may be the 'best estimate' 2050 hazard line, for example (see CZMS Coastal Hazard Development Control Option for guidance) Temporary, sacrificial or relocatable structures only permitted seaward of the setback line <p>This policy aims to guide Council and other agencies on the appropriate construction of public facilities in the coastal zone, to minimise the extent of assets at risk over time.</p>	<ul style="list-style-type: none"> Whole of LGA 	1	2015, or as soon as practical	BSC	Staff time only, or minor consultancy (\$15,000) if required.	Nil	See CZMS: Integrate CZM Planning Option; refer also to CZMS DCP Option for guidance regarding consideration of hazard zones and timeframes regarding new Council development / works (BMT WBM, 2014a)



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Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities	Resources Req'd	Preceding Actions	Further Info
PD.2	Integrate Coastal Zone Management into Council's operations by conducting internal Council training to educate the different Council departments and the Councillors about coastal hazard zones and the CZMP, to support greater consideration of coastal hazards and development controls in Council planning and other activities. Repeat internal education on a regular (1-2 year) basis.	<ul style="list-style-type: none"> Whole of LGA 	1	2015, or as soon as practical. Repeat every 1-2 years.	BSC	Staff time only, or minor consultancy (\$5,000) if required.	Nil	See CZMS: Integrate CZM Planning Option (BMT WBM, 2014a)
PD.3	As part of the next amendment to Councils Floodplain Risk Management Plan, linkages between fluvial inundation, coastal inundation, and estuary inundation should be clearly documented in the plan and the most appropriate policy response specified. Once amended, the Floodplain Risk Management Plan should be referred to as the as the peak strategy for regulation of coastal and estuary inundation. In the interim, consider coastal inundation impacts for development applications made within the immediate coastal inundation risk zone, as identified in this CZMP and the Draft Bellingen Estuary Inundation Mapping study (BMT WBM, 2014b).	<ul style="list-style-type: none"> Whole of LGA 	1	At next review of Floodplain Risk Management Plan	BSC	Staff time only.	Nil	See CZMS: Flood Planning for Coastal Inundation (BMT WBM, 2014a); & Estuary Inundation Mapping Study (BMT WBM, 2014b)



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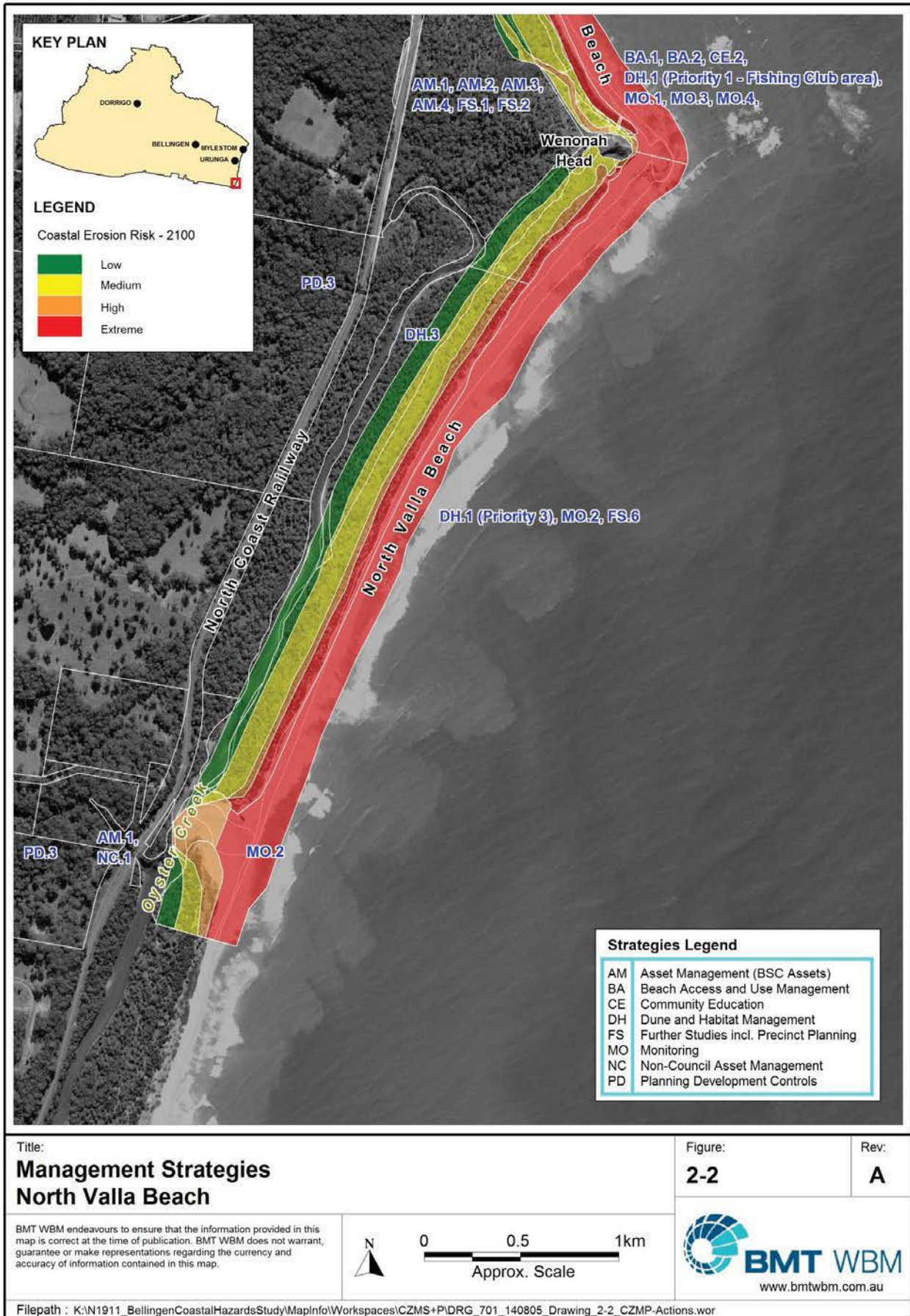
Ref	Action	Locations	Priority	Timing / Trigger	Responsibilities	Resources Req'd	Preceding Actions	Further Info
PD.4	When reviewing the zoning of land, utilise the most current hazard mapping and monitoring data to identify at risk land for rezoning (or to keep appropriate zoning), to reduce risks to future development.	<ul style="list-style-type: none"> Whole of LGA 	2	At next review of LEP	BSC	Staff time only.	Nil	See CZMS: LEP Review and Rezoning Option (BMT WBM, 2014a); & Estuary Inundation Mapping Study (BMT WBM, 2014b)

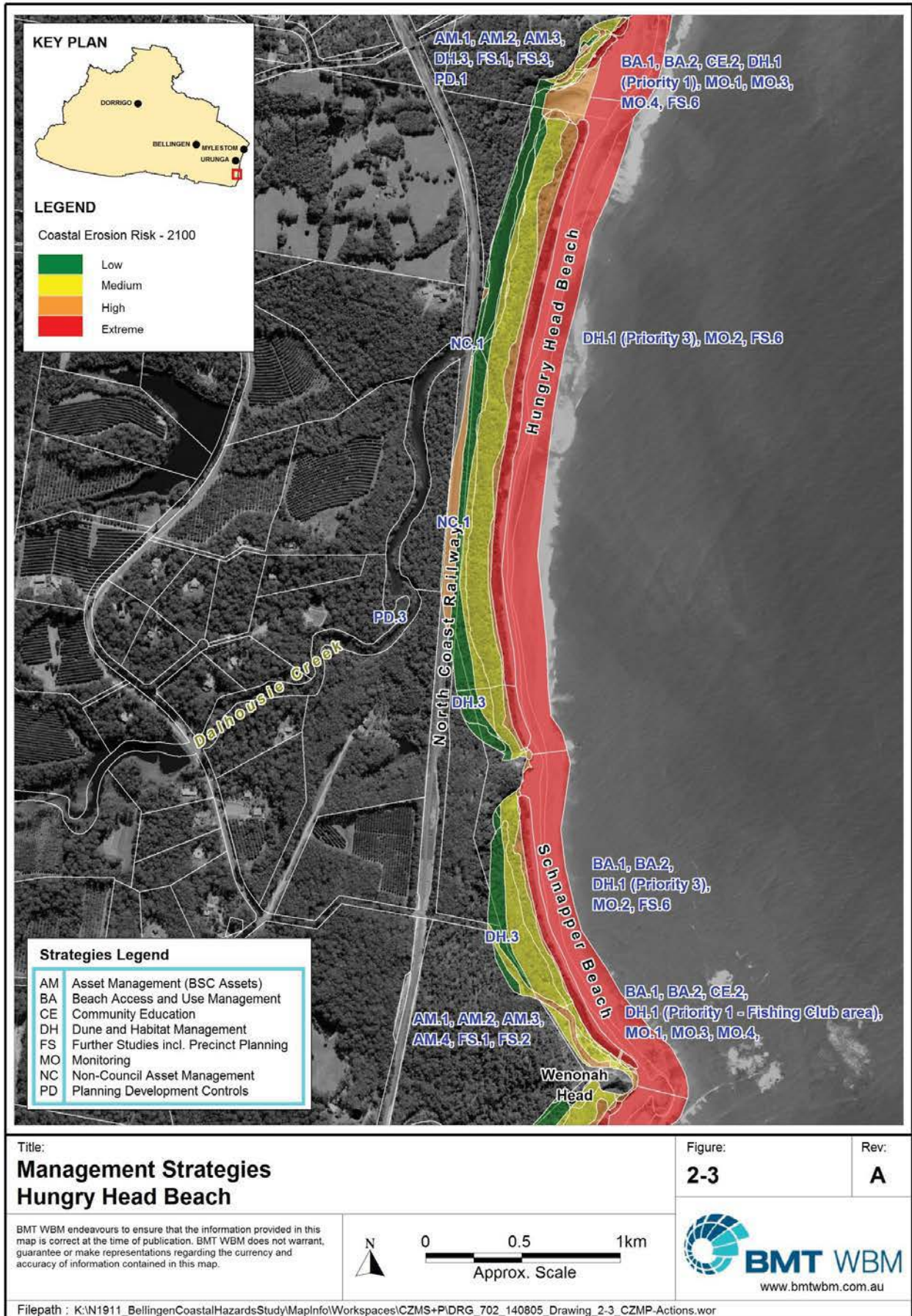
¹ Abbreviations as follows: Bellingen Shire Council (BSC); Department of Industry - Lands (Dol - Lands); Bellingen Heads State Parks Trust (BHSPT); NSW Crown Holiday Parks Trust (NSWCHPT); NSW National Parks and Wildlife Service (NPWS); Local Aboriginal Land Council (LALC); NSW Surf Life Saving (NSWSLS).

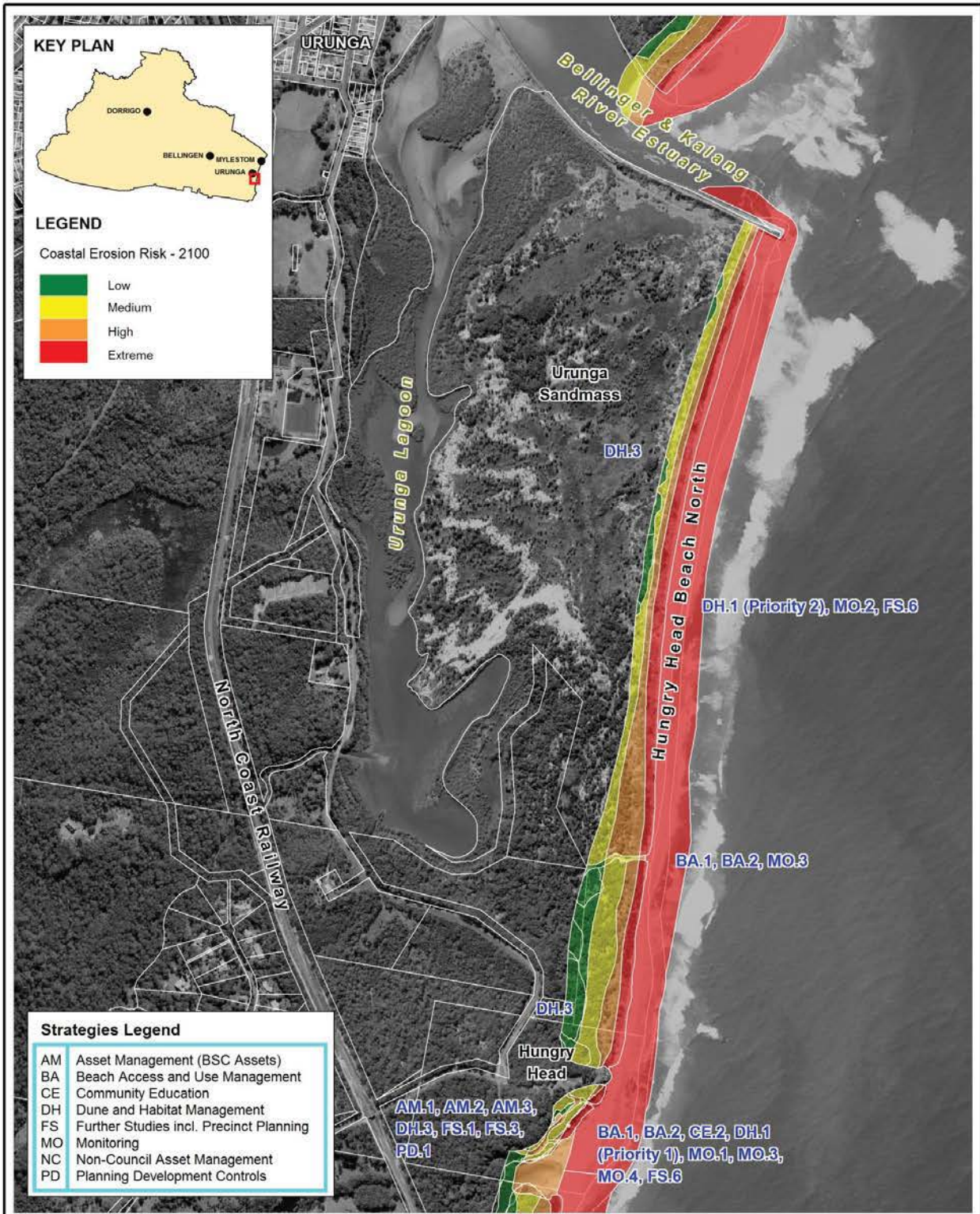


2.3 Management Strategy Maps

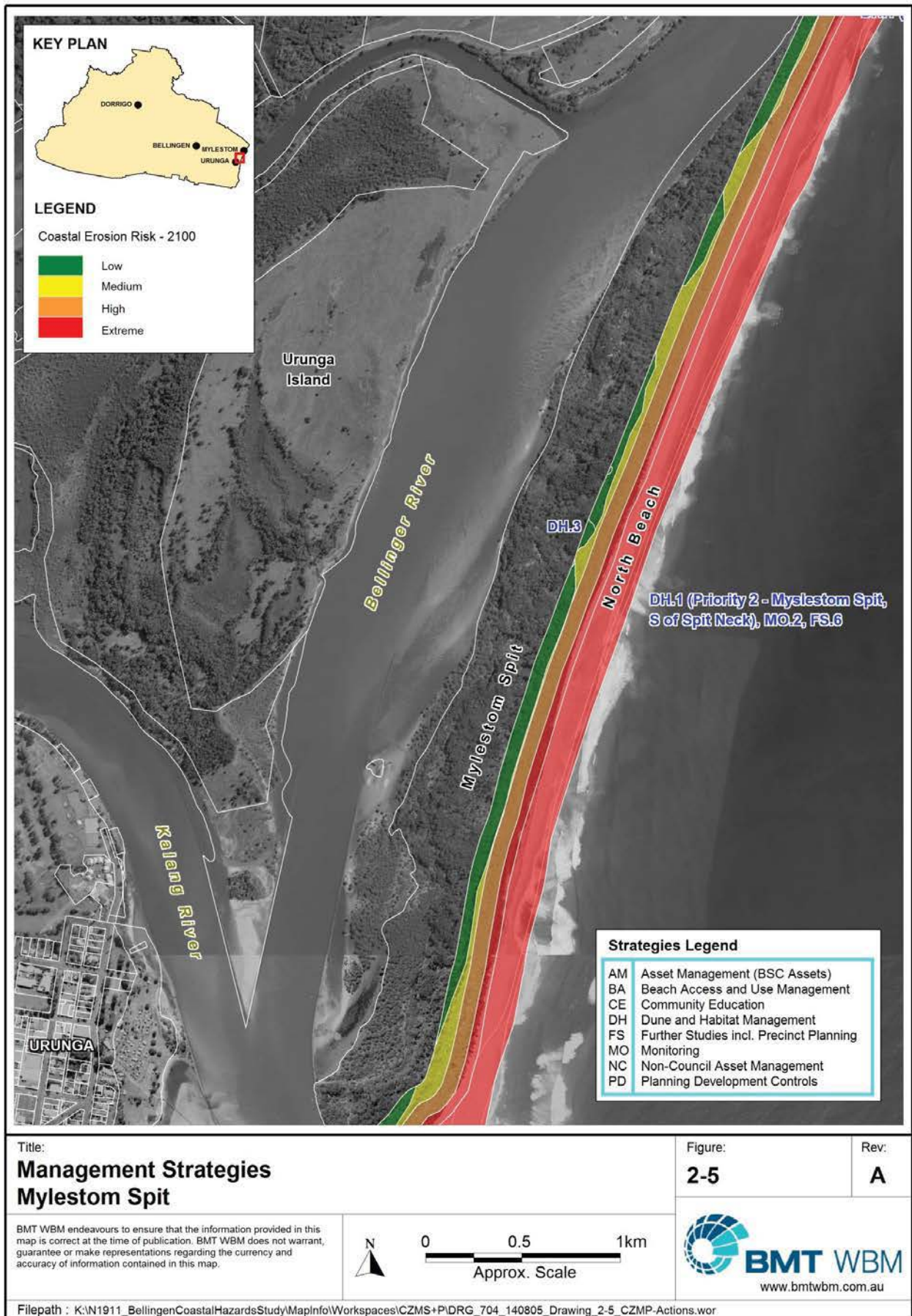
Maps showing the location of the recommended management actions are provided in Figure 2-2 to Figure 2-6. The recession risk mapping for the 2100 timeframe has been used as a base layer for this purpose. Note the complete suite of risk maps for the open coastline are provided in Appendix C, and coastal inundation risk mapping for the Bellinger Kalang River Estuary is provided in BMT WBM (2014b).

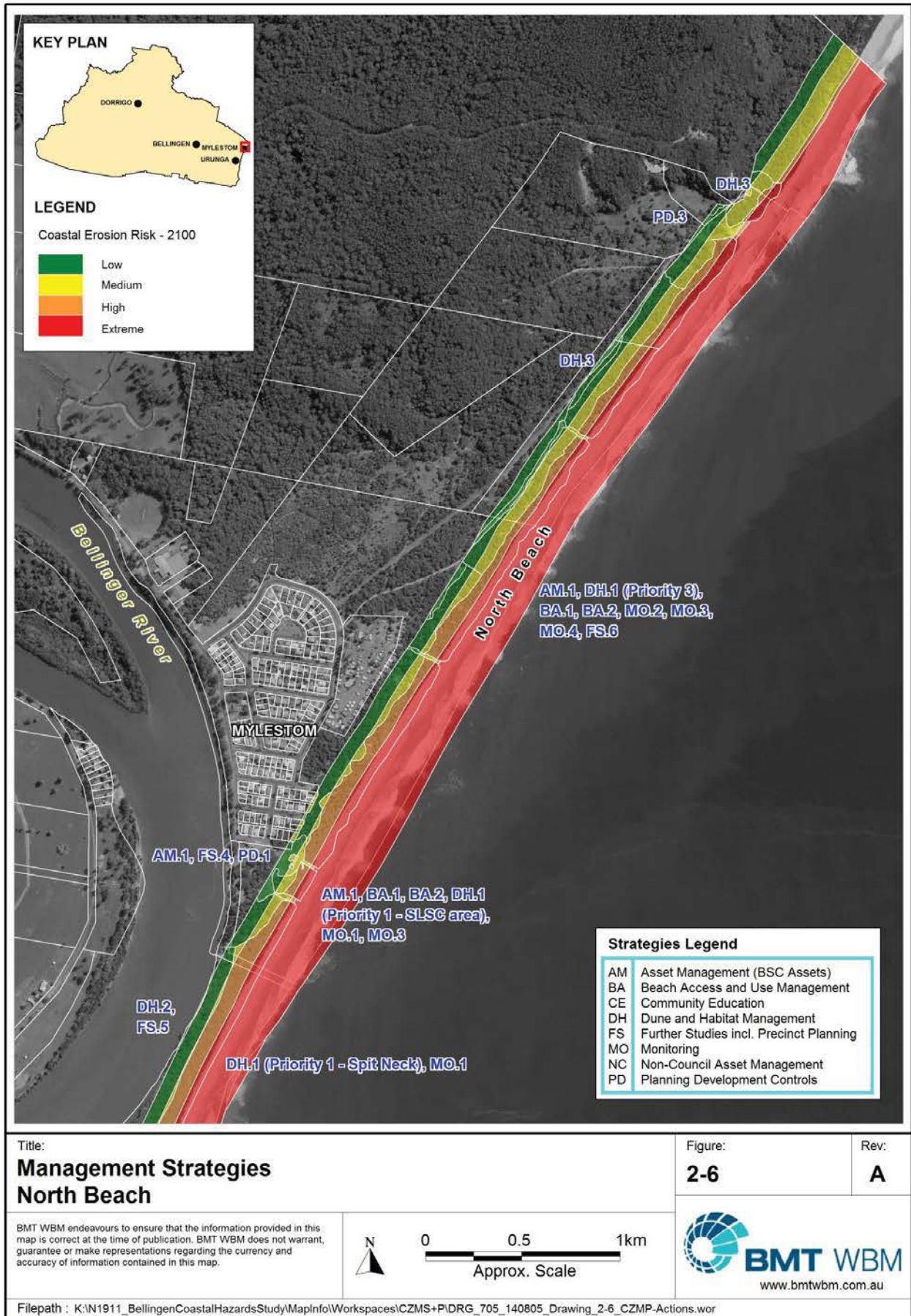






<p>Title:</p> <h3>Management Strategies North Hungry Head Beach</h3>		<p>Figure:</p> <p>2-4</p>	<p>Rev:</p> <p>A</p>
<p>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</p>		<p>N</p> <p>0 0.5 1km</p> <p>Approx. Scale</p>	<p>BMT WBM</p> <p>www.bmtwbm.com.au</p>
<p>Filepath : K:\N1911_BellingCoastalHazardsStudy\MapInfo\Workspaces\CZMS+P\DRG_703_140805_Drawing_2-4_CZMP-Actions.wor</p>			





3 Plan Evaluation and Review

3.1 Performance Evaluation

The Bellingen Coastal Zone Management Plan 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, contingencies should be emplaced to remedy the situation. A series of performance measures to assist in the evaluation process are discussed below. As part of any evaluation or review process, Council will need to take the lead role in co-ordinate with other agencies/organisations responsible for implementation of this plan.

3.1.1 Primary Performance Measures

The first set of performance measures should ascertain whether the strategies are actually being implemented, or not, in accordance with the timeframe and triggers designated in the Implementation Tables above. As such, the primary performance measures are simply a *measure of action initiation*.

Organisations (mostly Council) responsible for implementation will need to review the Plan carefully and ensure that adequate funding and resources are allocated to the various strategies and actions to ensure that the timeframe or trigger for implementation is being achieved. Indeed, monitoring actions within the plan are very important for investigating this performance measure with respect to when triggers for action implementation are being met.

Specific questions to be answered as part of an evaluation process are:

- What strategies have actually been implemented (regardless of outcome – see Secondary Performance Measure)?; and
- What strategies are outstanding, and should have been implemented within this nominated timeframe / trigger?

If it is determined that the strategies are 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 Coastal Zone Management Plan to reflect a timeframe for implementation that is more achievable. The revised Plan would need to be endorsed by all relevant stakeholders and agencies responsible for implementation.

3.1.2 Secondary Performance Measures

The second set of performance measures are aimed at measuring the overall outcomes of the Plan 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, consideration will need to be given to all relevant mechanisms in place that assist with managing future risks and increasing Council's and the community's resilience to a changing climate and associated coastline responses (including erosion, recession and coastal inundation).

There are two specific questions to be answered here:

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

If, after a reasonable period of time it is determined that the risks have not been adequately managed / mitigated (or indeed, new intolerable risks have arisen), then the following contingencies should be adopted:

- Carry out a formal review of the implemented management strategies, identifying possible avenues for increasing the effectiveness of the strategy in managing the risks along the coastline (including new risks);
- Commence implementation of additional management strategies that may assist in meeting the objectives of the Coastal Zone Management Plan (possibly 'fast-tracking' some longer term strategies as necessary);
- Reconsider the objectives of the risk management. For example, accommodating future changes may no longer be feasible and an alternative approach of abandonment and planned retreat may be necessary. Any such changes to the Plan would need to be endorsed by the stakeholders and relevant government agencies, as well as the public.

3.2 Factors of Success

The success of the Bellingen Coastal Zone Management Plan can be improved by the following factors:

- Certification by the Minister and Adoption by Council;
- Broad stakeholder and community agreement on the overall Plan strategies and objectives for risk management;
- Understanding and agreement on implementation responsibilities and funding opportunities by Council (particularly across its various departments) and other government agencies, stakeholders and the general community;
- Commitment by organisations and departments involved to dedicate appropriate time and resources to achieve the objectives and timeframe of the Plan; and
- Actively sourcing of appropriate resources and funds, through grants, user contributions, and in-kind commitments from the agencies, stakeholders and community.

A particularly important aspect is the acceptance and agreement by the local community. Without significant support and pressure by the local community, Council may find it difficult to prioritise coastal management works when considering the full range of Council assets and lands requiring attention in the future. Continued community engagement should occur as part of any future precinct planning, to ensure that the community at large remains positively engaged in the management of Bellingen Shires coastal environment.

3.3 Plan Review

It is recommended that this Bellingen Coastal Zone Management Plan be reviewed annually, to determine progress with individual actions and strategies, while a broader audit and update be conducted every 5-10 years. The annual review should focus on funding, resources and barriers to implementation of the individual actions and strategies, which could be reported in a State of Environment Report, or other relevant community accessible forum, as needed by Council. The 5 year audit should target re-evaluation of risks to determine progress with overall risk management and reduction. From the 5 year audit, changes can be made to the Plan to ensure the document remains current, and relevant to the changing landuse and community demands along the Bellingen Shire coastline.

Conclusion

4 Conclusion

This CZMP details a range of actions to be implemented over the coming 5 - 10 years to manage the priority risks from coastal hazards identified across Bellingen Shire Coastal Zone. The actions prescribed in this Plan are founded on a risk based approach, which determined the risk to various coastal assets (social, natural and built) from coastal hazards, with priority for management action given to assets at greatest risk (refer Appendix B).

Bellingen Shire's open coast is generally well placed to deal with coastal hazards because of the undeveloped nature and large reserve status of the coastal fringing corridor, which allows coastal processes to act unimpeded. Nevertheless there are a number of areas requiring management action to address both: the immediate coastal hazard risks; and improve preparedness to manage future sea level rise scenarios.

This Coastal Zone Management Plan forms the culmination of previous coastal zone studies, including the:

- *Bellingen Coastal Processes and Hazards Definition Study* (BMT WBM, 2012), which identified the extent of coastal hazards affecting the Bellingen coastline;
- *Bellingen Coastal Zone Management Study* (BMT WBM, 2014a), the companion document to this Plan, which details a range of potentially suitable management strategies for risks at the immediate and future timeframes; and.
- *Draft Bellingen Shire Estuary Inundation Mapping* (BMT WBM, 2014b) and *Bellinger and Kalang Rivers Estuary Action Plan – Sea Level Rise* (BMT WBM, 2014c), which provides mapping and recommendations for management of inundation risks within the estuary.

This Plan primarily focusses on addressing the erosion, recession and inundation hazards that threaten the open coast shoreline, but also addresses at a higher level the coastal inundation risks within the Bellinger and Kalang River Estuary.

The Plan also references the *Draft Coastal Public Safety Risk Assessment: Bellingen Local Government Area* (SLSNSW, 2014) to incorporate treatment of risks to public safety arising from coastal processes.

The actions within this Plan can be broadly categorised into the following:

- Asset Management
- Beach Access and Use Management
- Community Education
- Dune and Habitat Management
- Further Studies including Precinct Planning
- Monitoring
- Non-Council Asset Management
- Planning and Development Controls

Conclusion

Much of Bellingen's coastline is contained within the Bellingen Coast Regional Crown Reserve. Council needs to work in close partnership with DoI - Lands and the relevant Trusts to best achieve the management objectives and strategies proposed in this Plan. Collaboration with the Bellinger Heads State Park Trust and the NSW Crown Holiday Parks Trust in particular, along with other key stakeholders and members of the community, is required for ongoing implementation of this plan.

5 References

BMT WBM (2012), *Bellingen Coastal Processes and Hazards Definition Study*, Final Report prepared for Bellingen Shire Council, June 2012.

BMT WBM (2014a), *Bellingen Coastal Zone Management Study*, Final Report prepared for Bellingen Shire Council, August 2014.

BMT WBM (2014b), *Bellingen Shire Estuary Inundation Mapping*, Draft Report prepared for Bellingen Shire Council, August 2014

BMT WBM (2014c), *Bellinger and Kalang Rivers Estuary Action Plan – Sea Level Rise*, Final Report prepared for Bellingen Shire Council, July 2014

SLSNSW (2014) *Coastal Public Safety Risk Assessment: Bellingen Local Government Area*. Draft Report, prepared by Surf Life Saving NSW.

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Bellingen Coastal Zone Management Plan – Final Report
Legislative Requirements of the Bellingen Coastal Zone Management Plan

A-1

Appendix A Legislative Requirements of the Bellingen Coastal Zone Management Plan

Legislative Requirements of the Bellingen Coastal Zone Management Plan**A.1 Guidelines for Preparing Coastal Zone Management Plans: Minimum Requirements**

The minimum requirements for the process, content and outcomes of a Coastal Zone Management Plan, as detailed in the *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013) are reproduced herein.

CZMPs are to contain:

- (1) *a description of:*

 - (a) *how the relevant Coastal Management Principles have been considered in preparing the plan*
 - (b) *the community and stakeholder consultation process, the key issues raised and how they have been considered*
 - (c) *how the proposed management options were identified, the process followed to evaluate management options, and the outcomes of the process*

- (2) *proposed management actions over the CZMP's implementation period in a prioritised implementation schedule which contains:*

 - (a) *proposed funding arrangements for all actions, including any private sector funding*
 - (b) *actions to be implemented through other statutory plans and processes*
 - (c) *actions to be carried out by a public authority or relating to land or other assets it owns or manages, where the authority has agreed to these actions (section 55C(2) (b) of the Coastal Protection Act 1979).*
 - (d) *proposed actions to monitor and report to the community on the plan's implementation, and a review timetable.*

- (3) *CZMPs are to be prepared using a process that includes:*

 - (a) *evaluating potential management options by considering social, economic and environmental factors, to identify realistic and affordable actions*
 - (b) *consulting with the local community and other relevant stakeholders. The minimum consultation requirement is to publicly exhibit a draft plan for not less than 21 days, with notice of the exhibition arrangements included in a local newspaper (section 55E of the Coastal Protection Act 1979)*
 - (c) *considering all submissions made during the consultation period. The draft plan may be amended as a result of these submissions (section 55F of the Coastal Protection Act 1979).*

- (4) *CZMPs are to achieve a reasonable balance between any potentially conflicting uses of the coastal zone.*

Details of how these minimum requirements have been met in this Bellingen Coastal Zone Management Plan (and associated documents) are summarised in Table A-1.

Legislative Requirements of the Bellinghen Coastal Zone Management Plan

Table A-1 Minimum requirements for CZMP, as addressed by the Bellinghen CZMP

Requirement	Addressed by Bellinghen CZMP	CZMS / CZMP Report Section
(1) (a)	Details of how the Coastal Management Principles have been considered in preparing this Plan are detailed in Table A-2.	A.2 (CZMP)
(1) (b)	<p>Comprehensive community and stakeholder consultation was undertaken in developing this plan, through workshops, surveys and phone calls.</p> <p>Information on community values and issues was gathered from this process, and then incorporated into the risk assessment process. This feedback was also incorporated into the development of specific management actions.</p> <p>Community consultation undertaken also included public exhibition of key documents. Comments from public exhibition of the draft Coastal Zone Management Study (CZMS) have been incorporated into the final CZMS. The same process has occurred for this Coastal Zone Management Plan (CZMP). This CZMP is eligible for submission for certification.</p>	1.3.3; Appendix C (CZMS) 1.4 (CZMP)
(1) (c)	<p>A staged approach was used to identify and evaluate the management options presented in this plan. This was documented in the CZMS and CZMP, and included:</p> <ul style="list-style-type: none"> a 'coarse filter' multi-criteria (cost benefit) analysis, which considered social, economic and environmental factors of each action; followed by a site specific assessment, to tailor suitable management options to the areas deemed to have intolerable levels of risk <p>From this process, a range of technically feasible and environmentally and socially suitable management options were detailed in the CZMS. These options were subsequently reviewed by Council and the community (via exhibition), and finalised for inclusion within the CZMP.</p>	3.3; 4; Appendix E (CZMS) 1.3, 1.4, 2 (CZMP)
(2) (a) (2) (b) (2) (c) (2) (d)	<p>Within the implementation tables provided in this CZMP, the proposed actions: (a) have been prioritised; (a) have proposed funding arrangements detailed; (b) have details where actions have shared responsibilities, such as through other plans and processes; and (c) details where an action is to be carried out in coordination with a public authority (i.e. CL).</p> <p>Proposed mechanisms are also provided in the Plan to: (d) monitor and report on the plans implementation and undertake a review of the timetable.</p>	Asset Man't Action Tables in 2; 3.3 (CZMP)
(3) (a)	<p>As shown in the response to requirement (1) (c), potential management options were evaluated with consideration of:</p> <ul style="list-style-type: none"> Social, economic and environmental factors; and Technical feasibility and affordability. 	3.3; 4; Appendix E (CZMS) 1.3, 1.4, 2 (CZMP)

Legislative Requirements of the Bellingen Coastal Zone Management Plan

Requirement	Addressed by Bellingen CZMP	CZMS / CZMP Report Section
(3) (b)	As shown in the response to requirement (1) (b), community and stakeholder consultation has been undertaken in developing this plan, which has included (amongst other means of consultation) placing the draft CZMS on public exhibition for a period of 3 weeks. Community feedback and comments received from this process has been incorporated into the final CZMS, as appropriate. The same process was taken place for this CZMP, prior to it being submitted for certification.	1.3.3; Appendix C (CZMS)
(3) (c)	As above.	
(4)	Management actions arising out of this CZMP incorporate a balance between conflicting users of the coastal zone. For example, the community consultation process highlighted that some beach users value 4WD beach access opportunities, whereas others see 4WD on beaches as an environmental issue. These conflicting views are addressed through the action developed to improve and maintain beach access facilities (thus ensuring 4WD access is sustained over the duration of the Plan), whilst rationalising surplus beach access paths (subsequently limiting unnecessary 4WD impacts to the beach / dune environment).	1.3.3; Appendix C (CZMS) 2 (CZMP)

(CZMP) refers to this document, the Draft Bellingen Coastal Zone Management Plan

(CZMS) refers to the Bellingen Coastal Zone Management Study, Final Report (BMT WBM, 2014)

A.2 Coastal Management Principles

The Coastal Management Principles detailed in the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013) are reproduced herein. Details of how the Coastal Zone Management Principles have been addressed within the Bellingen Coastal Zone Management Plan (and associated documents) summarised in Table A-2

Principle 1 Consider the objective of the Coastal Protection Act 1979 and the goals, objective and principles of the NSW Coastal Policy 1997.

Principle 2 Optimise links between plans relating to the management of the coastal zone.

Principle 3 Involve the community in decision-making and make coastal information publicly available.

Principle 4 Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach.

Principle 5 The priority for public expenditure is public benefit; public expenditure should cost-effectively achieve the best practical long-term outcomes.

Legislative Requirements of the Bellingen Coastal Zone Management Plan

Principle 6 Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented.

Principle 7 Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions.

Principle 8 Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems.

Principle 9 Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy.

Principle 10 Support recreational activities consistent with the goals of the NSW Coastal Policy.

Table A-2 Coastal Management Principles addressed by the Bellingen CZMP

CZM Principle	Addressed by Bellingen CZMP	CZMS / CZMP Report Section
P1.	This CZMP has been developed with consideration for ecologically sustainable development, and is aligned with the NSW Coastal Policy. This plan also considers the objectives of the NSW <i>Coastal Protection Act 1979</i> , as detailed in in Table A-3, below.	1 (CZMS) A.3 (CZMP)
P2.	Existing plans relating to the management of the coastal zone have been reviewed and considered. By using a risk-based approach to assess risk from coastal hazards undertaken in this CZMP process, controls within existing plans could then be incorporated into the analysis of risk, and also used as baseline for developing risk treatments. This CZMP also provides guidance for future and revised plans.	2.5; Appendix A (CZMS) 2.6 (CZMP)
P3.	Comprehensive community and stakeholder consultation has been undertaken in developing this Plan, through workshops, surveys and phone calls (see Table A-1, (1) (b) for details).	1.3.3 (CZMS)
P4.	The risk based approach is an internationally recognised framework for management because it incorporates the best available information and its uncertainty. Management options recognise the overlap between flooding and oceanic processes through estuaries, streamlining management into one approach. The adopted Risk Management Framework intrinsically requires ongoing monitoring of risks and review and tailoring of risk treatments (management options).	2.1; Appendix E (CZMS) 1.3; 2 (CZMP)
P5.	Cost benefit analysis for management options has recognised the public benefit as a key selection criteria for management options.	3.3 (CZMS)
P6.	This plan has been prepared using the ISO 31000:2009 Risk Management Principles and Guidelines. Risks to public safety and assets have been analysed and mapped. Evaluation of the tolerability of risks has been evaluated. In certain cases risks that cannot be reasonably treated must be accepted. A triggered based	2; 4.6 (CZMS) 2.1 – 2.9 (CZMP)

Legislative Requirements of the Bellingen Coastal Zone Management Plan

CZM Principle	Addressed by Bellingen CZMP	CZMS / CZMP Report Section
	approach to implementation has been applied, with “no regrets” actions to build resilience to be implemented now, a future intent signalled to plan for appropriate approvals and funding to implement for more difficult options in the future.	
P7.	The adaptability of management options to future circumstances was a consideration in selecting preferred options. A trigger based approach has also been applied, where appropriate, to promote adaptive risk management over time.	4.6 (CZMS) 2.1 – 2.9 (CZMP)
P8.	Ability of a management option to provide environmental protection or benefit has formed part of the cost benefit analysis of options. Specific options for prioritising rehabilitation for at risk coastal ecosystems have also been developed.	Appendix E (CZMS) 2.3, 2.5 (CZMP)
P9.	Specific beach access strategies have been developed as part of this plan, which promotes improved and safe public access to beaches. Also, this plan interlinks with existing community access plans (i.e. POMs) by recommending coastal hazards considerations be incorporated into such plans.	Appendix E (CZMS) 2.3 (CZMP)
P10.	This plan makes recommendations to facilitate the improvement of community recreational facilities, with consideration to coastal hazards, to: maintain beach amenity; promote public access to the beach by a variety of users; and provides ongoing public access to coastal recreational facilities.	4.2, Appendix E (CZMS) 2.3, 2.6 (CZMP)

A.3 Coastal Protection Act 1979: Section 3 – Objects of this Act

The objectives of the CPA 1979, as detailed in Section 3 of the Act are reproduced herein.

The objects of the Coastal Protection Act 1979 are to provide for the protection of the coastal environment of the State for the benefit of both present and future generations and, in particular:

(a) to protect, enhance, maintain and restore the environment of the coastal region, its associated ecosystems, ecological processes and biological diversity, and its water quality, and

(b) to encourage, promote and secure the orderly and balanced utilisation and conservation of the coastal region and its natural and man-made resources, having regard to the principles of ecologically sustainable development, and

(c) to recognise and foster the significant social and economic benefits to the State that result from a sustainable coastal environment, including:

(i) benefits to the environment, and

(ii) benefits to urban communities, fisheries, industry and recreation, and

(iii) benefits to culture and heritage, and

Legislative Requirements of the Bellingen Coastal Zone Management Plan

(iv) benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water, and

(d) to promote public pedestrian access to the coastal region and recognise the public's right to access, and

(e) to provide for the acquisition of land in the coastal region to promote the protection, enhancement, maintenance and restoration of the environment of the coastal region, and

(f) to recognise the role of the community, as a partner with government, in resolving issues relating to the protection of the coastal environment, and

(g) to ensure co-ordination of the policies and activities of the Government and public authorities relating to the coastal region and to facilitate the proper integration of their management activities, and

(h) to encourage and promote plans and strategies for adaptation in response to coastal climate change impacts, including projected sea level rise, and

(i) to promote beach amenity.

Details of how the CPA 1979 objectives have been addressed within the Bellingen Coastal Zone Management Plan (and associated documents) are provided in Table A-3.

Table A-3 Coastal Protection Act 1979 Objectives addressed by the Bellingen CZMP

Objective	Addressed by Bellingen CZMP	CZMS / CZMP Report Section
(a)	This CZMP promotes the retention and improvement of Bellingen's natural and undeveloped coastal environment, through: <ul style="list-style-type: none"> assessing the risk of coastal hazards in terms of impact to environmental assets (not just built asset), considering environmental aspects as part of the cost benefit analysis of potential management options, and developing targeted strategies to maintain and improve the health / condition of the beach, dune and other coastal habitats. 	1.1; 3.3; Appendix E (CZMS) 1.1; 2 (CZMP)
(b)	Through assessing all potential management actions in regards to their <i>environmental</i> , economic and <i>social</i> attributes, this CZMP ensures that the management strategy put forward promotes the utilisation and conservation of the coastal region (including both natural and man-made resources), in an ecologically sustainable manner. Likewise, the assessment of "risk" from coastal hazards considered the consequence to social and environmental attributes as assets, to ensure these assets were captured as priorities for management attention.	3.3 (CZMS)
(c) (i) (c) (ii) (c) (iii) (c) (iv)	This Plan promotes sustainable management of Bellingen's coastal environment, for (i) the benefit of the environment (see CZMP Actions: BA and DH); (ii) communities, industry and recreation (see CZMP Actions: BA, CE, FS); and (iii & iv) both Indigenous and Non-Indigenous culture and heritage (see CZMP Action: FS).	4, Appendix E (CZMS) 2 (CZMP)

Legislative Requirements of the Bellingen Coastal Zone Management Plan

Objective	Addressed by Bellingen CZMP	CZMS / CZMP Report Section
(d)	Targeted management strategies within this plan promote public access to the coastal region.	4, Appendix E (CZMS) 2 (CZMP)
(e)	Land acquisition was considered as a potential management strategy in the Bellingen CZMP. This action was not deemed necessary to manage coastal hazard risks within the Shire, and therefore does not form part of the actions recommended in this CZMP.	3.3; Appendix E (CZMS)
(f)	As shown in the Table A-1 response to CZMP preparation requirement (1) (b), comprehensive community and stakeholder consultation has been undertaken in developing this plan, as it is recognised that community and Council must work together to best manage present and future coastal risks. Furthermore, actions detailed within this study promote the continued collaboration between Council and community for ongoing management of the coast, such as through the Precinct Planning processes, Community Education and Monitoring programs.	1.3.3; Appendix C (CZMS) 1.4; 2.4; 2.7; 2.9 (CZMP)
(g)	Existing Government and public authority plans and policies relating to the management of the coastal zone have been reviewed and considered as part of this plan, to ensure proper integration with their management activities. Refer to Coastal Zone Management Principal 2 response in Table A-2 for an example of how this was achieved.	2.5; Appendix A (CZMS) 2.6 (CZMP)
(h)	The strategies put forward in this Plan achieve adaptive risk management of present coastal hazards and future coastal hazards in response to climate change (and sea level rise) through: <ul style="list-style-type: none"> • Detailing 'no regrets' actions to build resilience now, while signalling the appropriate approval processes and fund raising required to implement more difficult options in the future; and • Applying a 'trigger' based approach to implementation of difficult / expensive management options. 	2; 4.6 (CZMS) 2.1 – 2.9 (CZMP)
(i)	This Plan directly promotes beach amenity through management actions including: <ul style="list-style-type: none"> • Beach access management, • Dune and habitat management The other actions specified in this Plan aim to allow the beach to naturally retreat with sea level rise, and thus be maintained for future generations.	4; Appendix E (CZMS) 2.3; 2.5 (CZMP)

Legislative Requirements of the Bellingen Coastal Zone Management Plan**A.4 Coastal Protection Act 1979: Section 55C – Matters to be dealt with in CZMP**

The matters to be dealt with in coastal zone management plans, as detailed in Section 55C of the CPA 1979 are reproduced herein.

(1) A coastal zone management plan must make provision for:

- (a) protecting and preserving beach environments and beach amenity, and
- (b) emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event, and
- (c) ensuring continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion, and
- (d) where the plan relates to a part of the coastline, the management of risks arising from coastal hazards, and
- (e) where the plan relates to an estuary, the management of estuary health and any risks to the estuary arising from coastal hazards, and
- (f) the impacts from climate change on risks arising from coastal hazards and on estuary health, as appropriate, and
- (g) where the plan proposes the construction of coastal protection works (other than temporary coastal protection works) that are to be funded by the council or a private landowner or both, the proposed arrangements for the adequate maintenance of the works and for managing associated impacts of such works (such as changed or increased beach erosion elsewhere or a restriction of public access to beaches or headlands).

(2) A coastal zone management plan must not include the following:

- (a) matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 in relation to the response to emergencies,
 - (b) 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.
- (3) Despite subsection (1), the Minister may give a direction under section 55B that a council make a coastal zone management plan that makes provision for only one or more of the matters referred to in that subsection as specified in the direction

Details of how these matters have been addressed within the Bellingen Coastal Zone Management Plan (and associated documents) are provided in Table A-4.

Legislative Requirements of the Bellingen Coastal Zone Management Plan

Table A-4 Coastal Protection Act 1979 Matters to be dealt with (55C), as addressed by the Bellingen CZMP

Matters	Addressed by Bellingen CZMP	CZMS / CZMP Report Section
(1) (a)	As detailed in the Table A-3 response to CPA 1979 <i>objective (i)</i> , this Plan makes provision for protecting and preserving beach environments and amenity through targeted actions (see BA & DH), as well as selecting strategies that allow the beach to respond naturally to sea level rise.	4; Appendix E (CZMS) 2.3; 2.5 (CZMP)
(1) (b)	This plan makes provision for emergency action works, as detailed in the Bellingen Coastal Erosion Emergency Action Sub-Plan	Appendix B (CZMP)
(1) (c)	Provision and maintenance of public beach access is made for though the: <ul style="list-style-type: none"> Beach Access Management Actions - which details strategies to improve beach access infrastructure; and Monitoring Actions – which details the requirement to monitor beach access condition to ensure they are maintained. 	4; Appendix E (CZMS) 2.3; 2.7 (CZMP)
(1) (d)	Strategies for managing both present coastal hazards, and future coastal hazard under rising sea level conditions (as identified in the coastal hazard study) have been developed through the application of a risk based approach. This process enabled the intolerable risks to be identified and subsequently targeted for management. Following on from this, management actions were developed to reduce the intolerable risks.	2; 4; Appendix B; Appendix E (CZMS) 1.3; 2 (CZMP)
(1) (e)	N/A	N/A
(1) (f)	Refer response to CPA 1979 Matter (1) (d), above.	2; 4; Appendix B; Appendix E (CZMS) 1.3; 2 (CZMP)
(1) (g)	No actions within this Plan propose the implementation of coastal protection works.	
2 (a)	No matters under the State Emergency and Rescue Management Act 1989 are dealt with in this Plan.	N/A
2 (b)	No unauthorised actions or activities relating to public authorities are included within this Plan.	N/A
(3)	N/A	N/A

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Asset Risk Register

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Appendix B Asset Risk Register

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B.1 Erosion and Recession Risk Register for Bellingen Shire’s Open Coastline

Table B-1 Erosion and Recession Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe	
1	Vaila Beach	Vaila Beach	Beach	Extreme	Extreme	Extreme	Yes	DH.1 (Priority.3), MO.2, FS.6				
2	Vaila Beach	Foredune	Dunes	Extreme	Extreme	Extreme	Yes					
3	Vaila Beach	Oyster Creek Entrance	Waterway	High	High	High	Yes					
4	Vaila Beach	Hind Dune	Dunes	Medium	Medium	Medium						
5	Vaila Beach	Coastal Saltmarsh	EEC	n/a	Low	Medium						
6	Vaila Beach	Sub-tropical Coastal Floodplain Forest	EEC	n/a	Low	Medium						
7	Vaila Beach	Environmental Management	Environmental Protection Zone	High	High	High	Yes	DH.3				
8	Vaila Beach	Bellingen Coast Regional Crown Reserve	Parks, Reserves and Open Space	High	High	High	Yes					
9	Vaila Beach	Jagun Nature Reserve	Parks, Reserves and Open Space	High	High	High	Yes					
10	Vaila Beach	Oyster Creek	Waterway	n/a	Low	Medium		MO.2				



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Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
11	Schnapper Beach	Schnapper Beach Road	Road	High	High	High	Yes	AM.1, AM.2, AM.3, AM.4, FS.1, FS.2	Based on Geotech. Assessment and Precinct Planning Outcomes, the likely future options include: Sacrifice Land/Assets, Redesign/Retrofit and/or Protection. If Precinct Planning determines that no suitable Relocation sites are available and Protection options are not feasible, the preferred future option will likely be to:		Commence geotech bedrock depth study for Wenonah Head (Action FS.1) in the short term. Commence Precinct Planning (Action FS.2) before erosion scarp is 20 m from roadway. Place outcomes of P. Planning into forward works plans & implement when funds are available. Note: If erosion impacts road prior to completion of the P. Plan, then relocate impacted lengths of road immediately inland in the interim (Action AM.4), then manage per P. Planning.
12	Schnapper Beach	Urunga Fishing Club (Wenonah Head)	Public Recreation	Medium	High	High	Yes		Sacrifice Land/Assets to allow beach to retreat; and Redesign/Retrofit the road as required (i.e. progressive shortening), to allow for ongoing beach access; and Relocate the Shelter/Toilets/Club assets to the base of the bluff when required to maximise longevity of area, then Manage to Fail over the medium to long term.		
13	Schnapper Beach	Shelter (Wenonah)	Public Recreation	Medium	Medium	Medium		CE.2, FS.1, FS.2			
14	Schnapper Beach	Toilets (Wenonah Head)	Amenities / Blocks / Sheds	Low	Low	Low					



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Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
15	Schnapper Beach	Car Park & Picnic Facilities - Urunga Fishing Club	Public Recreation	Medium	Medium	Medium					
16	Schnapper Beach	Wenonah Head - Beach Access (4WD Access)	Beach Access	High	High	High	Yes	BA.1, BA.2, CE.2, DH.1 (Priority 1 - Wenonah Head recreational area, Priority 3 - remainder of Schnapper Beach), MO.1, MO.2, MO.3, MO.4, FS.6	Redesign/Retrofit: Modify as required to provide ongoing beach access	Sacrifice and remove access, if eroded/degraded state becomes unsafe and no alternate options available.	
17	Schnapper Beach	Schnapper Beach	Beach	Extreme	Extreme	Extreme	Yes		Planned Retreat: Sacrifice undeveloped land to allow the beach and dune system to retreat.	Undertake local feasibility study into protection options for the Wenonah Head Fishing Club Precinct (only).	
18	Schnapper Beach	Foredune	Dunes	Extreme	Extreme	Extreme	Yes				
19	Schnapper Beach	Sub-tropical Coastal Floodplain Forest	Endangered Ecological Community	Low	Medium	Medium					
20	Schnapper Beach	Environmental Management	Environmental Protection Zone	Low	Medium	Medium		DH.3			
21	Schnapper Beach	Environmental Conservation	Environmental Protection Zone	n/a	n/a	Medium					
22	Hungry Head Beach	Primary Production - Small Lots	Primary Production	n/a	n/a	Low					
23	Hungry Head Beach	North Coast Railway	Railway	n/a	n/a	High		NC.1			



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Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
24	Hungry Head	Hungry Head Road (Beach Access Loop Road)	Road	High	High	High	Yes	AM.1, AM.2, AM.3, FS.1, FS.3, PD.1	Based on Geotech Assessment and Precinct Plan Outcomes: Likely options include: Relocation, Redesign/Retrofit or Protection. Options will be driven by SLSC Option (see below)		Immediately commence geotechnical investigation into bedrock depth for headland fringes, including at road, SLSC and associated built infrastructure (see Action FS.1). When erosion escarpment is 30m of the roadway, commence planning to relocate, retrofit or protect the beach access and SLSC related infrastructure (see Action FS.3). Have outcomes of present planning put into forward works plans and implement when funding becomes available.



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Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
25	Hungry Head	Urunga (Hungry Head) Surf Club	Public Recreation	Medium	High	High			Based on Geotech Assessment and Precinct Plan Outcomes: Relocate SLSC outside of hazard zone is preferred option, if a suitable site is found to be available.	Based on Geotech Assessment and Precinct Plan Outcomes: Retrofit & Redesign SLSC to retain in existing location; or Protect SLSC and associated facilities with Seawall.	Immediately commence geotechnical investigation into bedrock depth for headland fringes, including at road, SLSC and associated built infrastructure (see Action FS.1). When erosion escarpment is 30m of the roadway, commence planning to relocate, retrofit or protect the beach access and SLSC related infrastructure (see Action FS.3). Have outcomes of precent planning put into forward works plans and implement when funding becomes available.



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Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
26	Hungry Head	Watch Tower (Urunga SLSC)	Public Recreation	High	High	High	Yes		Sacrifice Assets (i.e. Manage to Fail), then rebuild if required, as per Precinct Plan outcomes: Rebuild options will include redesign as removable structure; or relocate outside of hazard zone.		When erosion escarpment is 30 m of the roadway, commence precinct planning which should also identify options for the Watch Tower (including relocate, redesign and removable structure or abandon - as it may not be required with new precinct arrangement; see Action FS.3). Have outcomes of present planning put into forward works plans and implement when funding becomes available. Manage structure to fail as impact occur (ensuring public safety is maintained), then implement outcomes of precinct planning.
27	Hungry Head	Urunga SLSC Car Park	Car Park	Low	Low	Low				Incidentally managed through Options for Urunga SLSC (as above)	



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Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
28	Hungry Head	Dalhousie Creek & Urunga SLSC - Beach Access	Beach Access	High	High	High	Yes	BA.1, BA.2, CE.2, DH.1 (Priority 1 - fronting SLSC,	Redesign/Retrofit: Modify as required to provide ongoing beach access		
29	Hungry Head Beach	Hungry Head Beach	Beach	Extreme	Extreme	Extreme	Yes	Priority 3 - Hungry Head Beach),	Planned Retreat: Sacrifice undeveloped land to allow beach / dune / creek system to retreat		
30	Hungry Head Beach	Foredune	Dunes	Extreme	Extreme	Extreme	Yes	MO.1, MO.2, MO.3, MO.4, FS.6			
31	Hungry Head Beach	Dalhousie Creek Entrance	Waterway	High	High	High	Yes	MO.1, MO.2			
32	Hungry Head Beach	Swamp Sclerophyll Forest	EEC	n/a	Low	Low					
33	Hungry Head Beach	Sub-tropical Coastal Floodplain Forest	EEC	n/a	Low	Medium					
34	Hungry Head	Littoral Rainforest	EEC	n/a	n/a	Low		DH.3			
35	Hungry Head Beach	Hungry Head Holiday Cabins - BSC Reserve	Parks, Reserves and Open Space	n/a	n/a	Low					
36	Hungry Head	Bellingen Heads Holiday Park (Hungry Head)	Parks, Reserves and Open Space	n/a	Low	Medium					
37	Hungry Head Beach	Dalhousie Creek	Waterway	n/a	n/a	Low		MO.2			



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Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe	
38	North Hungry Head Beach	North Hungry Head Beach - Beach Access (4WD)	Beach Access	High	High	High	Yes		Redesign/Retrofit: Modify as required to provide ongoing beach access	Sacrifice and remove access, if eroded/ degraded state becomes unsafe and no alternate options available.		
39	North Hungry Head Beach	North Hungry Head Beach	Beach	Extreme	Extreme	Extreme	Yes	BA, 1, BA, 2, DH, 1 (Priority 2), MO, 2, MO, 3, FS, 4	Planned Retreat: Sacrifice undeveloped land and dunes to allow beach to retreat			
40	North Hungry Head Beach	Foredune	Dunes	Extreme	Extreme	Extreme	Yes					
41	North Hungry Head Beach	Hind Dune	Dunes	High	High	High	Yes					
42	North Hungry Head Beach	Sub-tropical Coastal Floodplain Forest	EEC	n/a	n/a	Medium		DH, 3	Beach Scraping: long term option only if dune barrier becomes threatened			
43	North Hungry Head Beach	Urunga Sandmass	Parks, Reserves and Open Space	Low	Low	Medium						
44	North Hungry Head Beach	Freshwater Wetland	EEC	Low	Low	Low						
45	North Hungry Head Beach	Swamp Sclerophyll Forest	EEC	n/a	n/a	Low						
46	Mylestom	Residential Block - George St to Winter Ave	Residential Development	n/a	n/a	Medium						
47	Mylestom	Residential - Winter Ave to Johnson Ave	Residential Development	n/a	n/a	Medium						



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Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement. Now	Option 1 (recommended)	Option 2	Future Trigger/ Timeframe
48	Mylestom	George Street	Minor Road	n/a	n/a	Low					
49	Mylestom	Johnson Avenue	Minor Road	n/a	n/a	Low					
50	Mylestom	Winter Street	Minor Road	n/a	n/a	Low		AM.1			
51	Mylestom	Unnamed Lane	Laneway	n/a	n/a	Low					
52	Mylestom	Water Line - Reticulation Main (North Beach SLSC)	Water Services	n/a	Low	Low					
53	North Beach	North Beach Surf Life Saving Club	Public Recreation	n/a	Medium	High		AM.1, FS.4	Relocate outside of hazard zone, when upgrade required (or hazard imminent); Support with removable watch towers		
54	North Beach	Beach Lookout (SLSC)	Public Recreation	Medium	Medium	Medium		AM.1, BA.1, FS.4	Incidentally managed through Options for North Beach SLSC (as above)		
55	North Beach	Car Park & Picnic Facilities - North Beach SLSC	Public Recreation	Low	Medium	Medium		AM.1, FS.4			



Bellingen Coastal Zone Management Plan – Final Report
Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe		
56	North Beach	North Beach (Holiday Park) - Beach Access	Beach Access	High	High	High	Yes	BA.1, BA.2, DH.1 (Priority 1 - SLSC and Spit Neck; 2 - Spit, S of Neck; 3 - remainder of North Beach), FS.4, MO.1 (SLSC and Spit Neck), MO.4,	Redesign/Retrofit: Modify as required to provide ongoing beach access				
57	North Beach	North Beach (SLSC) - Beach Access	Beach Access	High	High	Yes							
58	North Beach	North Beach - Beach Access (4WD)	Beach Access	High	High	Yes							
59	Myilestom Spit	North Beach - Beach Access (4WD)	Beach Access	High	High	Yes							
60	North Beach	North Beach	Beach	Extreme	Extreme	Extreme	Yes	Planned Retreat: Sacrifice undeveloped land and dunes to allow beach to retreat					
61	North Beach	Foredune	Dunes	Extreme	Extreme	Yes							
62	North Beach	Hind Dune	Dunes	Medium	Medium	Medium							
63	Myilestom	Freshwater Wetland	EEC	n/a	n/a	Low		DH.3					
64	Myilestom / Repton	Sub-tropical Coastal Floodplain Forest	EEC	n/a	Low	Low							
65	Myilestom Spit	Swamp Oak Floodplain Forest	EEC	n/a	Low	Low							
66	Myilestom \ Repton	Bellingen Coast Regional Crown Reserve	Parks, Reserves and Open Space	High	High	High	Yes				Planned Retreat: Sacrifice undeveloped land to allow beach and dune to retreat		
67	Repton	Bongil Bongil National Park	Parks, Reserves and Open Space	High	High	High	Yes						
68	Repton	Environmental Management	Environmental Protection Zone	n/a	Low	Low							



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Bellingen Coastal Zone Management Plan – Final Report
Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Erosion Risk	2050 Recession Risk	2100 Recession Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger/ Timeframe
69	Mylestom Spit	Bellingen River (landwards of Spit, i.e. Spit breach)	Waterway	n/a	n/a	High		DH.2, FS.5, MO.2			



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B.2 Coastal Inundation Risk Register for Bellingen Shire’s Open Coastline

Table B-2 Coastal Inundation Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Inundation Risk	2050 Inundation Risk	2100 Inundation Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
1	North Valla Beach (Oyster Ck)	Rural Landscape	Rural Landscape	High	High	High	Yes	PD.3, MO.2			
2	North Valla Beach (Oyster Ck)	North Coast Railway	Railway	Extreme	Extreme	Extreme	Yes	NC.1, MO.2			
3	North Valla Beach (Oyster Ck)	Valla Mine Road	Road	Medium	Medium	Medium		AM.1			
4	North Valla Beach (Oyster Ck)	Bellingen Coast Regional Crown Reserve	Parks, Reserves and Open Space	Medium	Medium	Medium					
5	North Valla Beach (Oyster Ck)	Jagun Nature Reserve	Parks, Reserves and Open Space	Medium	Medium	Medium		DH.3			
6	North Valla Beach (Oyster Ck)	Unnamed BSC Reserve	Parks, Reserves and Open Space	Medium	Medium	Medium					
7	Valla Beach	Valla Beach	Beach	Low	Low	Low					
8	Valla Beach	Foredune	Dunes	Low	Low	Low					
9	Valla Beach	Hind Dune	Dunes	Low	Low	Low					
10	North Valla Beach (Oyster Ck)	Coastal Saltmarsh	EEC	Medium	Medium	Medium					
11	North Valla Beach (Oyster Ck)	Sub-tropical Coastal Floodplain Forest	EEC	High	High	High	Yes	DH.3			



Bellingen Coastal Zone Management Plan – Final Report
Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Inundation Risk	2050 Inundation Risk	2100 Inundation Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
12	North Valla Beach (Oyster Ck)	Swamp Oak Floodplain Forest	EEC	Medium	Medium	Medium					
13	North Valla Beach (Oyster Ck)	Swamp Sclerophyll Forest	EEC	Medium	Medium	Medium		DH.3			
14	North Valla Beach (Oyster Ck)	Environmental Conservation	EEC	Medium	Medium	Medium					
15	North Valla Beach (Oyster Ck)	Environmental Management	EEC	Medium	Medium	Medium					
16	North Valla Beach (Oyster Ck)	Oyster Creek	Waterway	Medium	Medium	Medium		MO.2			
17	North Valla Beach (Oyster Ck)	Oyster Creek Entrance	Waterway	Medium	Medium	Medium					
18	Schnapper Beach	Wenonah Head - Beach Accesses (Pedestrian & 4WD)	Beach Access	Low	Low	Low					
19	Schnapper Beach	Schnapper Beach	Beach	Low	Low	Low					
20	Schnapper Beach	Foredune	Dunes	Low	Low	Low					
21	Schnapper Beach	Hind Dune	Dunes	Low	Low	Low					
22	Schnapper Beach	Sub-tropical Coastal Floodplain Forest	EEC	#N/A	#N/A	Low		DH.3			
23	Urunga (Dalhousie Ck)	Rural Landscape	Rural Landscape	#N/A	#N/A	Low		PD.3			



Bellingen Coastal Zone Management Plan – Final Report
Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Inundation Risk	2050 Inundation Risk	2100 Inundation Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
24	Urunga (Dalhousie Ck)	Primary Production - Small Lots	Primary Production	High	High	High	Yes				
25	Urunga (Dalhousie Ck)	North Coast Railway	Railway	Extreme	Extreme	Extreme	Yes	NC.1			
26	Hungry Head (Dalhousie Ck)	Hungry Head Road	Road	Low	Low	Low		AM.1			
27	Hungry Head Beaches	Beach Accesses (Pedestrian & 4WD)	Beach Access	Low	Low	Low					
28	Hungry Head Beaches (Dalhousie Ck)	Bellingen Coast Regional Crown Reserve	Parks, Reserves and Open Space	Medium	Medium	Medium					
29	Hungry Head Beaches (Dalhousie Ck)	Belling Head State Park	Parks, Reserves and Open Space	Medium	Medium	Medium		DH.4			
30	Hungry Head Beaches (Dalhousie Ck)	Hungry Head Holiday Cabins - BSC Reserve	Parks, Reserves and Open Space	Medium	Medium	Medium					
31	Hungry Head Beach	Hungry Head Beach	Beach	Low	Low	Low					
32	Hungry Head Beach North	Hungry Head Beach North	Beach	Low	Low	Low					
33	Hungry Head Beaches	Foredune	Dunes	Low	Low	Low					
34	Hungry Head Beaches	Hind Dune	Dunes	Low	Low	Low					



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Bellingen Coastal Zone Management Plan – Final Report
Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Inundation Risk	2050 Inundation Risk	2100 Inundation Risk	Maint Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
35	Hungry Head Beaches (Dalhousie Ck)	Sub-tropical Coastal Floodplain Forest	EEC	High	High	High	Yes				
36	Hungry Head Beach	Swamp Sclerophyll Forest	EEC	Medium	Medium	Medium					
37	Hungry Head Beach North	Urunga Sandmass	Parks, Reserves and Open Space	Medium	Medium	Medium		DH.4			
38	Hungry Head Beaches (Dalhousie Ck)	Environmental Conservation Zone	Environmental Protection Zone	Medium	Medium	Medium					
39	Hungry Head Beaches (Dalhousie Ck)	Environmental Management Zone	Environmental Protection Zone	Medium	Medium	Medium					
40	Hungry Head Beaches (Dalhousie Ck)	Dalhousie Creek	Waterway	Low	Low	Low		MO.2			
41	Hungry Head Beaches (Dalhousie Ck)	Dalhousie Creek Entrance	Waterway	Low	Low	Low					
42	North Beach	Beach Accesses (Pedestrian & 4WD)	Beach Access	#N/A	Low	Low					
43	North Beach	North Beach	Beach	Low	Low	Low					
44	North Beach	Foredune	Beach and Dunes	Low	Low	Low					



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Asset Risk Register

Asset #	Location	Asset Name	Asset Type	Immediate Inundation Risk	2050 Inundation Risk	2100 Inundation Risk	Man't Req'd	No Regrets Actions Implement Now	Option 1 (recommended)	Option 2	Future Trigger / Timeframe
45	North Beach	Hind Dune	Beach and Dunes	#N/A	#N/A	Low					
46	Tucker Rocks (Unnamed Creek)	Belling Heads State Park	Parks, Reserves and Open Space	Medium	Medium	Medium					
47	Tucker Rocks (Unnamed Creek)	Bongil Bongil National Park	Parks, Reserves and Open Space	Medium	Medium	Medium		DH.4			
48	Tucker Rocks (Unnamed Creek)	Littoral Rainforest	EEC	#N/A	#N/A	Medium					
49	Tucker Rocks (Unnamed Creek)	Environmental Management Zone	Environmental Protection Zone	Medium	Medium	Medium		PD.3			



Bellingen Coastal Zone Management Plan – Final Report
Risk Mapping

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Appendix C Risk Mapping

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Bellingen Coastal Zone Management Plan – Final Report
Bellingen Coastal Erosion Emergency Action Subplan

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Appendix D Bellingen Coastal Erosion Emergency Action Subplan

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