Coastal Management Program

June 2020

Scoping Study for Cape Byron to South Golden Beach

Byron Shire Council

BMT

Document Control Sheet

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Synopsis: **This Scoping Study fulfils Stage 1 of the NSW Government process for developing a Coastal Management Program (CMP). The report reviews existing information and data, establishes the strategic context for coastal management, outlines key management issues, reviews current management arrangements, identifies knowledge gaps and develops a forward plan for CMP Stages 2 to 5.**

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Acknowledgements

Byron Shire Council acknowledges the Traditional Owners of the land to which this study applies, i.e. the Arakwal and Midjungbal of the Bundjalung. Byron Shire Councils pays its respects to Elders past and present.

Byron Shire Council has prepared this document with financial assistance from the NSW Government through its Coastal Management Program. This document does not necessarily represent the opinions of the NSW Government or the Department of Planning, Industry and Environment.

MAYOR'S MESSAGE

It's no secret that Byron Shire has one of the most stunning coastlines in Australia. As visitation to our towns and beaches continues to soar each year, we need to keep our focus firmly on the important role we have in 'Caring for Country'. We are indebted to the traditional owners for allowing us to share their connection and commitment to this beautiful land – to understand, deeply, how rare and precious this fragile natural environment is.

Our role as stewards is to do all that we can – to ensure no stone is left unturned when it comes to protection and conservation of the Byron Shire's greatest assets – its country and coast.

This is why I put my full support behind this Stage 1 Scoping Study for the northern area of our coastline - Cape Byron to South Golden Beach. This scoping study sets the scene for the later stages of the process to develop a Coastal Management Program (CMP) under the new coastal legislation. It paints the picture of everything we know about our coastline and how we are presently managing the coast, what's working and what needs improvement.

Doing this in-depth study drawing on the knowledge of experts at this stage gives us a solid foundation, and greater confidence as we move forward with important decisions in our long-term coastal management planning. The level of detail presented in this Scoping Study enables us to draw meaningful insights into the complexity of issues and pressures facing our coastline and it gives us the very best chance of ensuring we have a resilient coastline that both honours the past and can be enjoyed in the future.

Executive Summary

A Stage 1 Scoping Study has been prepared for Cape Byron to South Golden Beach, of the Byron Shire Local Government Area. This Coastal Management Program (CMP) Scoping Study has been prepared under the NSW Coastal Management Framework in accordance with the Coastal Management Act 2016 (CM Act) and the Coastal Management Manual (OEH, 2018).

The study area for this CMP includes open beaches, foreshores and coastal waters extending inland to the predicted maximum year 2100 coastal hazard as previously assessed by Council (BMT WBM, 2013) while the oceanic extent stretches to 3 nautical miles offshore. The study area includes most of the open beaches in the Shire, and regions that have proven both complex and challenging for coastal management over an extended period of time. The requirements of delivering a CMP for this area are also considered to be within Council's resourcing and funding capacity.

The overall purpose of a CMP is to set the long-term strategy for the co-ordinated management of land within the coastal zone with a focus on achieving the objects of the CM Act, and specifically the Scoping Study seeks to determine the scope of the overall CMP (which consists of five stages) and provides a business case and costed forward program in this regard. Accordingly, there are many components to the overall CMP which are established within this Scoping Study such as the Vision. The Vision established for coastal management of the Cape Byron to South Golden Beach section is to:

> *"Adequately resource and fund management of the iconic and internationally recognised Byron coastline to conserve and promote its inherent natural values.*
>
> *These inherent values underpin the coasts enviable cultural, amenity, recreational use, local and tourism values and they will be kept central in the development of future management approaches.*
>
> *Future management approaches will address existing and emerging threats such as climate change through planning for a resilient coastline that is prepared to address multiple challenges in a flexible and adaptive manner; including consideration of novel funding approaches."*

Supporting the vision are a series of coastal management objectives which align with those in the CM Act.

The Vision has been developed in consideration of the strategic context of the study area. In this regard, the study area is embedded within a web of state, regional and local planning and strategy frameworks that seek to guide strategy, planning and management of lands, waters and its people.

Other key elements of the coasts strategic context relate to the environment of the coast in terms of the processes that control its form and function (i.e. coastal processes) and how these coastal processes have in the past and will potentially in the future result in changes to the coastal environment and human use and occupation of the study area. The environmental condition of the study area (i.e. foreshores and waters) defines part of its current values and these are intrinsically tied to social and cultural values around its use and economic importance.

Generally, the study area can be thought of as having high to very high environmental, social and cultural values tied to its extensive local and tourist usage for a variety of recreational, commercial and cultural activity. The values and use of the study area support local tourism which has been seen to increase markedly over the past few years. The study area also has an overlay of complex coastal processes where current day

coastal hazards have been extensively investigated in the past. Coastal hazards are exacerbated in the future associated with the effects of climate change, and other key drivers of change may relate to increased use of the coast if its popularity for living and recreating continue to increase.

A review of available literature for this section of the coast along with targeted community consultation and engagement activities identified relevant values of the coast and issues or threats that exist and may compromise or reduce these values over time. The values were considered in terms of 'environmental', 'social/cultural' and 'economic'. When the identified threats and issues where considered against these values a substantial overlap was observed.

Adopted values for the study area include:

1. *Natural character and geodiversity;*
2. *Biodiversity and ecosystem integrity;*
3. *Clean waters;*
4. *Accessibility and safety;*
5. *Amenity and recreation;*
6. *Socialisation and participation;*
7. *Heritage and cultural;*
8. *Education / scientific;*
9. *Tourism; and*
10. *Fishing.*

Adopted threats for the study area include:

1. *Beach erosion;*
2. *Shoreline recession;*
3. *Coastal inundation: wave run up and overtopping;*
4. *Coastal entrance instability;*
5. *Dune slope instability;*
6. *Coastal cliff instability;*
7. *Loss of amenity due to conflicts between user groups on the beach and foreshore;*
8. *Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities;*
9. *Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities;*
10. *Antisocial behaviour and unsafe practices (e.g. partying, fires on the beach);*
11. *Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking;*
12. *Adverse social or environmental impacts resulting from recreational boating and fishing;*
13. *Loss of plant and animal species (habitat disturbance or loss) due to coastal development;*
14. *Reduced water quality in ocean due to run off from coastal development (new and old);*
15. *Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts;*
16. *Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action;*
17. *Impacts resulting from an insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment; and*

18. *Insufficient or inappropriate governance and management of the coastal environment.*

To better understand the severity of known threats in the study area, at present and in the future a 'first-pass risk assessment' (FPRA) process was applied. For each threat the FPRA identified a current, future and overall risk rating that took into consideration current management arrangements and their adequacy to manage the threats. To provide directive going forward for later CMP stages, key knowledge gaps were identified along with recommended studies.

The Forward Plan identifies a future Governance Arrangement that will engage Council, relevant State Agencies and stakeholders in the implementation and coordination of coastal management activities associated with the CMP. Additionally, the Forward Plan provides costed actions, timelines and responsibilities (considering the Governance Arrangement) for completion of Stages 2 to 5 of the CMP.

The total cost of preparing the CMP is estimated to be between $405,000 and $750,000, with the next stage of the CMP expected to cost between $125,000 and $220,000. The range provides for uncertainty in the costs of certain activities as recommended in the forward program. Council as the lead agency has the ability to apply for a variety of grants to assist with the cost of implementation, however, this funding applies to the costs of external engagements for completing technical and planning studies, but generally does not apply to Council's internal costs in funding and conducting these studies.

Contents

List of Figures

List of Tables

1 Introduction

1.1 Section Overview

This section provides an introduction as to why a Coastal Management Program (CMP) is being prepared for a portion of the Byron Shire Council (BSC) coastline from Cape Byron to South Golden Beach (i.e. study area) and explains the new NSW Coastal Framework and how this Scoping Study fits into the new five stage process for preparing CMPs. An introduction to the study area and the vision and objectives for the CMP are also given.

1.2 Introduction to the Project

The project is primarily focused on the open beaches and coastal waters of the Byron Shire Local Government Area that extend north from Cape Byron. Further definition of the study area is provided in Section 1.4.

BSC has resolved to prepare Coastal Management Programs (CMP) for a portion of BSC's coastline that extends north from Cape Byron to the Shire's northern boundary near South Golden Beach. A CMP aims to provide a long term, coordinated strategy for managing the coastal zone in accordance with the *Coastal Management Act 2016* (CM Act) and local objectives. It shall be implemented through coordination between Council(s), state agencies and other key stakeholders.

In accordance with the NSW Coastal Management Framework, Stage 1 of preparing a CMP is to undertake a Scoping Study. The aims of a Scoping Study for an area of interest are to:

- Review management arrangements and supporting technical information;
- Develop a shared understanding of the strategic context of the CMP, identifying priorities;
- Establish the focus (purpose, vision, objectives and scope) of the CMP;
- Provide a forward plan for undertaking subsequent stages (Stages 2 to 5) of the CMP;
- Provide a business case to develop the CMP; and
- Provide a stakeholder and community consultation and engagement strategy for the preparation of the Coastal Management Plan.

This Cape Byron to South Golden Beach CMP Stage 1 Scoping Study documents the above elements. It has been prepared by BMT for BSC with funding and technical assistance provided by DPIE, in consultation with other relevant state and local stakeholders in accordance with the NSW Coastal Management Framework.

1.3 NSW Coastal Management Framework

The NSW Government recently completed a re-invigoration of the NSW Coastal Management Framework for managing the open coast, estuaries and the marine estate. The new framework came into force in April 2018 and comprises the following elements (Figure 1-1). The legislation is detailed further in Figure 1-1.

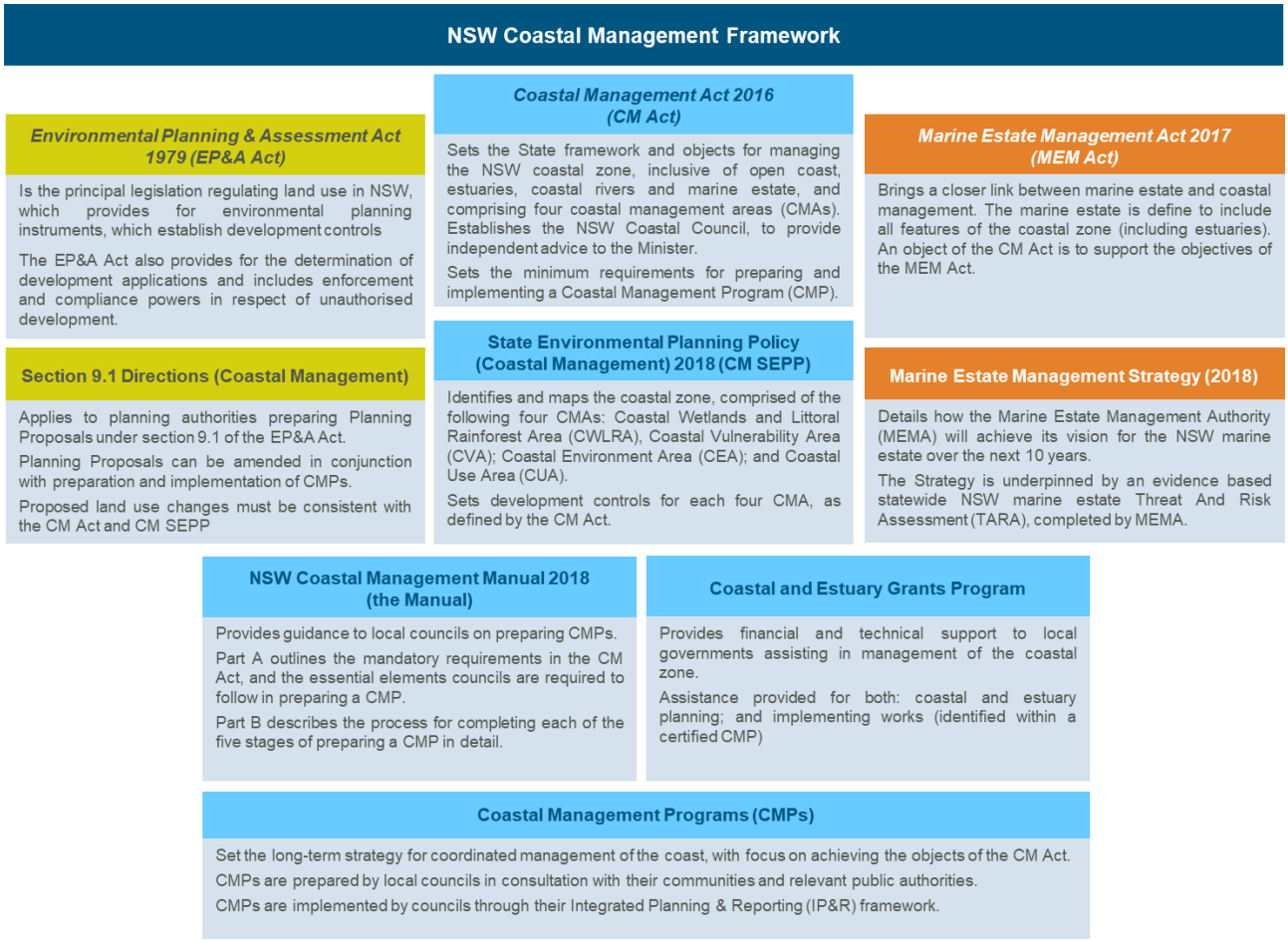

Figure 1-1 NSW Coastal Management Framework

In relation to the preparation of CMPs, the framework includes the following elements:

- the *Coastal Management Act 2016* (the CM Act) which replaced the *Coastal Protection Act 1979*, and provides minimum requirements for preparing CMPs (which replace CZMPs previously made under the *Coastal Protection Act 1979*) and a revised definition of the coastal zone as comprising four coastal management areas;
- the *State Environmental Planning Policy (Coastal Management) 2018* (CM SEPP) which amalgamated and replaced SEPP No. 71 Coastal Protection, SEPP No. 14 Coastal Wetlands, and SEPP 26 Littoral Rainforest, and provides development controls for each of the four coastal management areas with supporting mapping for these areas; and
- the NSW Coastal Management Manual (OEH, 2018), (the Manual) outlines the framework and the mandatory requirements for preparing CMPs in the relevant sections of Part A, and guidelines for the five stages of CMP preparation in Part B (noting Part B is not mandatory). The Manual is the certified guideline document relevant to the statutory provisions for exemptions from liability for Council under Section 733 of *the Local Government Act 1993*. Section 733 of the Local Government Act 1993 provides for exemptions from liability in respect of advice, actions or omissions by Council in good faith, in relation to the likelihood of land being affected by a coastline hazard. All s.733(5) does is provide a rebuttable presumption,

Council has acted in good faith for the purpose of the s733 statutory indemnity if actions substantially is accordance with the principle and mandatory requirements of the Manual.

1.3.1 What is a Coastal Management Program?

As stated in the CM Act (s12): "*The purpose of a coastal management program is to set the long-term strategy for the co-ordinated management of land within the coastal zone with a focus on achieving the objects of this Act*". That is, a CMP aims to provide a long-term, coordinated strategy for managing the coastal zone, considering the local context, priorities and objectives as well as the state objectives in accordance with the CM Act.

The mandatory requirements for preparing a CMP are set out in section 13 to 18 of the CM Act, and the relevant sections of Part A of the Manual. Part B of the Manual provides guidance for how to prepare a CMP.

The Manual outlines five stages of preparation of a CMP, as illustrated in Figure 1-2. It is a requirement that Councils conduct Stage 1 (Scoping Study), regardless of the existence of any preceding CMP, Coastal Zone Management Plan (CZMP) or other management plans, policies and practices. However, if the existing CZMP and supporting reports meets the requirements set by the CM Act and Manual, preparation of the CMP may be fast tracked from Stage 1 to Stage 4 or 5 (certification and implementation of the CMP).

A CMP shall be implemented through coordination between local government, state agencies and other key stakeholders. Councils are responsible for ensuring that their CMP(s) are reviewed at least once every 10 years. Nevertheless, any CMP may be amended (in whole or in part) or replaced by another CMP at any time.

This study relates to the Scoping Study (Stage 1) of preparing a CMP. It is the first step for Council along the new NSW Coastal Management Framework.

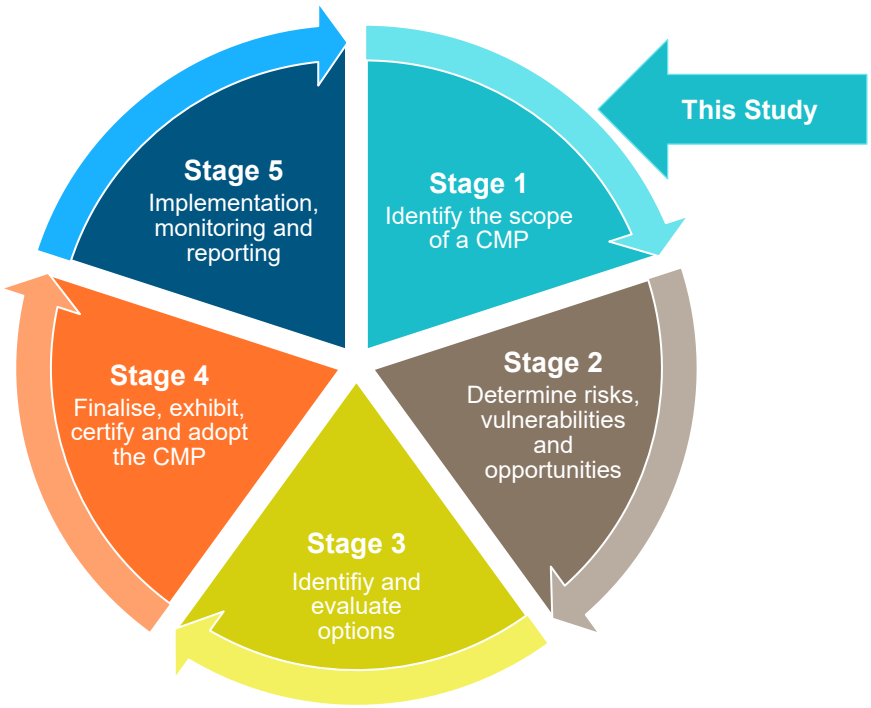

Figure 1-2 Stage Process for Developing a Coastal Management Program (adapted from the Coastal Management Manual; NSW Govt, 2018)

1.3.2 What is the Purpose of the CMP Stage 1 Scoping Study?

A Scoping Study (Stage 1) is instrumental in helping Councils to "get ready" and understand where their organisations are now, where they need to be, and how to make informed and confident decisions during development and implementation of the CMP. It is therefore about establishing a plan to complete the rest of the CMP stages (Stages 2 to 5).

The primary purpose of Stage 1 of a CMP is to determine the scope of the CMP and define a path for progressing further stages of the CMP. In this regard, the scope comprises: the strategic context for coastal management; the vision and objectives of the CMP; the areas to be covered (geographic extent and coastal management areas); the priority issues to be addressed, as well as knowledge and information gaps requiring attention; the communities and stakeholders to be involved; the governance, roles and responsibilities of stakeholders on the CMP; and a forward plan to complete the CMP, including the possibility of fast-tracking.

In cases where a Council has been implementing a CMP or CZMP, the Scoping Study should provide continuity to the planning cycle by evaluating and building on from previous plans or programmes (Figure 1-2). In cases where no previous coastal management plans are in place, then the Scoping Study should provide a platform for development of a CMP, in accordance with the CM Act.

1.3.2.1 Report Structure

The required components of a Scoping Study as specified in the Manual, and their location in this report are outlined in Figure 1-9 below.

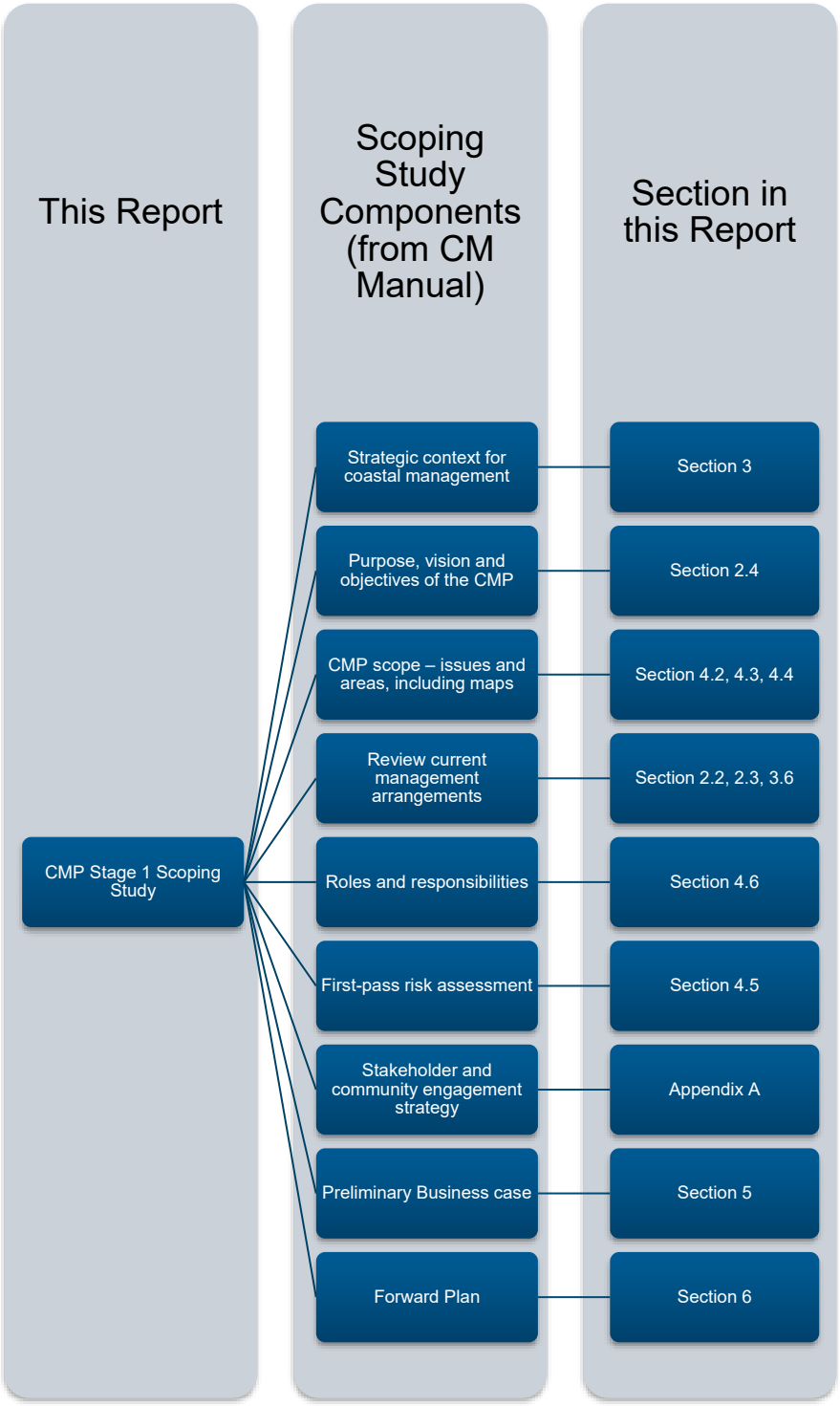

Figure 1-3 Components of CMP Scoping Study and Structure of this Report

1.4 Study Area

The study area for this CMP includes the open beaches, foreshore and coastal waters from Cape Byron to the Shire boundary north of South Golden Beach. The study area extends inland over the foreshore to the extent of the predicted maximum year 2100 coastal hazard as previously assessed by Council (BMT WBM, 2013). The study area includes coastal waters and extends to 3 nautical miles offshore.

It should be noted that the study area excludes the catchments of the Belongil and Brunswick River estuaries but includes the entrances insomuch as they influence the condition and future management of the open coast. The study area is shown in Figure 1-4.

This CMP covers a large portion of the Shire's coastline, a portion that experiences the most complex, challenging and highest risk management issues of the Shire. Focusing a CMP on this study area is estimated to be within the present day financial and resourcing capacity of Council, considering that Council has limited internal resources to develop, fund and resource projects of this nature, and that the most readily available funding only covers up to half of the cost of actual technical and planning study development (without any in-kind contribution to cover Councils internal costs).

Section 2 details the overarching strategy for coastal management throughout the Byron Shire Local Government Area, and how the proposed Cape Byron to South Golden Beach CMP format fits within this strategy.

1.4.1 SEPP Coastal Management Area Overlay

The study area includes all four management areas that make up the coastal zone as defined by the CM Act and mapped under the CM SEPP, including:

(1) Coastal Wetland and Littoral Rainforest Area (CWLRA);

(2) Coastal Vulnerability Area (CVA) (not presently mapped);

(3) Coastal Environment Area (CEA); and

(4) Coastal Use Area (CUA).

SEPP defined areas for coastal management areas 1, 3 and 4 are shown in a series of figures (refer Figure 1-6 to Figure 1-8) including a combined figure with all management areas overlaid (refer Figure 1-5). The overlay of imagery represents the identified precedence of coastal management areas. The precedence is CWLRA, CVA, CEA and finally the CUA. Note, there is no current mapping for CVA as there is currently no gazetted map. The suitability of existing information to develop a CVA for the study area is investigated in this report. Full definitions for each of the coastal management areas are provided in Appendix D.

- There are several instances of mapped CWLRA within the study area including mapped Littoral Rainforests at Wategos and Little Wategos Beaches, The Pass, Clarkes Beach, Belongil Beach and South Golden Beach. Additionally, there are several instances of mapped wetland areas at Clarkes Beach, Belongil Beach, Tyagarah Beach, New Brighton Beach and South Golden Beach;

- The vast majority of the study area is within the CEA, i.e. coastal waters (including estuaries), beaches and foreshores. A very small portion of the study area at The Pass Byron Bay (less than 0.01% of total study area) is outside the CEA;
- Effectively the entire beach and foreshore area is within the CUA, apart from waterway and ocean areas which are part of the CEA.

Many of the wetland and littoral rainforest areas are associated with declared natural areas including the Cape Byron State Conservation Area, Tyagarah Nature Reserve, Brunswick Heads Nature Reserve, Marshalls Creek Nature Reserve and Billinudgel Nature Reserve. These protected natural areas contain the majority of the foreshore of the study area with most of the foreshores being extensively vegetated. Much of the remaining foreshore has urbanisation within a relatively close distance of the beach, either behind the dune or in places behind previously constructed coastal protection works.

In terms of the CUA, the study area provides for a diverse range of recreational and commercial use on the foreshores, beaches and in the coastal waters. The study area is used by locals and experiences high volumes of tourist related usage throughout the year and particularly at peak periods such as holidays due to the extensive visitation by domestic and overseas tourists.

Common uses include swimming, surfing, boating/sailing, diving, parasailing, sun bathing, beach walking/running, foreshore walking/running, birdwatching, fishing, surf kayaking, bait harvesting, cultural and spiritual uses amongst other uses.

1.4.2 Coastal Sediment Compartment

The CM Act requires councils and public authorities to consider the study area for a CMP in the context of the broader regional coastal processes, which occur within the primary sediment compartment.

The Byron Shire coastline is part of the primary sediment compartment that extends from the Clarence River to Point Danger. Within this primary compartment are four secondary compartments, with the Byron-Tweed sediment compartment from Cape Byron to Point Danger forming the northernmost secondary compartment. The study area is part of the Byron-Tweed sediment compartment (Shoreline Explorer on Coast Adapt, 2018), see Figure 1-9.

Within a primary sediment compartment, individual beaches are part of an interconnected coastal sediment transport system. That is, the coastal processes affecting a beach are inter-connected spatially and temporally with the beaches and shorelines in the same sediment compartment. The secondary compartment boundary at Cape Byron is “leaky” with sediment transport occurring past Cape Byron and into the Byron Bay embayment.

This means that management of the study area should consider the impact of activities that may affect natural sand transport as changes in management could result in surplus/deficit of sand in the northern portion of the coastal compartment, which is located north of the study area. Examples may include changes to coastal protection works (creation or removal) or coastal management practices such as beach nourishment, or even changes to estuary entrance management.

SOUTH GOLDEN BEACH

South Golden Beach

NEW BRIGHTON

New Brighton Beach

Marshalls Creek

Brunswick River

BRUNSWICK HEADS

Simpsons Creek

THE HEATH

TYAGARAH

Tyagarah Beach

Pacific Highway

EWINGSDALE

Ewingsdale Road

Belongil Beach

Belongil Creek

BYRON BAY

SEE INSET

INSET

Little Wategos Beach

Wategos Beach

Cape Byron

The Pass

Main Beach

Clarkes Beach

BYRON BAY

0 0.5 1km

Approx. Scale

LEGEND

Study Area

2100 Hazard Line

Title:

Cape Byron to South Golden Beach Study Area

Figure: 1-4

Rev: A

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

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Approx. Scale

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SOUTH GOLDEN BEACH
South Golden Beach
New Brighton Beach
NEW BRIGHTON
Marshalls Creek
Brunswick River
BRUNSWICK HEADS
Simpsons Creek
THE HEATH
TYAGARAH
Tyagarah Beach
Pacific Highway
EWINGSDALE
Ewingsdale Road
Belongil Creek
Belongil Beach
BYRON BAY
SEE INSET

INSET

Little Wategos Beach
Wategos Beach
Cape Byron
The Pass
Main Beach
Clarkes Beach
BYRON BAY
0 0.5 1km
Approx. Scale

LEGEND

- Study Area
- 2100 Hazard Line

Coastal Management Areas

- Coastal Wetlands
- Proximity Area for Coastal Wetlands
- Littoral Rainforests
- Proximity Area for Littoral Rainforests
- Coastal Environment Area
- Coastal Use Area

Title:

Cape Byron to South Golden Beach Coastal Management Areas

Figure: 1-5

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SOUTH GOLDEN BEACH
South Golden Beach
NEW BRIGHTON
New Brighton Beach
Marshalls Creek
Brunswick River
BRUNSWICK HEADS
Simpsons Creek
THE HEATH
TYAGARAH
Tyagarah Beach
Pacific Highway
EWINGSDALE
Ewingsdale Road
Belongil Creek
Belongil Beach
BYRON BAY
SEE INSET

INSET

Little Wategos Beach
Wategos Beach
Cape Byron
The Pass
Main Beach
Clarkes Beach
BYRON BAY
0 0.5 1km
Approx. Scale

LEGEND

- Study Area
- 2100 Hazard Line
- Coastal Wetland
- Coastal Wetland Proximity Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area

Title:

Coastal Wetland and Littoral Rainforest - Coastal Management Areas

Figure: 1-6

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SOUTH GOLDEN BEACH

South Golden Beach

NEW BRIGHTON

New Brighton Beach

Marshalls Creek

Brunswick River

BRUNSWICK HEADS

Simpsons Creek

THE HEATH

TYAGARAH

Tyagarah Beach

Pacific Highway

EWINGSDALE

Ewingsdale Road

Belongil Creek

Belongil Beach

BYRON BAY

SEE INSET

Little Wategos Beach

Wategos Beach

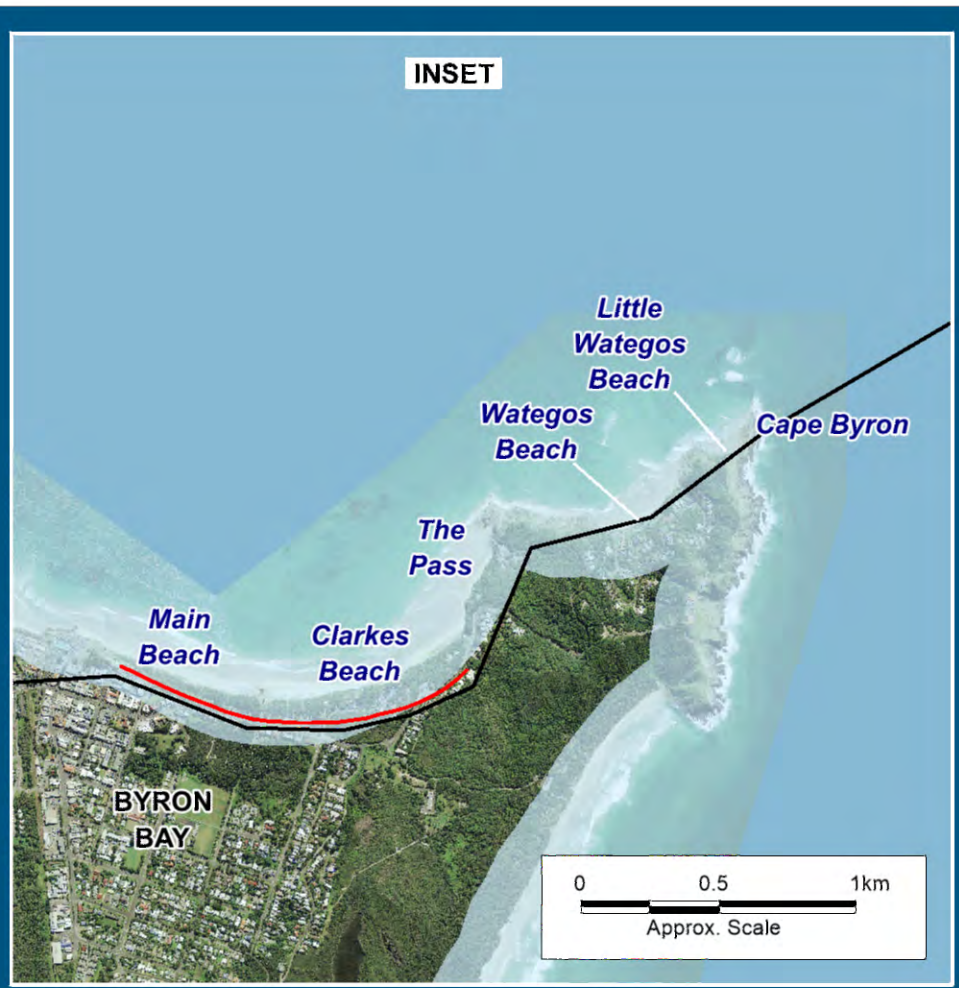
Cape Byron

Clarkes Beach

The Pass

Main Beach

INSET



LEGEND

Study Area

2100 Hazard Line

Coastal Envrionment

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Approx. Scale

Title:

Coastal Environment - Coastal Management Areas

Figure: 1-7

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SOUTH GOLDEN BEACH

South Golden Beach

New Brighton Beach

NEW BRIGHTON

Marshalls Creek

Brunswick River

BRUNSWICK HEADS

Simpsons Creek

THE HEATH

TYAGARAH

Tyagarah Beach

Pacific Highway

EWINGSDALE

Ewingsdale Road

Belongil Beach

Belongil Creek

BYRON BAY

SEE INSET

INSET

Little Wategos Beach

Wategos Beach

Cape Byron

The Pass

Main Beach

Clarkes Beach

BYRON BAY

0 0.5 1km

Approx. Scale

LEGEND

Study Area

2100 Hazard Line

Coastal Use

Title:

Coastal Use - Coastal Management Areas

Figure: 1-8

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Title:

Byron Tweed Sediment Compartment (CoastAdapt, 2018)

Figure: 1-9

Rev: A

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2 Overarching Strategy for Byron's Coastal Management

2.1 Section Overview

This section details the overarching strategy for coastal management throughout the Byron Shire, and how the proposed Cape Byron to South Golden Beach CMP format fits within this strategy. The purpose, vision and objectives for coastal management of Cape Byron to South Golden Beach are then outlined.

2.2 Coastal Management in Byron Shire

The coastal zone of the Byron Shire Local Government Area comprises the open coastline extending from Broken Head to South Golden Beach and includes the major estuaries of Tallow Creek, Belongil Creek and the Brunswick River. A portion of the Richmond River catchment extends across the southern Shire border.

For the purposes of adequately encompassing and addressing coastal management issues for the Byron Shire, the following format for CMP coverage is proposed and illustrated in Figure 2-1. As Council has limited resources (refer Section 2.3), the delivery of CMPs for the entire length of the coastline at one time is not feasible. Hence, the format proposed below has been prioritised based on highest hazard risks.

- Prepare a **CMP for Cape Byron to South Golden Beach coastline and waters (i.e. this study).** This CMP covers a large extent of the Shire's coastline. This portion of coastline experiences higher hazard risks and complexity of management issues (relative to the remainder of the Shire) and therefore a CMP for this area has been prioritised for immediate commencement.

  Previous reports show that there is immediate coastal erosion hazard risk to development and infrastructure at Clarkes and Main Beach, Belongil Beach and New Brighton Beach. There is also projected underlying long-term recession risk and sea level rise induced recession risks at Clarkes, Main, Belongil, New Brighton, and South Golden Beaches. As such, development of a CMP for this area of the coastline is a priority. There have been difficulties to-date in finalising a certified plan for this area of the coast where coastal hazard risks are high (close proximity of development and infrastructure to back beach escarpment).

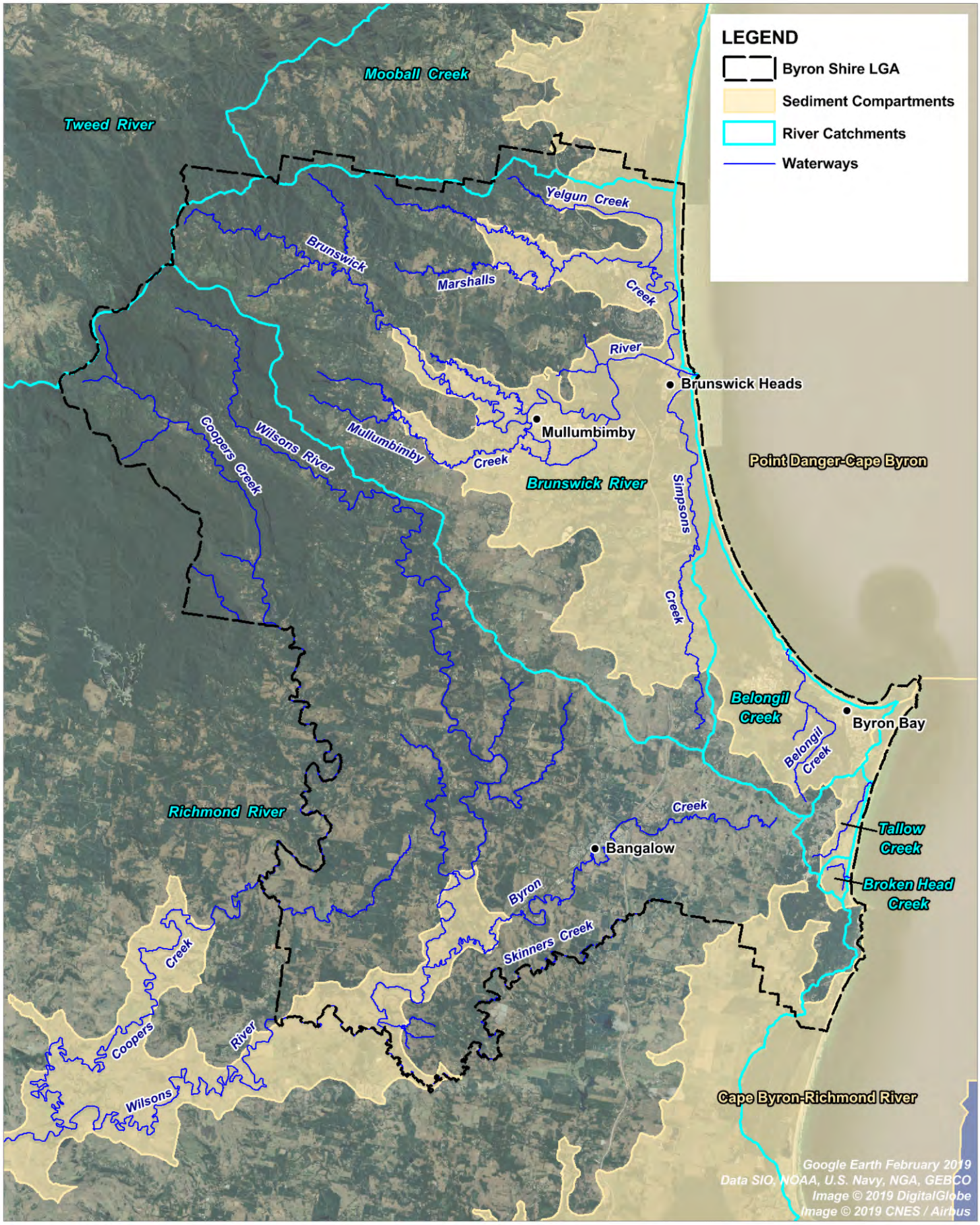
  The study area for this CMP excludes the catchments of the Belongil and Brunswick River estuaries (see further CMPs defined below) but includes the entrances insomuch as they influence the condition and future management of the open coast. The CMPs for the estuaries will encompass consideration of water quality and sediment quantity and quality, which in turn supports these values on the open coast. Completion of a CMP for this portion of the Byron Shire is within the present day financial and resourcing capacity of Council.

  It is noted that due to the complex and challenging management issues in this part of the coastline it may be feasible to divide this spatial extent and develop a CMP for the Byron Bay Embayment, i.e. Cape Byron to Tyagarah, and a separate one for Tyagarah to South Golden Beach. This approach would likely be decided at Stage 3 of the CMP process, however at the

Scoping Study stage the intent is to continue pursuing a CMP for Cape Byron to South Golden Beach collectively.

- Prepare a **CMP for Broken Head to Cape Byron encompassing Tallow Creek**. Council has previously developed a Floodplain Risk Management Study and Plan (SKM, 2009) which was updated in 2015, and an Entrance Opening Strategy, REF and Environmental Management Plan (BMT WBM, 2015) for Tallow Creek. The coastline is subject to risks arising from coastal hazards (refer BMT WBM, 2013) however these risks are expected to eventuate later, by around 2050, compared with the remainder of the Shire's coastline. Much of the catchment is already developed with a variety of coastal and estuarine issues present.
- Prepare a **CMP for Belongil Creek**. Belongil Creek has an existing Estuary Management Plan; however, this document is somewhat dated (Parker, 2001). Additionally, there are a number of activities (such as development) occurring within the catchment which have the potential to cumulatively impact on aspects of the estuary's values, function and existing management approaches (such as the opening regime for the creek). A Floodplain Risk Management Study and Plan (BMT WBM, 2015) has already been completed for the estuary and Council has recently finalised a long-term Entrance Opening Strategy. The potential impacts of water quality and sediment quality and quantity within Belongil Creek also affects the open coastal waters into which it flows. Catchment and waterway management to improve water and sediment quality and quantity is therefore of primary consideration for the CMP for the Belongil Creek and catchment. A CMP for the estuary is therefore of high priority to Council in the near future, to update the management objectives and actions to encompass present day risks and competing pressures on the estuary.

  Council will commence the development of a Stage 1 Scoping Study for Cape Byron to the southern LGA boundary in the next financial year (July 2020). The scoping study will include coastal areas from Seven Mile Beach (LGA boundary) to Cape Byron including Tallow Creek and Ti Tree lakes (Taylor's Lake) as well as the Belongil Creek catchment.
- Prepare a **CMP for Brunswick River Estuary**. Council has recently completed a CZMP for the Brunswick River estuary (BSC, 2018). While the CZMP was not formally gazetted, it does identify the key management aims, issues and actions for this estuary (in accordance with the previous framework). Currently a Floodplain Risk Management Study and Plan are being developed for the catchment. The Cape Byron to South Golden Beach CMP shall consider entrance management issues insofar as they influence the open coastline. Therefore, there is considered to be sufficient information to manage the estuary adequately over the short term until such time as Council has the financial and resourcing capacity to convert the CZMP into a CMP, expected to occur after progressing the above CMPs.
- Support preparation of the Richmond River Coastal Management Program as required. Currently Ballina Shire Council are preparing a Scoping Study for North Creek which extends into the southern portions of the Byron Shire.



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Byron Shire's Strategy for Coastal Management

Figure: 2-1

Rev: A

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

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2.3 Limitations on Coastal Management in the Byron Shire

Given the expansive nature of Byron Shire's coastal assets in the form of beaches, dunes, headlands, cliffs, estuaries and wetlands, it is important to also recognise the resource and financial limitations of this rural coastal council. Byron Shire's population, and therefore its rate payer base to fund management of all its environmental assets including the coast, is restricted.

Generally Council resources coastal studies by application to DPIE under the Coastal and Estuary Grants Program where Council receives 50% funding from the NSW Government. This process is competitive and not all applications receive funding support. This funding only covers half the costs of the development of CMPs and supporting technical studies and cost benefit analyses as may be required. This funding does not cover Council's internal costs in developing and running such programs and studies and it does not include in-kind contributions. As such this funding does not overcome limitations of Council to administer and facilitate implementation of CMPs and related technical studies. Currently Byron Shire Council has only one full time coast and estuary officer to manage the entirety of Byron's coastlines and estuaries.

While the lower population has helped to preserve the natural beauty and environmental richness of this region, the funding for coastal management must be balanced against the many other competing demands on Council as a service provider to its community.

Given the limited resources and competing priorities for available funds, Council may have to investigate 'innovative' ways to fund and resource coastal management studies and actions into the future. Previous consideration of potential funding sources has been made (WRL, 2016) which will be revisited during later stages of the CMP process. Council's Voluntary Visitor Fund (VVF) is being implemented to collect contributions from visitors and businesses to fund a variety of projects related to the maintenance and upgrade of facilities and protection of our natural environment. The VVF is in its infancy and the quantum of funds and where funds will be allocated are yet to be determined. Other grant schemes do exist, such as Environment Trust funding which does offer in-kind contributions.

The CMP forward program, priorities for Stages 2 to 4, and funding and financing have been designed with these financial and resource limitations in mind. Only those studies seen as necessary in Stage 2 have been recommended and Stages 3 and 4 are recommended to utilise existing information. The further studies devised during this Scoping Study are recommended for further investigation as potential actions that may be implemented through the CMP's program of works. The business case and forward program for preparation of the CMP are detailed in the final sections of this report.

2.4 CMP Purpose, Vision and Objectives

2.4.1 Purpose

The purpose of preparing this CMP is to provide the long term coordinated strategy for managing the coastal zone of the coastline between Cape Byron and South Golden Beach. A coordinated whole of government and community approach is needed, to bring Council, DPIE, other state agencies, stakeholders and local communities together to achieve the strategy, and management objectives.

As outlined in the NSW Coastal Management Manual the general purpose of a CMP Scoping Study is to:

- Describe the strategic context of coastal management: purpose, vision and objectives of the CMP;
- Determine the key management issues and threats to the coast;
- Review the current coastal management practices and arrangements and whether they have been effective;
- Identify knowledge gaps that need filling;
- Identify roles and responsibilities; and
- Identify the scope of the CMP.

As such, this Cape Byron and South Golden Beach CMP Stage 1 Scoping Study identifies the scope of the CMP and details the forward works program and costs to complete the CMP from Stage 2 to Stage 5.

This report has been prepared on behalf of Council and has been prepared in accordance with the CM Act, the Coastal Management Manual (the Manual) (OEH, 2018), consistent with the NSW Coastal Management Framework.

2.4.2 Vision Statement

As stated in the Manual (p7, the Manual Part B: Stage 1, OEH, 2018),

> *"A local vision statement that is consistent with the state's vision while reflecting the local context, will help communities to identify with the future of their coast, encourage a sense of community ownership of the actions in the CMP and foster commitment to its preparation and implementation"*.

The following vision statement was developed based upon the vision given in the CM Act plus feedback from Council, DPIE and other attendees at the First Pass Risk Assessment Workshop and also feedback obtained from Council staff at a biannual Council Staff Forum.

Vision for the CMP

Byron's coastline is resilient and protected and retains its iconic natural values now and into the future. Adequately resource and fund management of the iconic and internationally recognised Byron coastline to conserve and promote its inherent natural values.

These inherent values underpin the coasts enviable cultural, amenity, recreational use, local and tourism values and they will be kept central in the development of future management approaches.

Future management approaches will address existing and emerging threats such as climate change through planning for a resilient coastline that is prepared to address multiple challenges in a flexible and adaptive manner; including consideration of novel funding approaches.

2.4.3 CMP Objectives

Attendees at the First Pass Risk Assessment Workshop agreed that for this Scoping Study Stage 1 of CMP development, the objectives for the Cape Byron to South Golden Beach CMP shall reflect those of the CM Act, being:

- (a) to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience, and
- (b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and
- (c) to acknowledge Aboriginal peoples' (Bundjalung of Byron Bay – Arakwal Bumberlin people) spiritual, social, customary and economic use of the coastal zone, and
- (d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and
- (e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and
- (f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and
- (g) to recognise that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline, may result in the loss of coastal land to the sea (including estuaries and other arms of the sea), and to manage coastal use and development accordingly, and

- (h) to promote integrated and co-ordinated coastal planning, management and reporting, and
- (i) to encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events, and
- (j) to ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities, and
- (k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and
- (l) to facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone, and
- (m) to support the objects of the Marine Estate Management Act 2014.

In addition, the Cape Byron to South Golden Beach CMP shall give effect to the management objectives provided in the CM Act for the following four coastal management areas described in Section 1.4.

It should be recognised that the above objectives will likely undergo refinement as the CMP progresses through the later stages of development (i.e. Stages 2-5) in consultation with stakeholders and the community so that they are consistent state wide reflecting local issues and conditions.

2.4.4 Planning Timeframe

As per the requirements of the Coastal Management Manual (OEH, 2018), Councils should consider planning timeframes and pathways from now, to 20, 50, 100 years and beyond, where appropriate. In relation to this Council has been completing relevant technical and planning studies over an extended period that precedes the *Coastal Management Act* 2016, and Coastal Management Manual. Many of these earlier key technical works have adopted timeframes of 2050 and 2100 as their assessment timeframe as these timeframes align with other key existing policy statements such as Council's Climate Change Strategic Planning Policy.

This CMP will adopt the recommended planning timeframes in accordance with Mandatory Requirement 2 in the Coastal Management Manual and the dates reflecting the 20, 50 and 100 year timeframes insomuch as they are required to address coastal management concerns and influence future coastal planning intent. This is particularly relevant given the large extent of quality work that has previously been completed in the study area that have used the timeframes of 2050 and 2100. Future CMP related studies will consider timeframes for their relative value to study outcomes.

3 Strategic Context for the CMP

3.1 Section Overview

This section sets the strategic context for coastal management in the Cape Byron to South Golden Beach coastline study area. This is achieved through a high-level interpretation of existing published materials and experiences gained by the study team through community and stakeholder engagement activities.

3.2 Data and Information Review

There is a great deal of information from a wide range of sources relating to the physical processes and management of the Byron Shire coastline. A critical review of this information was conducted to determine content of the reports that is directly or indirectly relevant to:

- Understanding the physical, environmental, social and economic features and processes occurring within the study area;
- Identifying key values (or benefits), and known issues or threatening processes that may be reducing or undermining these values; and
- Determining existing management actions or strategies for managing the threats, and if possible, the effectiveness of these actions.

The data and information reviewed included:

- Technical studies and academic literature;
- Planning documents (e.g. strategic, operational and natural resource, coastal zone management plans); and
- Spatial mapping and data.

A full listing of documents and review of their adequacy or relevance to preparing the CMP is provided in Appendix B.

Outcomes of the data and information review were used to develop information contained in this Section and the first pass risk assessment (Section 4.5), in particular, to help identify coastline values and threats, and to help determine the adequacy of existing management, and of existing information to manage known threats at present and in the future. The outcomes of this critical assessment lead to the design of further studies to be completed in Stages 2 to 4 of preparing the CMP.

The section overviews strategic directions established for the coast in regional or local planning documents; legislation and policies relevant to the study area, governance matters related to the coastal zone, environmental / social / cultural and economic characteristics of the study area and future pressures affecting the coastal zone.

Additionally, this contextual information supports the vision, objectives and need for developing a CMP outlined earlier in Section 2.

3.3 Strategic Direction for the Coast

The strategic direction for the study area is formulated acknowledging existing visions, strategies and directives outlined in existing documentation by state, regional and local strategic planning documents.

3.3.1 Related Visions

The following visions from existing relevant documentation are outlined below:

- **Coastal Management Framework 2018 (OEH) -** "*aims to have thriving and resilient coastal communities living and working on a healthy coast, now and into the future*";
- ***Coastal Management Act* 2016 -** "*manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State*";
- **Marine Estate Management Strategy 2018 – 2028** – "A healthy coast and sea managed for the greatest wellbeing of the community, now and into the future";
- **North Coast Regional Plan 2036 (2017) –** "*The best region in Australia to live, work and play thanks to its spectacular environment and vibrant communities*.";
- **Far North Coast Regional Strategy (2006) -** "*A healthy, prosperous and sustainable future for the diverse communities of the Far North Coast Region", "Identify and protect important environmental assets, landscape and cultural values and natural resources", "Limit development in places constrained by coastal processes, flooding, wetlands, important farmland, and landscapes of high scenic, cultural and conservation value*.";
- **Local Land Services Strategy 2016 - 2021 –** "Resilient communities in productive healthy landscapes."
- **Our Byron Our Future Our Community Strategic Plan 2028 -** "Our community is empowered to be creative, innovative and listened to as we shape the future way of living that we want", "While we strongly protect our Shire; its natural environment, lifestyle, diversity and community spirit, we welcome visitors and the contribution they make to our culture", "Our future is sustainable, we have the services and infrastructure we need to thrive, and we encourage and support local business and industry", "We foster the arts and cultural activities, respect and acknowledge our first peoples and celebrate and embrace diverse thinking and being."

Overall these visions identify a variety of key descriptors and directives relevant to the study area including:

- **Environment** – managed, spectacular, healthy, productive, protected and provided with appropriately located and sustainable development;
- **Social** – vibrant, diverse, resilient, creative, innovate, welcoming, consulted, supported, respectful communities where lifestyle / culture / spirit protected; and
- **Economy** – prosperous with local business and industry supported.

3.3.2 State Level Plans and Strategies

The key State level plan for the Byron coastline is the new coastal management framework, as explained in Section 1.3. Additional key legislation that covers and supports management of this coastal environment are listed in Table 3-2, and detailed in Appendix D.

The NSW Marine Estate Management Strategy provides the framework for the NSW Government to coordinate the management of the marine estate over the next decade in accordance with the objectives of the *Marine Estate Management Act* 2014. It has been developed through consideration of threats and risks to the Marine Estate whereby it seeks to manage threats to the marine environment including social, cultural and economic threats to human use of the marine estate. All identified threats and risks (outlined in statewide Threat and Risk Assessment TARA) have been considered during the preparation of this CMP as outlined further in Section 4.

The NSW Marine Estate Management Strategy (2018-2028) identifies a linkage to the NSW Coastal Reforms whereby the *Coastal Management Act* 2016 supports the objectives of the *Marine Estate Management Act* 2014. Specifically, coastal management programs will provide for local and regional application of management actions in management initiatives of the Marine Estate Management Strategy. Specific management initiatives identified include:

- Improving water quality and reducing litter;
- Delivery healthy coastal habitats with sustainable use and development;
- Planning for climate change; and
- Delivering effective governance.

Other management initiatives of the Strategy are also likely to be relevant.

Of relevance to the study area is the extensive presence of the Cape Byron Marine Park (CBMP), which is described further below under Local Level Plans (Section 3.3.4).

3.3.3 Regional Level Plans

North Coast Regional Plan 2036

The North Coast Regional Plan 2036 sets an overarching vision and strategy for the Northern NSW coast. The plan sets out four regionally specific goals focusing on the environment, economy, community and lifestyle. In addition to forecasting population and demographic mix at 2036, it also provides a variety of regional priorities relating to housing, economy and employment as listed below:

- Regional priorities -
    - Identify additional urban and employment investigation areas to secure future housing and employment land supply.
    - Support a strong and diversified economy based on Byron Shire's unique character, landscapes and important farmland.
    - Manage and support growth in Byron Bay.

- Encourage new opportunities for agribusiness, particularly in relation to organic and boutique food production.
- Foster stronger connections and alignment with Tweed, Ballina, Lismore and South East Queensland.

- Economy and employment -
  - Maximise opportunities associated with the growth of South East Queensland.
  - Investigate opportunities for additional employment land at West Byron Bay.
  - Protect important farmland at Eureka, Federal, Bangalow, Goonengerry, Coorabell, Tyagarah, Mullumbimby, Nashua and Billinudgel to support the agribusiness sector.
- Housing -
  - Deliver housing at West Byron.
  - Investigate opportunities for increased housing diversity in the form of additional multi-unit dwellings in appropriate locations.

Generally, the existing population centres of the Byron Shire will be retained, and no new urban growth investigation areas have been identified along the coastline itself. Growth is proposed for Byron Bay in the Belongil catchment, through the Byron Industrial Estate (employment land) and West Byron (housing) although these developments are subject to development approval. Most other coastal lands are incorporated within Nature Reserves and not subject to future coastal development. Generally, it is expected that growth needs in existing population centres of relevance to the study (i.e. Ocean Shores, New Brighton, Brunswick Heads and Byron Bay) will be met through intensification of existing development.

Local Strategic Plan 2016 – 2021

The Local Strategic Plan 2016 – 2021 was devised by the North Coast Local Land Services (North Coast LLS) to deliver the State Strategic Plan in the North Coast Region. The strategic approach focuses on community engagement, setting and delivering local priorities and how the North Coast LLS priorities are best achieved at a local level. The State Strategic Plan has 9 key strategies which in combination address its four main goals. The goals include:

(1) Resilient, self-reliant and prepared local community;

(2) Biosecure, profitable, productive and sustainable primary industries;

(3) Healthy, diverse and connected natural environments;

(4) Board members and staff who are collaborative, innovative and commercially-focused.

Of relevance to this CMP, Goal 3 of the plan outlines regional and area specific priorities and details a range of expected outcomes with a focus on healthy, diverse and connected natural environments including coastal, coastal fringe and marine habitats. The regional priorities for Goal 3 in these areas include requirements for land managers to be actively protecting, maintaining and improving land and habitat in these areas.

3.3.4 Local Level Plans

Byron Shire Council

The Byron Local Environmental Plan 2014 (BLEP) details aims for the use and development of land within the Byron Local Government Area (LGA). The BLEP was prepared in accordance with the Standard Instrument (Local Environmental Plans) Order 2006 and Standard Instrument – Principal Local Environmental Plan in accordance with Section 3.20 of the *Environmental Planning and Assessment Act 1979.* The Byron Development Control Plan 2014 (BDCP) provides detailed planning and design guidelines to support the planning controls in the BLEP.

The Standard Instrument (SI), on which the current Byron LEP 2014 is statutorily based does not currently have any dedicated coastal land use zones in the SI LEP. The LEP 2014 abandoned the use of the previous format (refer Section 3.6.2.3 for more information) and consequently urban coastal lands are a deferred matter in Byron LEP 2014 and the provisions of the previous Byron LEP 1988 are currently in force.

Under the CM Act, councils are required to establish links and alignment between management strategies in their CMPs and objectives and strategies in their Community Strategic Plan[1]. This will result in the integration of coastal management actions (that involve Council) being integrated into Council's Delivery Plan (4 yearly) and Operational Plan (yearly) to align with its overall Integrated Planning and Reporting (IPR) Frameworks. It is envisioned that this will mainstream coastal management into Council's overall service delivery and asset management responsibilities.

The State Government's IPR Framework is set out in the *Local Government Act 1993*. The cornerstone of the IPR Framework is the Community Strategic Plan (CSP), which for the Byron region is the Our Byron Our Future Our Community Strategic Plan 2028. The CSP identifies the community's main priorities and aspirations for the future. In this context of this CMP relevant and related strategies include (overarching objectives identified):

- Provide essential services and reliable infrastructure which meet an acceptable community standard (Community Objective 1);
- Provide accessible, local community spaces and facilities (Community Objective 2);
- Enhance community safety and amenity while respecting our shared values (Community Objective 2);
- Partner to protect and enhance our biodiversity, ecosystems and ecology (Community Objective 3);
- Partner to protect and enhance the health and the Shire coastlines, estuaries, waterways and catchments (Community Objective 3);
- Engage and involve community in decision making (Community Objective 5); and
- Manage Council's assets and allocate resources in a fair and holistic manner (Community Objective 5).

[1] NB Implementation of the CMP is to be prescribed within and reported on within Council's IPR framework

The CSP is supported by:

- Delivery Programs (4 yearly) which outlines to the community how Council intends to achieve the community priorities and goals; and the
- Operational Plan (annual), which outlines the details of the Delivery Program on an annual basis.

Byron Shire Council has prepared a (draft) local strategic planning statement (LSPS) presents "*a 2036 vision and framework for land use within Byron Shire, outlining how growth and change will be managed to maintain the high levels of environmental amenity, liveability and landscape quality that characterises the Shire*" (draft LSPS, in prep). The LSPS sets ongoing, immediate, short, medium and long-term action timeframes in which to deliver strategic land use planning priorities. It sets out the 20-year vision for land-use in the local area, the special character and values that are to be preserved and how change will be managed into the future. The LSPS effectively acts as a link between strategic priorities identified at a regional level and local planning expressed in Council's CSP, BDCP and BLEP.

Additional relevant plans of management developed and administered by Council relevant to the study area include:

- Destination Management Plan 2014 to 2020 – This plan updates the existing Tourism Management Plan 2008 to 2018 (BSC, 2009) and identifies the status of tourism in the Shire along with several strategic destination directions which are supported by a detailed action plan. Many of the actions are relevant to the physical use of the study area for tourism related purposes, but also relate to ongoing leadership, governance, communication, funding, education, stewardship, economy and cultural relations as they are related in tourism in general. The scope of the plan identifies the central role of tourism and the tourism economy in modern day Byron Bay and surrounds and the importance of understanding and directing tourism drivers, trends to achieve desired benefits and avoid potential impacts.
- Generic Plans of Management for Public Land. Council has prepared generic and / or specific plans of management for public land within the study area. Management of public land owned or controlled by Council (land owned by the Crown but controlled by Council) is governed by the *Local Government Act 1993* (LG Act). All public land must be classified by Council as either 'community' or 'operational' and Plans of Management prepared.

Byron Bay Town Masterplan

Completed in 2016, the Town Centre Master Plan has been developed to provide master planning and place making guidance for the town centre of Byron Bay. It was developed considering six Place Vitality Criteria including Access and Movement, Public Domain, Natural Environment, Culture, Economic Development and Built Form & Aesthetics.

The Master Plan is divided into twelve precincts two of which are of direct relevance to the CMP (i.e. precincts of Main Beach and Clarkes Beach).

The values of Main Beach to the community are identified and the Master Plan provides a series of short and long term of priorities which primarily relate to upgrading and redesigning existing parks and infrastructure to make is more visually appealing. The outcomes of the Master Plan

will necessarily respond to the outcomes of the CMP process and/or coastal protection works identified for this precinct. The ability for pedestrians to walk along the foreshore is clearly identified.

For the Clarkes Beach precinct the Master Plan identifies the need for continued dune rehabilitation and preservation of existing vegetation. The need for the maintenance of access tracks through to Clarkes Beach is also noted.

Cape Byron Marine Park Operational Plan

Of relevance to the study area is the extensive presence of the Cape Byron Marine Park (CBMP). Approximately, 16 km of the study area coastline is within the CBMP. The overall CBMP extends 37 km along the coastline from Lennox Head in the south to the Brunswick River northern training wall in the north. The CBMP extends 3 nautical miles offshore and includes Julian Rocks. As such the CMP study area extent into the ocean is the same as the CBMP. Of the total CBMP Estate which is 220 km^2 approximately 94 km^2 exists within the CMP study.

The CBMP is managed by the Department of Primary Industries in accordance with an operational plan (CBMP Operational Plan, 2010) and the provisions of legislated management rules: Marine Estate Management (Management Rules) Regulation 1999 — Part 5 Cape Byron Marine Park Management Rules. The CBMP Zoning Map identifies the current allowed usage types and locations.

Plans of Management (National Parks and Wildlife Service)

The NSW National Parks and Wildlife Service (NPWS) manages a lot of coastal land within the study area including the Cape Byron State Conservation Area, Arakwal National Park, Cumbebin Swamp Nature Reserve, Tyagarah Nature Reserve, Brunswick Head Nature Reserve, Julian Rocks Nature Reserve, Marshalls Creek Nature Reserve and Billinudgel Nature Reserve. These are managed under various Plans of Management developed by the NPWS. These plans identify their extent, values and sensitivities and provide extensive management information for the environment and community use of the areas. A summary of the features of these National Park reserves is outlined in Appendix H.

Plans of Management (Crown Land)

Crown Land is owned by the State and is managed by the Department of Planning, Industry and Environment (DPIE–Crown Lands) under the *Crown Land Management Act 2016,* commenced in July 2018. Most Crown Land is generally managed in accordance with a Plan of Management.

The newly enacted *Crown Land Management Act 2016* significantly reforms the use and management of Crown Land in NSW. The former structure of reserves, reserve trusts and reserve trust managers has been replaced with a single manager responsible for each reserve. Most of the beach areas of the study area not within National Park or Nature Reserve is Crown reserve (with the exception of a small road reserve ‘the Esplanade’ at Belongil Beach). These Crown reserves are owned by the State but generally are managed by either DPIE-Crown Lands, Council or NSW Crown Holiday Parks Manager t/a Reflections.

The Crown reserves that lie within the study area are outlined in Table 3-1 along with details of the relevant land manager.

Table 3-1 Crown Reserves of the Study Area

Crown Reserve # (north to south of Study Area)	Land manager	Purpose	Location
R140052	Byron Shire Council	Public Recreation or Conservation	South Golden beach
R755687 (plus R88045; R58412)	DPIE-Crown Lands	Future Public Requirements	New Brighton Beach (north of Brunswick River to New Brighton)
R82780	DPIE-Crown Lands	Future Public Requirements	Brunswick Heads (Torakina, southern breakwater area).
R97139	Byron Shire Council	Public Recreation or Conservation	Brunswick Heads (Surf Club to Main Beach)
R755692	DPIE-Crown Lands	Future Public Requirements	Brunswick Heads Main Beach
R755695	DPIE-Crown Lands	Future Public Requirements	Belongil Beach to North Beach (north of Belongil Creek)
R96441	Byron Shire Council	Public Recreation or Conservation	Belongil Beach (small land reserve adjacent last house/property)
N/A (Road Reserve)	DPIE-Crown Lands	Road Reserve	Belongil Beach – road reserve called 'The Esplanade'.
N/A (Road Reserve)	Byron Shire Council	Road Reserve	Belongil Beach – road reserve called 'The Esplanade'. (Council is responsible for small part of reserve 10 m x 40 m in length).
R82000	Byron Shire Council	Public Recreation	Main Beach and Clarkes Beach
R1013529	NSW Crown Holiday Parks Land Manager (NSWCHPLM) t/a Reflections Holiday	Public or Community Building or Facility	Clarkes Beach – Reflections Holiday Park
R49122	DPIE-Crown Lands	Public Recreation or Conservation	Clarkes Beach - Adjoins/landward of Reflections (reserve for preservation of native flora and public recreation).

Council Managed Crown Land

Under the new Act Council as a Crown land manager, now must manage the Crown land as if it were public land under the LG Act. By June 2021 Council will need to prepare Plans of Management (PoMs) under the LG Act for those reserves where Council is the appointed Crown land manager. Council has commenced the preparation of one PoM that will outline management for all Crown reserve vested to Council in one document.

NSW Crown Holiday Parks Land Manager (NSWCHPLM) t/a Reflections Holiday Parks

There is one 'Reflections Holiday Park' located within the study area at Clarkes Beach (Byron Bay)

This park is located on Crown land and is managed under the *Crown Land Management Act 2016* by 'NSW Crown Holiday Parks Land Manager' – a 'non-Council' Crown land manager. The park is currently managed under the Plan of Management for the Clarkes Beach Holiday Park (July, 2009)

The PoM provides a framework for the future management, use and development of the reserved Crown land site. This site has been subject to recent severe coastal erosion and remedial actions are currently being considered (refer Section 3.6.2.4).

3.4 Legislative and Policy Context

The legislation and policy governing the management of the coastline from Cape Byron to South Golden Beach is complex and includes:

- 2 Commonwealth Act and 3 agreements,
- 13 State Government Acts and associated guidelines and manuals,
- 1 Regional Plan,
- 2 State Environmental Planning Policies
- 1 Local Environment Plan,
- Development Controls.

As outlined previously, the CM Act establishes the framework and overarching objectives for coastal management in NSW which focus on strategic, integrated and ecologically sustainable management of the NSW's coastal zone.

Table 3-2 provides a snap shot of the legislation and policy that have a major influence in the management of the Byron coastal zone, as detailed in Appendix D.

Table 3-2 Key Legislation Governing the Study Area

NSW Coastal Zone Legislation and Policy	Additional Key Legislation Supporting Coastal Management
Coastal Management Act 2016 Coastal Management SEPP 2018 Marine Estate Management Act 2014	**Commonwealth** Environment Protection and Biodiversity Conservation Act 1999 Native Title Act 1993 Japan-Australia Migratory Bird Agreement China-Australia Migratory Bird Agreement Republic of Korea-Australia Migratory Bird Agreement **NSW** National Parks and Wildlife Act 1974 Environmental Planning & Assessment Act 1979 Mining Act 1992 No 29 Local Government Act 1993 Fisheries Management Act 1994 Protection of the Environment Operations Act 1997 Water Management Act 2000 Local Land Services Act 2013 Crown Land Management Act 2016 Aboriginal Land Rights Act 1983 Biodiversity Conservation Act 2016 Draft Environment SEPP

3.5 Governance Context

There are many organisations from the Federal, State, Regional to Local level that are involved in governing the Byron coastline and its waters. The governance role is largely tied to land tenure however, there are governance overlays due to the presence of features such as the Cape Byron Marine Park.

Figure 3-1 to Figure 3-3 illustrates the current land tenure arrangements and governance context for the study area. It can be seen from these figures that the study area is comprised of a mixture of land tenure and land management arrangements - private freehold land, Council public land (community and operational land), Crown land reserve, State Conservation Areas / Nature Reserves, road reserve, marine park and railway lands. Most of the beach areas of the study area **not within** National Parks or Nature Reserves are Crown reserve (with the exception of a small road reserve 'the Esplanade' at Belongil Beach). These Crown reserves are owned by DPIE-Crown Lands but generally are managed by DPIE-Crown Lands, Council or NSW Crown Holiday Parks Manager.

Importantly a co-management framework has been established through Arakwal Indigenous Land Use Agreements (ILUAs) within the study area which are described in more detail further below in Section 3.8.

In the Federal context, the key piece of legislation relevant to the study area is the *Environmental Protection and Biodiversity Conservation Act 1999*, which protects nationally significant threatened species and communities.

State and local government share strategic and statutory planning responsibilities for land in the study area. The Department of Planning, Industry and Environment (DPIE) and Council administer the *Environmental Planning and Assessment Act 1979*, which is the key legislation for land use planning and development assessment in NSW. The NPWS administers the *National Parks and Wildlife Act 1974* which includes management of lands in the study area including several Nature Reserves and a State Conservation Area. The Cape Byron State Conservation Area is jointly managed with the Arakwal people as members of the Cape Byron Trust. Other crown land areas are managed under the *Crown Land Management Act 2016*.

The CM Act provides the legislative framework for managing the coastal zone in a strategic and coordinated manner. The CM Act is administered by DPIE. Under the CM Act, CMPs are developed and certified to specify actions to be implemented by local councils (generally through councils Integrated Planning and Reporting Framework, which is established in the *Local Government Act 1993*) and state agencies (through written agreement).

Native title has been determined over some of the study area (refer National Native Title Tribunal numbers NC01/8 and NC95/1) with the remaining areas to be determined in the future .

This recognises in Australian law that the Bundjalung peoples have ongoing rights and interests in the lands, seas and waters deriving from their use of the lands. The Native Title rights do not apply to freehold lands. The rights are non-exclusive and non-commercial and allow for activities such as entry, travel over lands and water, taking of natural resources such as food and water (including hunting and fishing), camping, lighting fires, and conduct of cultural activities and teaching. Further information is included in Section 3.8 in relation to how Indigenous parties are engaged in governance aspects related to the study area.

Council will be responsible for preparing and maintaining the CMP with input from agencies, stakeholders and the community. Implementation of actions within the CMP will lie also with these groups based on their jurisdiction which may solely be based on land tenure or they are a core service of the agency.

Tweed Shire Council being within the same coastal sediment compartment as Byron Shire will be involved in coastal management in the Byron Shire through the CMP as this is a requirement of the CM Act. This is probably of most relevance when options which may affect coastal processes are being considered.

A full listing of all organisations that may have a role in governance of the coastline and offshore waters are listed and roles and responsibilities described in Appendix C.

Billinudgel
Nature Reserve

SOUTH
GOLDEN
BEACH

South Golden Beach

Marshalls Creek
Nature Reserve

NEW
BRIGHTON

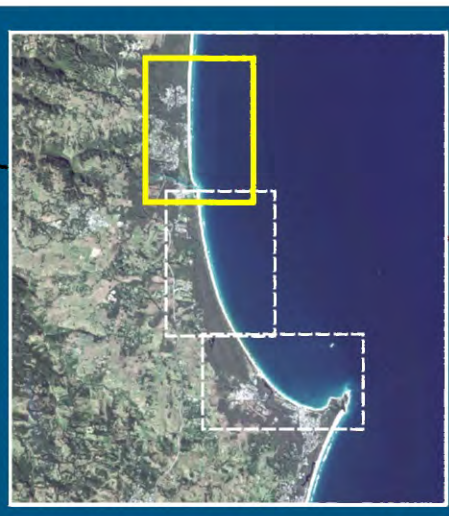
New Brighton Beach

Marshalls Creek

Brunswick River

BRUNSWICK
HEADS

Brunswick Heads
Nature Reserve



LEGEND

- Study Area
- 2100 Hazard Line
- Railway
- Road Reserve
- Council Operational Land
- Council Community Land
- Byron Shire Council - Crown Land Manager
- Cape Byron Marine Park
- National Parks/Reserves
- Crown Land

Title:

Land Status and Governance Arrangements in the Study Area - Map 1 of 3

Figure: 3-1

Rev: A

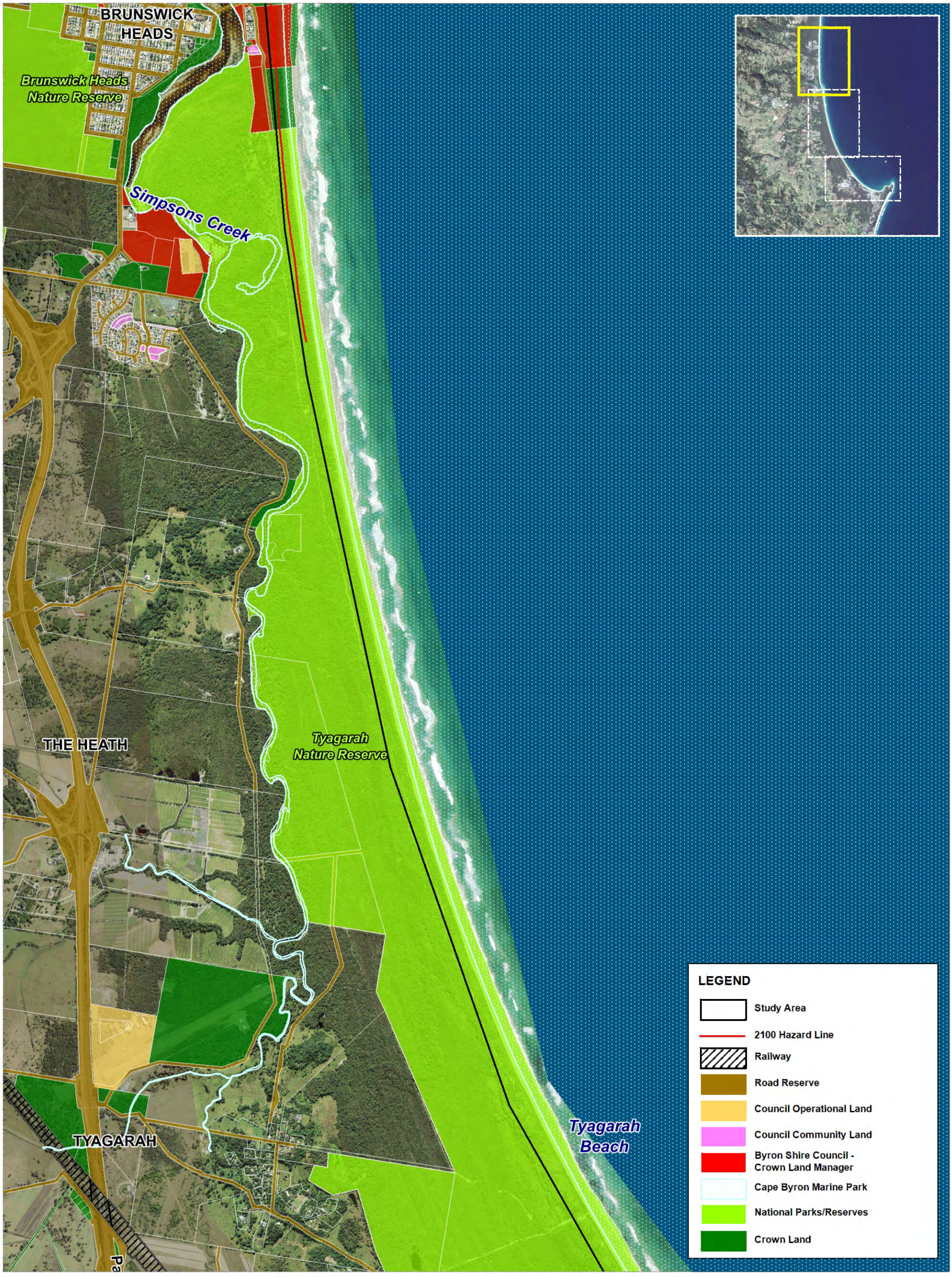
N

0 400 800m

Approx. Scale

BMT
www.bmt.org

Filepath: I:\B23329_I_DCC ByronCMP\DRG\COA_009_190104_LandOwnershipMgmt_North.wor



Title:

Land Status and Governance Arrangements in the Study Area - Map 2 of 3

Figure: 3-2

Rev: A

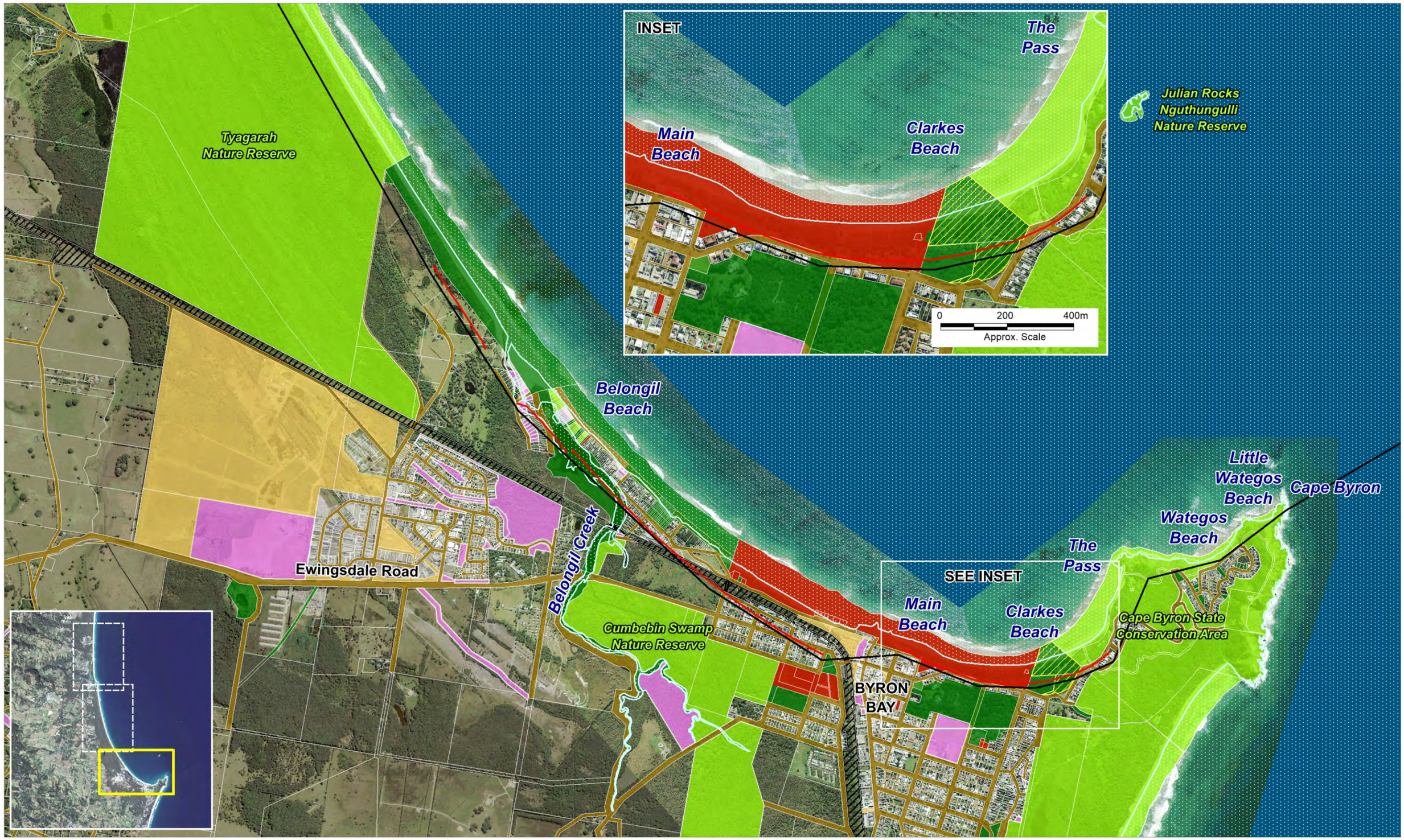
N

0 400 800m

Approx. Scale

BMT
www.bmt.org

Filepath: I:\B23329_I_DCC ByronCMP\DRG\COA_010_190109_LandOwnershipMgmt_Central.wor



LEGEND

- Study Area
- 2100 Hazard Line
- Railway
- Road Reserve
- Cape Byron Marine Park
- National Parks/Reserves
- Crown Land
- NSW Crown Holiday Parks Manager T/A Reflections Holiday Park
- Council Operational Land
- Council Community Land
- Byron Shire Council - Crown Land Manager

Title:

Land Status and Governance Arrangements in the Study Area - Map 3 of 3

Figure: 3-3

Rev: A

N

0 400 800m

Approx. Scale

BMT

www.bmt.org

Filepath: I:\B23329_I_DCC ByronCMP\DRG\COA_011_190109_LandOwnershipMgmt_South.wor

3.5.2 Legal Context & Background

The Byron Bay embayment has a long history of coastal development and exposure to coastal processes. The land tenure pattern includes a matrix of public and private ownership.

Coastal protection works in various forms have been implemented in Byron Shire on a reactive basis in response to coastal erosion events since the 1950's. A major comprehensive assessment by the Public Works Department in in 1978 entitled the Byron Bay – Hastings Point Erosion Study (Gordon, Lord & Nolan, 1978), advocated the need for a coastal management plan to decrease the piecemeal and non-strategic attempts at protection works along the coastline.

In 1988 Council adopted the Byron Local Environment Plan 1988 (Byron LEP 1988) and Development Control Plan No 1 (DCP 1988) which includes Part J that relates to development on coastal lands. This marked the beginning of Council's development control on coastal lands in accordance with a policy of relocation or 'planned retreat' as it is known locally (refer Section 3.6.2.3 for more detail).

Relocation or planned retreat was one of several hazard management options expressly contemplated by the State Government's overarching legislative framework including the Coastal Policy and Manual, as the framework was in force under the *Coastal Protection Act 1979* and from time to time.

Council has had in place, at least since 1988, a land use planning framework which sought to preclude the construction of new hard engineered coastal protection works on land zoned 7(f1) and (f2) (deferred from the current LEP 2014) and sought to control the type form, duration and relocatability of development permissible on land at risk of coastal hazards.

Development controls had also been developed and adopted in what is known as the "Part J controls" which are now included in DCP 2010. In order to give effect to the Part J controls various conditions of development consent have either been imposed or sought to have been imposed on development approved under the framework on coastal zoned land.

The land use planning framework aimed to facilitate long term adaptation and relocation by allowing development on coastal zoned Land only to occur with recognition and accommodation of coastal processes based on triggers relating to the coastal erosion escarpment.

In December 2010 amendments were inserted into the ISEPP which made certain types of coastal protection works permissible with development consent (or under Part 5 of the EPA Act for public authorities) notwithstanding the particular provisions of local environment plans. Some existing works were carried out under this regime.

The coastal management legislative framework has been reviewed on a number of occasions and culminating in the repeal of the *Coastal Protection Act 1979* and its replacement with the *Coastal Management Act 2016*. The current framework includes the Manual and the Coastal Management SEPP.

The provisions introduced into the ISEPP relating to coastal protection works were repealed, but are replaced by similar provisions in the Coastal Management SEPP.

Against this background and changing legislative framework, no coastal management plan has been approved or certified by the Minister (notwithstanding several attempts) to be implemented by Council for the Byron Bay Embayment.

Legislative change has rendered Council's coastal management planning process at times redundant, with Council having to start again responsive to changes in the framework in the new planning process. Over time coastal protection works in various forms have proliferated and now almost the entire Belongil Spit has some form of protection (Section 3.6.2.3)

Coastal hazard management and development control has also been the subject of litigation before the Courts. Proceedings have included merit development appeals, judicial review challenges to decisions and actions and claims for damages. A high level snapshot of some of the proceedings includes:

(a) Supreme Court proceedings between Council and several landowners at Belongil Beach which resulted in Consent Orders made in August 2016, without admission. In summary, these Orders maintain the status quo and preclude Council from taking steps to require the removal of certain identified existing coastal protection works without the consent of landowners (on terms);

(b) Development consents for repair works to certain existing coastal protection works granted through the court conciliation process in December 2018 in merit appeals to the Land and Environment Court between some land owners and the Transitional Coastal Panel as the relevant consent authority at that time; and

(c) Orders made by the Land and Environment Court in 2010 and 2011 in proceedings between Council and landowners relating to terms, obligations and works pursuant to a 2001 development approval for the construction of interim beach stabilisation works at Belongil.

As this is a scoping study, the implications of the land use planning framework, the Orders, Court decisions and the terms of development approvals are matters which will need to be considered for management options within future stages of the CMP process, as they form part of the factual and legal matrix.

3.6 Environmental Context

3.6.1 Values

There have been several recent (and historic) assessments of the environmental values of the study area (WRL 2016, BSC 2000, BSC 2016, BSC 2018). Further community consultation undertaken as part of this study confirms previous findings (refer Section 3.7.3). Key community based environmental values associated with the study area include its healthy environment, naturalness and geodiversity/landscape amenity (i.e. natural structure, aesthetics, views). Main attributes of these values are described generally below.

Geodiversity / Landscape Amenity Values

The study area consists of a wide variety of environments including marine areas, sandy/rocky foreshores, coastal dunes, littoral rainforest and wetlands/heathlands and estuary entrances. The marine environment consists of deep subtidal areas with a sandy floor, deep offshore reefs, shallow nearshore and offshore subtidal reefs and rocky islets e.g. Julian Rocks (WBM Oceanics

2003). This diversity of coastal environments contributes significantly to the Shire's overall biodiversity, and also exhibit high biodiversity in their own right. (BSC 2000).

Landscape and visual values of the Byron coastline are well recognised (BSC, 2000, WBM Oceanics 2003, BSC 2010, BSC 2014, BSC 2016, BSC 2018) and are deemed iconic and are considered a destination driver for both domestic and international tourism alike (BSC, 2014). Views and visual amenity values of the study area may be experienced within a variety of onshore and offshore locations and are associated with the combination of ocean, coastline, coastal plain and inland range viewsheds.

Flora, Fauna and Biodiversity Values

In relation to the Shire's floral diversity BSC (1999) identifies that, "*The North Coast of NSW (coastal areas east of the Dividing Range between the Hunter River in the south to the Queensland border in the north) has the highest number of Rare or Threatened plant species in the State*", while in relation to faunal diversity BSC (1999) identifies, "*Byron Shire is at the centre of one of the richest and most diverse regions for vertebrate fauna in Australia. On a unit/area basis, the NSW North Coast region (north-eastern NSW-south-eastern Queensland, Thackway and Cresswell 1995) has the highest frog, non-Ctenotus skink, snake and marsupial species diversity in Australia (Pianka and Schall 1981) and the bird species diversity is exceeded only by the Queensland wet tropics (NSW National Parks and Wildlife Service 1995)".*

The region's high biodiversity could be considered to support community values associated with naturalness and healthy environment.

Water Quality

A review of available water quality data is provided in Section 3.6.2.5 and it identifies oceanic waters of the study area are highly suitable for safe swimming, with some issues prevalent within the estuaries. Clean water with limited visible sources of pollution could be considered to support community values associated with naturalness and healthy environment. There are some potential sources of water pollution entering the study area including estuarine discharges from Belongil Creek and the Brunswick River as well as a number of stormwater pipes which discharge to beaches within the study area.

3.6.2 Coastal Processes, Hazards and Management

The study area is comprised of a diverse range of environments including open water, beaches (intertidal areas), dunes and foreshores. Coastal processes relevant to the study area are discussed in this section, along with identified coastal hazards and coastal management strategies including works present within the study area.

3.6.2.1 Coastal Processes

Coastal processes at Byron are highly complex, with interactions at regional to local scales, temporally and spatially. A summary of relevant coastal hazards and processes information for the Byron Bay Embayment is provided in Appendix G. Key messages regarding the coastal processes of Byron are listed below. The summary in Appendix G attempts to present key findings of the Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013) (herein 'the Hazard Update') that are widely accepted, and to also present alternative findings where the consensus

varies. The aim is to provide a succinct reference point for current knowledge of coastal processes and hazards for Byron, which includes both the agreed and the uncertain elements of that knowledge.

The predominant south easterly wave climate in NSW generates a regional net northerly sediment transport, which increases in strength moving northward along the NSW coast. In the NSW north coast sediment compartment within which Byron is located, net longshore sand transport increases from about 150,000-200,000 m /year at the Clarence River to about 550,000 m^3/year at the Gold Coast. The stability of the beaches and dunes in Byron are therefore predominantly dependent on these larger scale coastal processes and regional sediment transport patterns.

The positive gradient in the net longshore sediment transport between the Clarence River and Point Danger of about 350,000-400,000 m^3/year along 150 km would potentially lead to average shoreline recession for an active vertical zone of about 0.15-0.18m/year (that is, the beaches supply the longshore sediment transport gradient, resulting in erosion of the shoreline). Recent research by Patterson (2013) indicates that there remains a residual net shoreward sand supply into the shore-face from the inner continental shelf of about 0.5-1.0 m^3/m/year, offsetting some of the shoreline recession that would otherwise result from the longshore transport gradient, to an average recession of less than 0.1m/year in Byron Bay (BMT WBM, 2013).

Further evidence of the underlying long term recession occurring at Byron Bay is the relative absence of Holocene (last 10,000 years) dune barriers, with older Pleistocene dune barriers and indurated sand (or “sandrock”) commonly outcropping on the beach and surfzone at the eastern end of the embayment. The Holocene barriers that would have developed here have since been removed by erosion associated with the northward gradient in longshore drift.

The deep water wave climate of northern NSW coast comprises a highly variable wind wave climate superimposed on a persistent long period moderate to high energy swell arriving predominantly from the southeast to east direction sectors. Two types of storm wave generation, east coast low cyclones and tropical cyclones, are dominant in determining the prevailing extreme wave climate. BMT WBM’s (2013) analysis found a distinct seasonal pattern with more southerly directions in winter and more easterly directions in summer. The plan shape of the shoreline along the region reflects the dominant southeast swell conditions and northward net movement of beach sand. This manifests as a series of crenulate shaped embayments, more hooked at their southern ends and aligned more uniformly and relatively consistently at north-northeast (approx. 20º) at their northern ends.

There appears to be a tendency for high energy storm wave occurrences that can be related to ENSO patterns, with periods of high energy southerly waves coincident with El Nino conditions (e.g. 2002-3); and high energy waves from east to east-southeast coincident with La Nina phases (e.g. early 2009 and 2011-2012) (BMT WBM, 2013).

Modelling of waves to nearshore by BMT WBM (2013) illustrated that there is relatively direct propagation of east to north-east waves onto the Byron shoreline, with these wave directions producing the maximum wave height coefficients at the shoreline. The persistence of more easterly swells is believed to be a significant factor in the enhanced erosion of the shoreline currently evident in the eastern corner of the embayment. For south east to southerly waves there are zones of substantial wave height reduction evident along the sheltered beach areas north of

headlands. Cape Byron in particular has a profound effect at the shoreline to its north that may extend to the Gold Coast for more southerly waves.

The nearshore wave coefficients combined with the substantial natural variability in the wave climate occurring over the longer term (years and decades) has significant consequent effects on shoreline behaviour. Southerly waves tend to cause higher rates of northward sand transport along the northern parts of embayments, including more headland bypassing, while having reduced energy and lower sand transport potential in the sheltered southern embayment areas. Easterly waves cause higher transport rates at the more east-west oriented shorelines towards the southern embayment areas but reduced transport (or downcoast transport) at the north-south oriented northern areas. These alongshore sand transport differentials and varying exposure to wave energy result in differences in erosion and accretion patterns along the coastline.

BMT WBM (2013) determined the regional net longshore sediment transport rate past Cape Byron to be ~ 400,000 m^3/year, based upon new modelling done for that study, plus a number of previous analyses using different techniques by the lead author for the BMT WBM (2013) report, Dean Patterson (see Patterson, 2007; Patterson 2013). These values differ from that of PWD (1978) that were determined without the modelling and analytical techniques that are available today and based upon “subjective” analysis and observations. Aside from this, there is quite substantial agreement between the PWD (1978) and BMT WBM (2013) studies.

Sediment transport patterns across the Byron Bay embayment have been described by PWD (1978) and BMT WBM (2013) with arguably similar conclusions. Based upon these reports, sand transport pathways northwards around Cape Byron are as follows.

- Sand may be worked along shore in the highly active surfzone / littoral zone in ~ 6-10 m water depth where longshore and cross-shore sand movements occur, with net littoral movement to the north. BMT WBM (2013) suggest approximately half of the transport past Cape Byron follows this path.
- Sand may be deposited between approximately Cape Byron and Julian Rocks, and gradually worked northwest towards New Brighton under wave action beyond the active surfzone, out to ~ 15-25 m water depth. BMT WBM / Patterson termed this “cross embayment transport”, however the description of this sediment transport process matched closely the PWD (1978) description of waves producing oscillating forces on the bed and subsequent northwards sand transport.
- BMT WBM (2013) suggest approximately 50,000 m^3/year of the littoral drift transport is intercepted by the southwards directed EAC and lost to a deep water sediment sink. This is a unique element of the Byron Bay coastline is the interaction of net northerly littoral drift (driven by the predominantly south easterly wave climate) with the East Australia Current (EAC), which runs from north to south along the east coast of Australia, at typical speeds of 1-2 m/s, and in water depths greater than 40 – 50 m. At these depths, the EAC does not typically influence sediment transport in the surfzone of east coast beaches. But offshore of Cape Byron, the shoreface dips sharply and steeply to water depths of 40 to 50 m, at slopes of 1:18 to 1:30 (PWD, 1978). This places the northerly littoral drift currents immediately next to the southerly directed EAC, resulting in some of the northerly littoral sand being sheared off by the EAC where it is then effectively lost from the coastal system at water depths of 40 m+.

The PWD (1978) study was highly rigorous and allowed for extensive data collection particularly of offshore sedimentological data. However, the authors themselves noted that most available data sets were either immature, or unavailable at the time.

The BMT WBM (2013) and Patterson (2013) studies provided an extension of the (PWD) 1978 study. BMT WBM (2013) utilised the data and incorporated the findings of that earlier work with a further 40 years of highly accurate photogrammetric and lidar topographic beach profile data, a long time series wave record from various sources including a local wave ride buoy, and substantially improved mathematical modelling programs and capabilities compared with what was available in 1978. The BMT WBM (2013) and Patterson (2013) studies also adopted a regional approach that required consideration of the interactions with adjacent embayments. As noted by WRL (2010), the application of a regional scale, sophisticated modelling tool allowed greater insight into the coastal processes of Byron Bay. Therefore, the BMT WBM (2013) is considered the best available scientific information for Byron Bay at present. The coastal hazards estimates derived through the BMT WBM (2013) report are detailed in the subsequent section.

3.6.2.2 *Coastal Hazards*

Shoreline Recession and Beach Erosion

Calculations for long term recession and short term erosion that have been applied to the study area are outlined in Table 3-3 below. The long term recession estimates of PWD (1978) are also provided, as these formed the basis of the current coastal planning regime applied by Council.

Table 3-3 Long Term Recession and Short Term Erosion Estimates for the Study Area

	Discussion
Long term recession	
PWD (1978)	Based upon ~ 30 years photogrammetry (with “excellent” coverage for 17 years). The 50 and 100 year recession lines projected by PWD (1978) were adopted by Council as the “Part J” coastal planning lines. • Entire embayment: -0.6 m/year, +/- 0.3 m/year • Byron Bay: -1.5 m/year • New Brighton: -1.8 m/year • Brunswick breakwaters: 2.5m/year accretion
BMT WBM (2013) *(Adopted)*	Long term regional recession trend of -0.05-0.1m/year, noting that recession is not uniform along the coastline, being less immediately updrift (south) of headlands and greater downdrift (north). The longer term recession trend has at times been masked by the superimposed short term erosion events and medium term variability in wave conditions and thus longshore transport relating to ENSO and IPO. For example: • higher rates of recession calculated by PWD (1978) have not been realised, with an over-estimate calculated due to the shorter photogrammetric record and the masking effect of the severe cyclone erosion over that period; and • a period of sustained shoreline accretion despite the longer term erosion trend at Main-Clarkes Beach after 1973 to around 2009.

	Discussion
	Long term trends are further complicated by the coastal protection works at Jonson Street (anchoring the shoreline) and along Belongil Spit (which has transferred recession losses to the north).
Short term erosion	
BMT WBM (2013) *(Adopted)*	Short term erosion of 250 m^3/m for all beaches, noting 150-200m^3/m as typical. Short term erosion rates given in the study are consistent with other regional studies. PWD (1978) and WRL (2016) indicate that erosion of 200m^3/m would entirely remove the dune fronting Manfred Street, permitting washover directly into the street behind, and presumably Belongil Creek.

Dune Slope Instability

Typical equations as per Nielsen *et al* 1992 were defined for the different dune heights along the study area, which can be applied as required on a site by site basis. Appendix G provides further detail.

Cliff Instability

To date, the potential for cliff / rock fall, landslip and associated risks to public safety and property have not been fully assessed in the study area.

Coastal Inundation: Wave Overtopping

The design deep water conditions for assessment of wave run-up and overtopping potential were:

- 100 year ARI significant wave height of 7.5m from direction just north of east (with wave coefficients greatest at the shoreline under this wave direction); and
- 100 year ARI storm tide (or, ocean water) level of 1.84m AHD, consistent with Byron Shire Council's flood planning scenario design level policy. This level is conservatively high, being 0.4m higher than commonly adopted for the NSW coastline of 1.44 m (from Fort Denison).

Design run-up levels relative to existing mean sea level (approximately AHD) for the different parts of the embayment are calculated for both natural beaches, using the method of Nielsen and Hanslow (1991) which includes wave set-up, and for typical rock seawalls (using conventional methodology for permeable rubble slopes set out in the Shore Protection Manual (1984) and an adopted armour slope of 1:2), as listed in Table 3-4. Potential run-up levels for the 2050 and 2100 scenarios are also provided in Table 3-4 based on a linear addition of the projected sea level rise components of 0.34m and 0.84m respectively to the present day levels. Run up levels provided in Table 3-4 assume the seawalls are rough, permeable rock structures. For the impermeable, smooth sandbag wall structures, the general 'rule of thumb' suggests the run-up component (i.e. not whole water level) may be almost twice that of properly designed permeable rock structures.

Table 3-4 Calculated 'Immediate' wave run-up levels on 1.84m (AHD) storm tide

Location	Nearshore Wave Height (H_s, m)	Run-up Component (m)		Run-up Level Inc. Storm Tide + SLR					
				Present	(m AHD)	2050	(m AHD)	2100	(m AHD)
		Sea wall	No seawall	Sea wall	No seawall	Sea wall	No Sea wall	Sea wall	No Sea wall
Main Beach	2.85	N/A	2.43	N/A	4.6	N/A	5.1	N/A	4.27
Jonson Street	3.00	3.1	2.49	5.3	N/A	5.8	N/A	4.94	4.33
Belongil Spit	3.58	3.1	2.73	5.3	4.9	5.8	5.4	4.94	4.57
Byron North Shore	4.30	N/A	3.0	N/A	5.2	N/A	5.7	N/A	4.84
Brunswick Heads	5.7	3.46		5.30		5.64		6.14	
New Brighton	6.0	3.55		5.39		5.73		6.23	
South Golden	6.0	3.55		5.39		5.73		6.23	

The calculated 'Immediate' wave run-up levels result in overtopping hazards as follows.

- No potential for overtopping along Main Beach where dune heights are in excess of 6m (AHD), significantly higher than potential run-up levels.
- Minor overtopping at the eastern end of the Jonson Street protection works.
- The dune crest levels along Belongil Spit are generally greater than 6.0m (AHD), with overtopping unlikely along most of its length; however:
  - In Scenario 1 (seawalls retained), site-specific analysis of seawall crest levels are needed to determine the vulnerability to overtopping; and
  - A significant overtopping potential exists at Manfred Street where the present dune crest level is approximately RL+4m, well below the run-up limit.
- A clear potential for overtopping and/or inundation within the mouth area of Belongil Creek where the berm levels are generally at RL+1 to +3m (AHD).
- Sufficient dune height along the North Shore area (generally >8m) to prevent wave overtopping.
- Generally sufficient height of existing frontal dunes at New Brighton and South Golden Beach, however, the expected dune erosion during major storm events will extend to lower hind-dune areas that are significantly lower, making those areas vulnerable to inundation by wave overtopping.

Future overtopping hazards are as follows.

- The future evolution and potential for wave overtopping and inundation of the Belongil Spit area is intimately determined by the retention or removal of the protective seawalls and the

associated shoreline recession behaviour. With no change to the existing protection, the potential for overtopping will increase further due to shoreline recession into the lower hind-dune areas along Belongil Spit where the prevailing dune levels are relatively low, and due to the higher sea levels relative to the existing dune and seawall crest levels. Assessment of management options involving seawalls should involve review of these run-up and inundation considerations in terms of design and cost requirements for adequate wall crest levels to protect the land behind.

- The level of the hind-dune area about 20m further landward of the immediate erosion escarpment, to which the storm bite would extend as shoreline recession proceeds, are low, making the New Brighton to South Golden shoreline vulnerable to immediate and future inundation by wave overtopping (in the absence of mitigating action).

Coastal and Tidal Inundation in the Estuaries

The design elevated water levels adopted for Belongil and Brunswick River as listed in Table 3-5 were based on Council's policy for the 100 year design elevated ocean levels at estuary mouths for flood planning scenarios with storm surge events and climate change. Council's policy design levels for estuary flooding include provisions for:

- The design storm tide level, including climate change induced increased storm surge;
- A wave setup component; and
- Climate change induced future sea level rise.

Based upon these design storm tide levels, the extents of potential inundation within Belongil Creek and Brunswick River were mapped, using a 'bathtub' approach with the present creek bathymetry. The maps are available in the Hazard Update (BMT WBM, 2013) and therefore are not reproduced here.

Table 3-5 Design Storm Tide Levels

Immediate (mAHD)	2050 (mAHD)	2100 (mAHD)
2.29	2.89	3.49

Tidal inundation, or inundation of land adjacent to Belongil Creek and Brunswick River associated with high spring tides will become more extensive with future sea level rise. Mapping has been undertaken of the extents of inundation by a tide of 0.94m above mean sea level for the immediate and projected 2050 and 2100 year scenarios, using a 'bathtub' approach.

While the mapping described above provides very useful tools for planning in lieu of hydrodynamic modelling, the following recommendations are made with regard to mapping the storm event and regular tidal inundation risks in Belongil Creek and Brunswick River:

- A dedicated flood study that investigates the inundation extents and velocities with coincident catchment rainfall and ocean tide events plus future sea level rise is required, and will provide substantially improved mapping of inundation, flood hazard, and flood planning levels;

- In addition, and conducted as part of or separate to the above, a dedicated hydrodynamic investigation of tidal inundation (considering, for example, mean high water, high high water solstice springs (i.e. “king tide”) or highest astronomical tide) with future sea level rise would provide a more accurate indication of the permanent impacts of sea level rise on water levels and adjacent foreshore land within the estuaries, particularly for Belongil Creek which is affected by periodic entrance closure.

These studies would appropriately be considered in a later CMP for the Belongil Creek and Brunswick River estuary and catchment.

Coastal Entrance Instability

A specific investigation of the combined sediment transport and entrance dynamics, considering the influences of both fluvial inputs and open coastal transport processes, including shoreline recession impacts, has not been completed to date. Council has recently completed a Belongil Creek Entrance Opening Study, to investigate the dynamics of the entrance and better defined artificial opening limits. BMT WBM (2013) have provided an overview of coastal entrance instability issues, summarised in Appendix G.

3.6.2.3 Coastal Management Strategies

Six main management strategies have historically been implemented in response to the main management issues in the Byron coastline (Cape Byron to South Golden Beach), as follows:

(1) The retention and implementation of coastal protection works at Main Beach (Jonson Street) and Wategos Beach;

(2) The application of planning and development controls on development in urban coastal hazard risk areas (LEP 1988 zoning and land use provisions, Part J controls under Council’s Development Control Plan, 2010 and its predecessors). The controls prescribe the type of development that may or may not be permitted on coastal land and enable Council to impose conditions of consent for new development applications that require specified types of structures until such time as the erosion escarpment recedes to a defined distance to the development, at which time the development consent ceases and the development (or relevant part of it) is to be relocated or removed;

(3) Beach scraping programs at New Brighton Beach;

(4) Dune vegetation management through local dune care programs;

(5) Public access management of beach access ways (fencing and access stabilisation works); and

(6) Public safety management and implementation of the Emergency Action Sub Plan.

These management strategies are described in more detail below, along with details of other coastal management strategies and protection structures in place within the study area.

1a – Coastal Protection Works at Jonson Street, Main Beach, Byron Bay

The coastal protection works at the end of Jonson Street (JSPW), Main Beach, extend for 420 metres from the First Sun Holiday Park to the Byron Bay Surf Life Saving Club. The JSPW

comprise a rock rubble seawall (rock revetment) for the majority of the extent with rock toe protection in front of the Holiday Park and geofabric sandbags covered in dune vegetation in front of the Surf Club. The JSPW were first constructed in the early 1960's and have been subject to various restoration and extension efforts since that time, including major remedial works in 1975. A short section of geotextile sand containers (GSC) was added in front of the Byron Bay Surf Life Saving Club (SLSC) in 2002. The works are an important public asset that play a significant role in protecting the Byron Bay Town Centre from coastal erosion during large storm events and shoreline recession. The JSPW also protect the public reserve and land area adjacent to the works is widely regarded as an "iconic" Australian coastal location.

The existing works have been identified by previous studies as being degraded and not compliant with contemporary coastal engineering design standards. The works are largely comprised of undersized rock armour which is hydraulically unstable and of insufficient crest level to prevent wave overtopping in storm events > 1 year ARI (Worley Parsons 2014). There exists an immediate threat to the structural integrity of the works and therefore, the integrity of the Byron Bay Memorial Pool, and the Byron Bay Town Centre, adjacent lands and reserves, development and infrastructure.

Modifying the works will result in increased public benefit due to improved public safety, amenity and aesthetics, reduction in the footprint of the structure and improved stability to mitigate risk from large storm events. Council has commenced a comprehensive design investigation of the works for the modification of this structure – refer to the Main Beach Shoreline Project (MBSP). The project will involve coastal modelling, geomorphological assessment of the adjacent coastline and detailed assessment to understand the most feasible and appropriate concept for modification of the works to protect the Town Centre from coastal hazards into the future and improve beach access and amenity.

The retention of the JSPW at Main Beach has been a priority management strategy for Council who have consistently resolved over the preceding years to protect the Byron Bay Town Centre. The delivery of this design investigation project and development of the CMP can and are occurring separately but in parallel of each other. This is quite normal as the CMP provides the overarching long-term planning for the coast and does not preclude other investigations such as this project.

The outcomes of the MBSP will be incorporated into the CMP as the plan continues through the five stages of preparation. Progression of the MBSP into the construction stage of the project will be dependent on ministerial certification of the CMP. The state government Coastal and Estuary Grants Programs requires a certified CMP in order to fund implementation projects (i.e. construction works).

1b – Coastal Protection Works at Wategos Beach

The existing protection works at Wategos Beach consist of a limited rock boulder wall along the scarp between the main esplanade (Marine Parade) and the beach. There are also other reactive works including geofabric bags that have been installed likely in response to impacts from stormwater and informal pedestrian access. The efficacy and structural integrity of these works is unknown and it is unclear as to the extent of bedrock which may underlay these works and Marine Parade. A detailed assessment of coastal hazards risks at Wategos Beach was not undertaken

in the Hazard Study (BMT, 2013) due to its sheltered location in the lee of Cape Byron, expected constraint of bedrock as well as the limited protection works. However, previous (draft) CZMP's have outlined that further investigation is warranted to determine the coastal hazard risk, substrate composition, integrity of the works and risk to assets.

2 – Planning and Development Controls

Council's existing coastal planning and management framework recognises the coast as a dynamic feature which presents particular planning challenges. In 1988 Council adopted the Byron Local Environment Plan 1988 (Byron LEP 1988) and Development Control Plan No 1 (DCP 1988) which included Part J that relates to development on coastal lands. Importantly, the planning instruments were developed in recognition of the long-term erosion trend of the Byron-Hastings coastal embayment as identified in the PWD Study (Gordon, Lord & Nolan, 1978). This marked the beginning of Council's development control on coastal lands in accordance with a 'policy of relocation' as described in the earlier PWD (1978) study.

Byron LEP 1988 contains designated coastal land use zonings with specific objectives, supplemented by separate clauses and development controls reflecting Council's long-term strategic planning response to coastal areas at risk. However, the Standard Instrument (SI), on which the current Byron LEP 2014 is statutorily required to be based, has abandoned this format. As such there are presently no dedicated coastal land use zones in the SI LEP. Rather there are coastal consideration clauses. There are impediments to logical translation of Council's established planning controls in place for over twenty (20) years into the current Byron LEP 2014. Hence, urban coastal lands are a deferred matter in Byron LEP 2014 and the provisions of Byron LEP 1988 remain currently in force on relevantly affected land.

The Byron LEP 1988 contains two zones applying to land that is likely to be influenced by coastal processes ("7(f)" zones). Broadly, the coastal zones follow the alignment of Planning Precincts 1 and 2 in 'Part J' of Byron DCP 2010. The Part J Planning Precincts were based on the PWD Study (Gordon, Lord & Nolan, 1978).

That land use planning framework sought, amongst other things, to preclude the construction of hard engineered coastal protection works on lands zoned coastal under the LEP 1988 and to require development approved in the coastal zone to be temporary and/or relocatable based on triggers pertaining to coastal hazards and the erosion escarpment, which include the imposition of conditions of consent on development approvals.

In 2010, amendments were inserted into State Environmental Planning Policy (Infrastructure) 2007 which made certain types of coastal protection works permissible in the coastal zone with development consent (or under Part 5 of the EPA Act for public authorities), notwithstanding the particular provisions of local environmental planning schemes.

Council, having recently completed the Hazard Study now has a more contemporary coastal hazard assessment to inform land use and development.

Council is committed to having contemporary planning controls to manage areas susceptible to coastal hazards. However, it is noted, that until such a time as new planning controls and coastal hazard mapping is adopted, the Part J (DCP 1988) planning precincts and associated development controls will apply, overlaid by other State Environmental Planning Instruments..

3 – Beach Scraping at New Brighton Beach

Beach 'scraping' is a very useful and cost effective technique for rebuilding dunes or restoring beaches. Scraping accelerates the natural process of dune re-building by moving sand from the intertidal area of the beach and placing it on the dunes. It doesn't technically add sand reserves to the beach but does provide for existing sand reserves to be retained as an erosion buffer.

Beach scraping has been completed many times at New Brighton Beach, initially occurring after large storm events in the 1970s when the dunal area at New Brighton was almost completely lost, and houses were destroyed at the southern end of the village.

In 2010 Council conducted a pilot study to understand if beach scraping could be used as an effective management strategy at New Brighton. The study was deemed a success and subsequent beach scraping has been conducted in 2013 and 2017.

The October 2017 program of beach scraping at New Brighton beach had the primary objective of creating a larger sand dune to buffer against coastal erosion during storm events. The longevity of this recent program will be subject to the severity and frequency of future storm events post scraping episodes.

4 – Dune Vegetation Management Through Local Dune Care Programs

Recreational activities and other human disturbances, such as illegal camping and informal access through the dunes lead to negative impacts on dune formation and stability and damage to native coastal vegetation/fauna. A variety of dune vegetation land care groups are active within the study area working on Council or Crown Land reserves, in parallel with Council's bush regeneration team play an on-going and active role in revegetating and stabilising some areas of dunal system. However, there are many areas of the coastal dune system within the study area that are being impacted where groups and/or Council are under-resourced to manage and or restore.

5 – Public Access Management of Beach Access Ways

Council plays an active role in public access management, providing safe beach access ways and fencing at locations throughout the study area. However, on-going funding each year is not sufficient to adequately address the pressure and impact on beach accessways due to the popularity of Byron's coastline. In general funding is spent on a reactive basis in response to access management during and after storms when available but is often limited.

6 – Public Safety Management and Implementation of the Emergency Action Sub Plan

Council has developed an Emergency Action Sub Plan (EASP) that details intended emergency actions to be carried out by Council in response to an emergency. The EASP is an internal procedure that was developed over the preceding years as part of previous CZMPs. Although not part of a certified CZMP, if the EASP guides Council's management of coastal erosion events. Council intends to self-assess the EASP after a triggering event to confirm aspects of its effectiveness.

Other Management Strategies

Other management strategies that have been undertaken or are being undertaken with the study area include:

- Belongil Estuary entrance activities – Council has developed a long-term opening strategy to guide entrance management of the creek mouth. This strategy was recently adopted by Council and appears to in line with current best practice ICOLL entrance management.
- Compliance Activities – regular ranger patrols (illegal camping, dogs, parties, etc) though resources are limited. The team primarily respond to complaints and monitor regular hot spots (Main Beach, Belongil & Brunswick Heads Beach) on Council owned or managed land.
- Coastal amenity infrastructure installation and maintenance program – Council does undertake inspections of beach accessways and infrastructure on a regular basis, however it is more reactive rather than coordinated (e.g. not based on an annual program). The present budget allocated to fund maintenance and infrastructure installation is inadequate as many of the access way require upgrading to provide disability access.
- Lagoon Management (Main and Clarkes Beach) – excavation of a small channel to drain stormwater builds from the berm to the ocean. This is undertaken on a semi-regular reactive basis.

Existing Coastal Protection Works & Beach Access Stabilisation Works at Belongil Beach

A variety of other coastal protection works have been constructed in the study area both ad hoc and some with planning authorisation. These include works consisting of rock revetment, containers, rock rubble, concrete cubes), haybales and geotextile structures. Presently there are intermittent forms of rock/geotextile structures between Border Street and the last house at the western end of Belongil Beach with over 1 km length of the Belongil spit having some form of rock (or other) protection. Details on some of the coastal protection works may be found at the report 'Byron Bay Erosion Protection Structures – Risk Assessment' (Worley Parsons, 2013). This study, however, does not consider any works outside the Main/Belongil Beach Study Area such as the Brunswick River breakwaters, the groyne at New Brighton Beach, nor the rock protection works at Wategos Beach.

The Risk Assessment component of the study considers the adequacy and effects of the identified coastal structures on Resilience (i.e. wave impact, overtopping and geotechnical stability), Coastal Processes (effects on sand transport and beach form), Coastal Ecology and Public Use and Amenity. All structures are considered in their effect/risk from Low to Extreme. It was found that every structure had some effect/risk with the lowest overall rating across all categories being moderate, while nine structures had ratings as either high or extreme in one or more categories. Most of the works have impacted on local coastal processes through outflanking/dislodgement of rocks and end-wall erosion effects.

- Privately Constructed Rock Protection Works at Belongil Beach

  Various erosion protection works have been constructed by private residents adjacent to private property over the years largely in a reactive (ad hoc) fashion in response to storm events, with some of the works being the subject of Court Cases (refer Section 3.6.2.1). Some

of these works lie completely within private property boundaries, however others also traverse the public beach Crown reserve and/or the small Council road reserve (part of The Esplanade).

Several of the protection works have been identified as being degraded and not compliant with contemporary engineering standards, meaning they would be unlikely to withstand a design storm event or series of storms.

- Council Constructed (Interim) Beach Access Stabilisation Works at Belongil Beach (IBAS) (refer Figure 3-4):

  Border Street: The IBAS works at Border St, Belongil Beach fronting the beach accessway were constructed by Council in 2002. The works consist of a geotextile container revetment which remain largely buried most of the time. The structure was damaged in the May 2009 storm event and reconstructed in 2011 by Council. The works are not expected to provide effective protection against large storm events but rather the design intent is to reduce erosion that may be caused by small seas combined with high tides. The works were constructed as interim (temporary) in their design.

  Don Street: The IBAS works at Don St, Belongil Beach fronting the beach accessway were constructed by Council in 2002. The works consist of a geotextile container revetment tied into the private property seawall on the south eastern side and adjacent works on the western side (private property). The works were damaged in the May 2009 storm event and reconstructed in 2011 by Council. The works have the same interim design intent as the IBAS at Border St. The works are expected to be overtopped in large storm events and were not designed to protect against direct wave attack.

  Manfred Street: The original IBAS works were first constructed by Council in 2002 at the same time as the Don and Border Street IBAS. They too consisted of a geotextile container revetment. Following the May 2009 storm event they were reconstructed with sand imported to site to rebuild the landward side of the structure. In 2015 the works were removed and replaced by Council with a temporary rock structure pursuant to an approval granted under the provisions of State Environmental Planning Policy (Infrastructure) 2007 and tie into the private property works on the western side. These works are called the interim beach access stabilisation works (IBAS) at Manfred St and were constructed with a higher crest than the other beach accessway works (between 3.5 to 4.5 m AHD).

Figure 3-4 Temporary Coastal Protection Works (TPCWs) within the lower section of Belongil Creek

Other Coastal Protection Works

Belongil Creek: TCPWs within the lower section of Belongil Creek consisting of geotextile containers were constructed in March 2015 to protect the creek entrance frontage of the North Byron Beach resort (Elements). The works are located wholly within private land. The TPCW were permissible under Part 4C of the *Coastal Protection Act 1979* with the landowner obliged to maintain the works in accordance with the requirements of the permission.

- Brunswick River Breakwaters

  At Brunswick Heads the Brunswick River entrance is permanently trained by breakwaters. The breakwaters are a significant structure that are managed by the Maritime Infrastructure Delivery Office (MIDO), a joint initiative between DPIE Crown Lands and Transport for NSW (formerly RMS). Constructed in 1960 the training walls stabilise the entrance to the river and were built for navigation purposes. However, the natural ingress and movement of sand along, into and past the entrance does impact navigability for incoming/outgoing boats.

- Groyne at New Brighton Beach

  A small groyne was constructed near Gaggin Street, New Brighton in the 1970s. The groyne is of unknown design and construction standard and is largely covered with sand most of the time having little to no effect on shoreline alignment (BMT, 2013). As such, the groyne is not expected to provide shoreline stability, being likely to fail in the event of substantial beach erosion.

- TPCWs at Clarkes Beach

  Recent TPCWs were installed at Clarkes Beach by 'NSW Crown Holiday Parks Land Manager', trading as 'Reflections Holiday Parks'. In response to the recent erosion impacts

(refer Section 3.6.2.4) Reflections enacted the coastal protection works provisions available to public authorities under section 19 (2)(iii) of the CM SEPP, being "*the placing of sandbags for a period of not more than 90 days*". At the end of 2019, sandbags were placed across approximately 120 m of the toe of the erosion escarpment along the beach frontage of the Holiday Park to provide temporary protection from further erosion and to allow for the orderly movement of site infrastructure.

The TPCW were placed at the base of the dune on the proviso that they would be removed within 90 days. However at the time of finalising this report there were issues with the removal of these works as an Aboriginal midden has been located on the crest of the dune. Council has been informed Reflections was waiting on for permission to remove the TPCW in accordance with an approved plan to ensure no impact to aboriginal heritage.

3.6.2.4 Recent Coastal Events

Since the Hazards Update (BMT WBM, 2013), there have been a few significant wave events on the North Coast of NSW including:

- 2013 Ex TC Oswald;
- 2016 'Black NE'rly'; and
- 2019 TC Oma.

These swell events and others yielded various erosion impacts to beaches through interference with littoral sand transport and sand bypass across the Byron Bay embayment. The effects of these large swell events have not yet been correlated against nearshore and beach profiles. However, there has been notable erosion and recession at The Pass and Clarkes Beach. This erosion has substantially lowered the beach and berm, removed incipient dunes, eroded the frontal dunes, undermined beach access infrastructure, exposed indurated sand layers on the beach and in the dune which may not have been exposed for decades and also further exposed Aboriginal Middens.

The erosion occurred over a period of months (not a single storm event), commencing in 2018 and becoming progressively worse during subsequent events throughout 2019 that included more easterly waves variously combined with high tides and elevated ocean levels (for example, Cyclone Oma in February 2019, and a storm in early July 2019). The shoreline has eroded yet further since March 2019 and the current dune erosion escarpment is likely close to or at the immediate erosion hazard line. Figure 3-5 and Figure 3-6 shows the eroded beach form on Clarkes Beach in July 2019.

Figure 3-5 Clarkes Beach looking East 25 July 2019

Figure 3-6 Clarkes Beach looking West 25 July 2019

The removal of sand was evident as erosion on the shoreline, but also as a significant lowering of sand reserves across the entire surfzone in the eastern end of the BBE. Furthermore, the more easterly swells have tended to subdue and even reverse the typical northerly sediment transport that occurs past Cape Byron into the embayment, enhancing the erosive impact of these events. Other portions of the embayment such as along Belongil Spit have experienced some of the widest beach sand reserves in recent memory.

The 'NSW Crown Holiday Parks Land Manager' (NSWCHPLM), trading as 'Reflections Holiday Parks' manage the holiday park at Clarkes Beach, including the beach frontage of the park. Reflections have undertaken a number of actions to respond to the erosion impacts, enacting the coastal protection works provisions available to public authorities under section 19 (2)(iii) of the CM SEPP, being "t*he placing of sandbags for a period of not more than 90 days*". Sandbags were placed across approximately 120 m of the toe of the erosion escarpment along the beach frontage of the Holiday Park to provide temporary protection from further erosion and to allow for the orderly movement of site infrastructure (construction is visible in Figure 3-6). Reflections then relocated six beachfront cabins that were shown to be within the zone of reduced foundation capacity behind the erosion escarpment and therefore unsafe for public use, and were also required to demolish both beach accessways and a viewing platform and guest lounge that were directly undermined by erosion.

NSWCHPLM are required to remove the sandbags within 90 days of their placement and have no planning pathway available to them to allow them to stay. Information has been provided which indicated the removal of the sandbags will damage an aboriginal midden that was identified by dune erosion. The sandbag removal therefore requires approval of DPIE through provision of an Aboriginal Heritage Impact Permit (AHIP). Upon receipt of AHIP, NSWCHPLM will be required to remove the sandbags. Following removal, NSWCHPLM will reinstate beach access stairs and commence dune rehabilitation works, both of which are dependent on issuing of the AHIP.

3.6.2.5 Water Quality and Water Quality Processes

As reported in BSC (2018), oceanic waters of the study area are in a location of convergence of warmer northern waters and cooler south waters. Upwelling of cooler nutrient rich waters is reported to occur in the region as a result of local geomorphology. These processes support high biodiversity as discussed later in this Section.

In relation to recorded water quality for the study there are limited sources of data to characterise conditions and overall health. However, over the period of 2009 to 2013 Council in association with the former NSW Office of Environment and Heritage participated in the NSW Government's Beachwatch program (OEH, 2010) (OEH, 2011) (OEH, 2012) (OEH, 2013). This program was developed to provide the community with information on water quality to enable individuals to make decisions about choices to swim.

The program monitors swimming sites and grades them from 'very good' to 'very poor' in accordance with the National Health and Medical Research Council's 2008 Guidelines for Managing Risks in Recreational Waters. The grades provide a long-term assessment of beach suitability for swimming and are determined from the most recent 100 water quality results (which can be 2 to 4 years of data depending on sampling frequency). The rating also includes a risk assessment of potentially polluting sources. Generally, water samples are analysed in a laboratory for enterococci and the results are combined with a sanitary inspection to determine an overall grading, noting that the statistical confidence in the result increases for a greater sample number.

Sites rated as 'very good' are considered suitable for swimming almost all of the time, with few potential sources of faecal contamination. Sites rated as 'good' are considered suitability for

swimming most of the time, but they may have some susceptibility to contamination. 'Fair' rated sites should be avoided for the purposes of swimming during and for three days following rainfall or if there are signs of stormwater pollution, such as discoloured water or odour or floating debris.

Monitoring locations and sample numbers for the Byron Shire include:

- 2009 to 2010 – 10 sites in the Shire, 7 in the study area, sample size unstated;
- 2010 to 2011 – 11 sites in the Shire, 7 in the study area, sample size unstated;
- 2011 to 2012 – 9 Sites in the Shire, 6 in the study area, sample size unstated; and
- 2012 to 2013 – 11 sites in the Shire, 7 in the study area with 341 samples.

Typically, the beach watch program monitors all locations on a weekly basis between November and June (swimming season).

Results reported in the annual State of the Beaches report identify the following results for different years.

- In the 2009 to 2010 report, 7 sites were located in the study area and all rated as 'good' or 'very good'. Sites were located at The Strand (New Brighton), Belongil Beach, Wategos Beach, while sites at South Beach (Brunswick Heads), Main Beach and Clarkes Beach were rated as 'good'. Torakina Beach was rated as 'fair'.
- In the 2010 to 2011 report, 7 sites were located in the study area and all rated as 'good' or 'very good'. Sites were located at The Strand (New Brighton), Torakina Beach, South Beach, Belongil Beach, Main Beach, Clarkes Beach and Wategos Beach. All open ocean sites were graded as 'very good' apart from South Beach which rated as 'good'. The Torakina site which is estuarine rated as 'good'.
- In the 2011 to 2012 report, 6 sites were located in the study area and all rated as 'good' or 'very good'. Sites were located at The Strand (New Brighton), South Beach at Brunswick, Belongil Beach, Main Beach, Clarkes Beach and Wategos Beach. All open ocean sites were graded as 'very good' apart from South Beach which was rated as 'good'.
- In the 2012 to 2013 report, 7 sites were located in the study area and all rated as 'good' or 'very good'. Sites were located at The Strand (New Brighton), Torakina Beach, South Beach, Belongil Beach, Main Beach, Clarkes Beach and Wategos Beach. All open ocean sites were graded as 'very good'. The Torakina site which is estuarine rated as 'good'.

After this monitoring period Council withdrew from the monitoring program on the basis of having a number of years of data which identified similar water quality conditions within the open oceans and estuarine monitoring locations.

There are no known changes in the study area which are considered likely to have changed or increased pollution to the waters of the study area since this time. The Brunswick Heads Sewage Treatment Plant was decommissioned in late 2012 with sewage diverted to Mullumbimby for treatment and discharge reducing further risk of sewage contamination within this estuary and by proximity waters of the study area.

Within the study area there are a number of stormwater pipes that discharge to beaches. The outfalls are important for conveying stormwater from the Byron CBD to reduce potential for local flooding. Yet they are somewhat undesirable given untreated urban stormwater can present a health risk to beach users (through primary contact) as well as transport litter to the beach (SMEC, 2010). Periodically lagoons can form at beaches including Main and Clarkes Beach that comprise stormwater and/or oceanic waters. When sand is actively accreting to Clarkes Beach, stormwater cannot flow directly to the ocean and the water pools on the beach behind the sand berm. When this occurs Council has a licence to excavate a channel through the lagoon berm to allow the stormwater to escape for the purposes of ensuring public health and safety.

As part of the recently adopted Belongil Creek Floodplain Risk Management Plan (BMT WBM, 2015), an upgrade of the main Clarkes Beach outfall at Cowper Street is planned but is currently unfunded. This includes substantially increasing the current capacity of the drain and incorporating stormwater treatment into the system (detention basin wetland adjacent the drain) to improve the water quality of stormwater exiting the outfall. Also, the stormwater outlet adjacent the eastern property boundary of Reflections Holiday Park at Clarkes Beach is proposed to be upgraded in the near future (refer Figure 3-7). The upgrade will involve rehabilitation of the entire gully through the dune that has formed due to stormwater flow and will also dissipate and improve water quality of stormwater exiting the outfall onto the beach. The upgrade works to the stormwater gully also recommends Council redirect stormwater currently entering Reflections Holiday Park from Lighthouse Road and divert it to the south west away from Clarkes Beach. However, currently the redirection of Council's stormwater is unfunded.

Figure 3-7 Eroded gully at eastern end of Reflections Holiday Park

There are several stormwater outlets at Wategos Beach. These outlets may impact on water quality and general amenity at Wategos Beach however the size of the urban stormwater

catchment is relatively small (WBM Oceanics, 2003). The building of large water pools at Wategos Beach behind the sand berm from stormwater is not a known occurrence and primarily occurs at Clarkes Beach.

Ecology

Flora and fauna attributes are associated with the different environments of the study area which include marine areas, sandy/rocky foreshores, coastal dunes, littoral rainforest and wetlands/heathlands and estuary entrances. The health and values of ecosystems of the study area have been considered in a variety of studies (BSC 1999, BSC 2000, WBM Oceanics 2003, BSC 2016). These environments are shaped by climatic, coastal and water quality processes that also supports the regions high biodiversity. Previous studies indicated that the Byron Shire supports amongst the highest number of threatened flora and fauna species in NSW (BSC 1999). Some of the key features include:

- Over 500 fish species recorded in the Cape Byron Marine Park with species present typically associated with a variety of climatic zones (WRL, 2016). The study area supports iconic marine fauna, including dolphins, manta rays, marine turtles (such as Loggerhead and Green Turtles) and Humpback Whales (WRL 2016).
- Inter-tidal areas provide food and breeding resources for vertebrate fauna such as turtles, local and migratory seabirds and shorebirds (BSC 2000, WBM Oceanics 2003, BSC 2016) while dune habitats are utilised by a range of threatened bird species. Of significance is the upper beach berm adjacent to the Belongil Creek entrance which provides for shorebird foraging, roosting and breeding resources with many of these identified as being of conservation concern and protected under migratory agreements. Management of this region has been outlined in the Belongil Estuary Seabird and Shorebird Management Plan.

  Additionally, the area immediately north of the Brunswick Estuary northern breakwater lies within the Brunswick Heads Nature Reserve. Forty-three threatened animal species have been recorded in and around the reserve and is home to significant shorebirds, including threatened pied oystercatchers, sooty oystercatchers and beach stone-curlews (NPWS, 2019).
- The extensive system of nature reserves and conservation areas provide important refugia for native plants and animals, many of which are listed as threatened species or of conservation significance (WRL 2016).

3.7 Social Context

3.7.1 Population and demographics

The estimated resident population of the Byron Local Government Area (LGA) at 31 July 2017 was 33,987 (.id, 2019a).

The 2006 Census reported an estimated resident population of 30,125 with the 2011 census reporting 30,712 residents. The 0.4% per year growth between 2006 and 2011 was relatively low compared to the 1.7% per year growth experienced from 2011 to 2017. The NSW state average

for period of 2006 to 2017 was 1.4% growth per year. As at 2017 the estimated resident population of the Byron LGA represents just 0.4% of the State's population.

The future population of the LGA as at 2036 is projected to be 37,950 (NSW Government, 2017). The North Coast Regional Plan 2036 indicates that growth is expected to the contained in the West Byron Urban Release Area (as yet unapproved for development) with remaining growth largely occurring in the existing urban growth centres (focused on existing major towns in the Shire) and existing rural areas of the Shire. Generally, this growth is expected to occur through intensification of existing development areas within the Shire.

The spread of this population by localities within the primarily coastal areas of the Byron Shire (as at 2017) is approximately as follows:

- Ocean Shores / New Brighton – 6,683;
- Brunswick Heads – 1,823;
- Tyagarah / Ewingsdale - 1,746;
- Byron Bay – 6,110;
- Broken Head / Suffolk Park - 4,228;
- Remainder – 13,397.

The population spread indicates that 60% of the Shire's population resides in just one quarter of the Shire's total area spread along the LGA's coastline.

In terms of general population demographics the Our Byron Our Future Our Community Strategic Plan 2028 (BSC, 2018b) includes a demographic snapshot which is reproduced in Table 3-2.

Table 3-6 Key Demographic datasets for the Byron Shire (BSC, 2018b)

Indicator	Byron Shire 2016	Regional NSW	NSW	Australia
Median age	44	43	38	38
Median weekly household income	$1,141	$1,166	$1,481	$1,431
Couples with children	21%	25%	32%	30%
Older couples without children	8%	13%	10%	10%
Medium and high-density housing	15%	17%	33%	27%
Households with a mortgage	24%	29%	30%	32%
Median weekly rent	$414	$278	$384	$339
Households renting	27%	26%	30%	29%
Non English-speaking backgrounds	7.4%	5.8%	21%	17.9%
University attendance	3%	3%	5%	5%

Indicator	Byron Shire 2016	Regional NSW	NSW	Australia
Bachelor or higher degree	24%	14%	23%	22%
Vocational	19%	24%	18%	19%
Unemployment	6.6%	6.62%	6.3%	6.9%
SEIFA index disadvantage	976.6	968.6	995.8	1002
People needing assistance with day to day life due to disability	4.4%	6.3%	5.4%	5.1%

The (resident) demographic of the Byron Shire is generally older than the NSW average, and there are less couples with children (these two factors may be related). Incomes are lower and rents are typically higher. Most homes are owned and are low density as opposed to medium or high-density housing. The community is generally educated to a higher degree (by indication of university degrees) than elsewhere in the state and there is generally a lower level of ethnicity (indicated by a non-English speaking background).

3.7.2 Tourism and Visitation

A recent tourism scale and impact analysis conducted for the Byron Shire (.id, 2018) provided insight into the tourism in the LGA. The impacts analysis was more focused on flow-on economics resulting from tourism without detailed consideration of the social or environmental impacts of this tourism. Byron Shire Council in its Sustainable Visitation Strategy 2020-2030 (BSC, 2019) provides further insight into the social impacts of tourism and visitation on the community.

Tourism and hospitality related services are considered as the LGA's largest employer and of a scale similar to larger tourism focused cities (note this is supported also by data provided in Section 3.9). Over the period of 2017/2018 the LGA was estimated to have had 2 million visitors, with half of these staying overnight (which is significantly above the state average). The rate of visitation is in line with those of much larger cities.

Total visitation has dramatically increased by nearly 50% over the period of 2014 to 2018 which is around four times that of NSW. Also, of significance is the massive increase in day trippers to the LGA which has increased by 74% over the period 2008 to 2018. It is expected that some of this growth is attributable to the upgrades of the Pacific Highway (and roads to the north) which connect the LGA to the major population centres in South East Queensland. The high rates of visitation are of concern to the Byron community at large (BSC, 2019).

Domestic and international stay overs in the LGA have both shown significant growth in recent years and this continues a trend which has been occurring for at least a decade. Factors supporting this growth include the Byron Ballina airport which over the last five years was the fastest growing airport amongst Australia's top 20. The increased spread and use of accommodation resources such as Airbnb is likely to have been a contributing factor in that more accommodation options have appeared which completes the supply side of the supply and demand equation. Forecasts for stay overs (domestic and international) are for significant growth over the coming decade.

The high daily visitation rates are expected to be somewhat variable across the year and cyclical depending on a variety of factors, such as time of year (Australian and overseas holidays, events) and time of week and other global and political factors. The high visitation rates will mean local services and features have higher usage than that which would occur from permanent residents alone. This visitation rate is higher than all locations in the NSW's north coast. Servicing costs for the additional population have been estimated at $23 million per year (for core services). The demand of holiday renting and housing in general has placed upwards pressure on house prices and rents with both of these being now higher than the NSW median.

Other impacts of the high visitation rates of Byron Bay include increased traffic congestion and travel times. There are also likely impacts on the social structure of the town due to the effects of Airbnb style accommodation which results in higher housing prices and an increase in the numbers of homes being made available to short term rental and unavailable to long term rental or resale.

The financial contribution of short-term holiday rental platform revenue to the local economy is unclear, relative to contributions from traditional forms of accommodation. Overall these trends in tourism and visitation are of concern due to their likely long-term impact on existing core values associated with the study area.

This phenomenon is presently being considered across Australia and internationally as well. Byron Shire Council recently participated in a research study by the Australian Coastal Councils Association (2018) into these matters and the report identified a number of significant findings as below:

- Short term holidays rental platforms bypassed traditional urban planning controls due to unclear regulations and inability to enforce requirements;
- Airbnb listings for whole homes in Byron Bay was 17.6% which is well above the nationwide average of 0.2% (of total housing stock) and well above the percentage of whole homes listed for rental accommodation at 3.5%;
- Of the rental housing stock Airbnb is estimated to represent 48.3% of the total available in Byron Bay;
- Airbnb holiday rental listings in the Byron Shire exceed the supply of traditional tourism; and
- The study identified that coastal localities require support to respond to the proliferation of this style of accommodation.

It is likely that further local level investigations are required to better understand the socio-cultural, economic and environmental impacts of this to the community, environment and Council as supplier of core services. An understanding of the impacts can be used in the derivation of approaches to sustainably address key issues.

3.7.3 Community values and issues

Values

Recent community consultation activities completed by BMT for this study and as part of previous coastal management studies for the Byron Bay Embayment have assisted in identifying community values and issues (WRL, 2016).

As part of this CMP, BMT developed a community survey with Council that aimed to gauge amongst other things community values and issues relative to the study area (refer to Appendix E for further details). The survey was hosted by Council on its website for about 4 weeks in late 2018. There were over 170 visitations to the survey, however only 23 full contributions were made. The survey was developed to elicit information on community values, uses, issues and threats to the coastline.

WRL (2016) included a Stakeholder Engagement Strategy utilising an on-line survey. It was developed to identify community use and values of the beaches in the Byron Bay Embayment. As such it had similar aims as the survey completed for this study. However, this earlier survey was conducted over January and February 2014 and received some 142 respondents.

In interpreting the outcomes of both surveys, the following condensed list of values has been identified for the study area in an approximate order of priority:

(1) Healthy environment;

(2) Naturalness;

(3) Dune backed beaches;

(4) Access;

(5) Passive and recreational opportunities;

(6) Cultural and heritage values; and

(7) Economic values.

Sensitivity of coastal values

Based on information compiled to date, pressures in the study area include:

- Trend of increasing visitation;
- Trend of increasing demand for coastal development opportunities; and
- Trends associated with climate change.

Many, if not all, of the key values of the study area identified above are sensitive to these pressures to some degree.

Issues

The community survey for this project asked respondents to identify a high, medium or low concern against a preselected list of potential issues (developed from review of existing studies and the statewide Threats and Risk Assessment for the marine estate). The review identified the following issues (summarised) as having mostly high responses:

- Loss of natural features (dunes, vegetation, animals);
- Impacts of climate change;
- Reduced water quality;
- Loss of amenity (due to increasing use / over-use and usage conflicts and presence of pollution);
- Impacts of coastal development;
- Impacts of insufficient community awareness, engagement and participation;
- Impacts resulting from a lack of compliance effort;
- Impacts of poor governance; and
- Impacts resulting from tourism.

The structure and response to the survey is insufficient to provide a high degree of confidence in its findings, as such it should be used to provide a general indication of community issues.

Historically, coastal management issues have been documented in a variety of other coastal studies pertaining to the study area or portions of the study area. The Coastal Zone Management Plan for the Byron Bay Embayment (BSC, 2016) provides an extensive list of issues and these issues have been included in Appendix B.3.

Section 4.3 and Section 4.4 provide further information on threats and issues identified for consideration in this study as applicable to the study area.

3.8 Cultural Context

Aboriginal peoples of the Bundjalung Nation are the recognised traditional owners of lands of the study area. Within the Bundjalung Nation exist a number of recognised tribes that include the Arakwal Bumberlin people who occupied lands extending from south of Broken Head to the Brunswick River (Arakwal, 2019) and the Minjangbal Tribe who occupied lands around New Brighton, Ocean Shores and Brunswick Heads. The estimated tenure of Aboriginal peoples in the region extends for at least 22,000 years.

The study area also resides within the Tweed Byron Local Aboriginal Land Council (LALC). The objects of each LALC are to "*improve, protect and foster the best interests of all Aboriginal persons within the Council's area and other persons who are members of the Council*". LALC's operate to acquire and manage land, promote/protect culture and heritage and facilitate business enterprise.

The Bundjalung of Byron Bay Arakwal people has a Memorandum of Understanding (signed 2013) in place with Byron Shire Council, where Council identifies support and cooperation with the Arakwal people in respect of previously established Indigenous Land Use Agreements (ILUA) and the Arakwal people's ongoing involvement in the management and protection of culturally significant places within the Byron Shire. The Memorandum of Understanding is based around five key priorities:

(1) Culture and Heritage

(2) Participation in Governance

(3) Cultural and Economic Development

(4) Caring for Country

(5) Social Justice and Community Development.

In 2019, Native Title Claims covering much of the study area were settled, the extent of the area included land from Broken Head to Brunswick Heads, including Australia's most easterly point at Cape Byron and the hinterland town of Bangalow. It also included marine areas offshore from the Tyagarah Nature Reserve (refer to 3.5 for further detail).

A number of Indigenous Land Use Agreements (ILUA) have been established between the Arakwal People and the NSW Government. ILUAs are a voluntary agreement about the use and management of land. The first ILUA (ILUA1) recognises the Arakwal people as the traditional owners of the Arakwal National Park. The park is jointly managed by the Arakwal people and the National Parks and Wildlife Service (NPWS). Subsequent ILUAs have strengthened ILUA1.

The Cape Byron State Conservation Area was created in 1997 as part of resolving a Native Title Claim. It was established under a Deed of Agreement between the Arakwal people, the Tweed Byron LALC and the NSW Government. The Conservation Area is managed by Cape Byron Trust of which the Arakwal people are members. The Deed of Agreement was acknowledged in the Indigenous Land Use Agreement (ILUA1).

There are a variety of culturally significant areas located in the Byron Bay Embayment (BSC, 2016) that includes pathways, middens, stone arrangement, stone resource sites, ceremonial sites and burials. Some of the sites are listed on the Aboriginal Heritage Information Management Service (AHIMS) site although a review of the site was not able to be completed for the study area. These culturally significant objects, resources and areas are at risk of loss due to coastal processes.

3.9 Economic Context

The economy of the Byron Shire is supported by a strong tourism market (OEH, 2016). Over the 2016/17 period, tourism and hospitality generated 23% of the Shire's jobs and generates 14.1% of economic output (.id, 2018). Visitation to the Shire continues to grow with 49% growth recorded between 2014 and 2018, which far exceeds that for NSW at 11% over the same period (.id, 2018).

As such, the Byron Shire is a recognised international destination, and this is confirmed by market research that identifies that the Byron Shire outranks all other regions area in NSW, apart from the City of Sydney, in a consumer recognition test (BSC, 2014).

When considered on the basis of destination drivers (i.e. why do visitors come to Byron Shire) the surf, beaches and waterways along with aspect (i.e. views, landmarks and whale watching) etc were identified amongst the top destination drivers (BSC, 2014). These destination drivers support the overall demand for tourism in the Shire. Tourism visitation analysis provided by Tourism Research Australia indicates that over 2014 to 2018 the vast majority of all visitation types recorded were for holiday purposes (between 64 and 73%) in all categories of visitation (.id, 2018).

The importance of the coastal zone (i.e. study area containing the near shore waters, beaches and foreshores) when considered as a destination driver is then able to be clearly linked to tourism. This assertion was tested in a community survey (WRL, 2016) where it was noted in survey responses that "… *almost 80% of respondents regard the BBE beaches as highly important to the success of the local economy*". The importance of tourism and coastal zone are further reinforced by the region's employment profile.

Employment Profile

The broader employment profile of the Byron Shire is provided in Table 3-7. Comparative data for NSW is provided along with historical data. At present the highest employment industry type is accommodation and food services (i.e. supporting tourism), followed by health care and social assistance, retail trade, education, construction and professional services. Compared to NSW the accommodation and food services industry has a far greater representation in the Shire than other industry types which are broadly on par with State averages. Agricultural, forestry and fishing are the other main industry types which notably exceed the state average. There are some lower than average industry representation 'public administration and safety', 'transport', 'postal and warehousing', 'financial and insurance' services.

Table 3-7 Byron Shire Employment by Industry Type, Period and Comparisons to NSW (.id, 2019b)

Employment (total) by industry	2017/18		2012/13		Change 2012/13 to 2017/18
Industry	**Byron %**	**New South Wales %**	**Byron%**	**New South Wales%**	
Accommodation and Food Services	14.6	7.5	14.6	7.1	+249
Health Care and Social Assistance	13.0	13.3	10.3	11.7	+605
Retail Trade	11.6	10.0	13.4	10.1	-66
Education and Training	10.3	9.1	8.5	8.2	+422
Construction	7.6	9.3	6.3	8.2	+320
Professional, Scientific and Technical Services	7.2	8.7	6.5	8.3	+209
Manufacturing	6.1	6.5	6.8	8.0	+4
Administrative and Support Services	5.0	3.4	4.7	3.5	+132
Agriculture, Forestry and Fishing	4.4	2.2	4.4	2.2	+73
Other Services	3.4	3.7	4.1	3.9	-43
Arts and Recreation Services	3.0	1.6	2.9	1.7	+62

Employment (total) by industry	2017/18		2012/13		Change 2012/13 to 2017/18
Public Administration and Safety	2.9	5.8	2.9	6.0	+43
Wholesale Trade	2.8	3.2	3.7	4.2	-78
Transport, Postal and Warehousing	2.6	4.8	3.1	5.2	-28
Rental, Hiring and Real Estate Services	2.4	1.7	2.4	1.8	+43
Financial and Insurance Services	1.4	5.0	1.4	5.1	+29
Information Media and Telecommunications	0.9	2.2	1.8	2.6	-113
Electricity, Gas, Water and Waste Services	0.7	0.9	1.4	1.1	-84
Mining	0.1	1.1	0.7	1.2	-80
Total Industries	**100.0**	**100.0**	**100.0**	**100.0**	**+1,698**

Also, of interest are changes in industry sector growth with the industries of accommodation and food services, health care and social assistance, education and training, construction, professional services all recording significant growth over the five-year period. The rapid change in industry focus in the Shire has resulted in declines in a number of industry sectors. Overall employment is estimated to have increased by approximately 1,700 over the five-year period. This increase represents an over 10% increase in the total job market of 15,694 over the period (.id, 2019b). Corresponding reductions in unemployment were observed over this period with Byron's unemployment rate being largely in line with the State and National averages.

Byron Shire's gross regional product (GRP) of $1.74B (.id 2019b) accounts for 0.31% of NSW gross state product (GSP). Significant annual growth rates in GRP of up to 7% were observed in the Byron Shire over the previous few years.

Similarly, over this period there were notable increases in median house prices in the Byron Shire. As at 2017, Byron's median house price was $928K compared to the state average of $711K. Units were valued at $683K in the Byron Shire, while the NSW average was $671K. Byron's house and unit price effectively doubles that observed in regional NSW (.id, 2019b).

Overall, the employment and economic indicators have been highly positive for Byron Shire with an expanding employment market, increasing GRP, falling unemployment and increasing house prices.

3.10 Future Context

3.10.1 Climate Change and Adaptation

The threat of climate change and its implications is expected to place stress on species, ecosystems and human settlements and industries. In recognition of this threat, in 2018 Byron Shire Council declared a Climate Emergency. The purpose of the declaration was to indicate the importance of the matter to Council and Community and to indicate that urgent action was required by all levels of government, including Byron Shire Council. Council has formed a community-led Climate Emergency Cluster Group which has the aim of developing a Shire wide Community Climate Emergency Plan to provide further resilience and to reduce the impacts of climate change.

Council has tailored individual approaches to climate change mitigation and adaptation. Mitigation is primarily directed towards immediate action on minimising Council's carbon footprint and promotion of renewable energy sources. Of primary interest to this study is Council's efforts in relation to adaptation. In this regard, Council (GHD, 2009) and OEH/DPIE (OEH, 2014) (OEH, 2016) have completed a number of climate change related consultations and investigations that encompass the Shire and region, that assist in gaining a better understanding of climate risk and adaptation pathways.

3.10.1.1 Sea Level Rise

Sea level variation, atmospheric, hydrologic and hydrodynamic processes are all predicted to shift under climate change, all of which influence coastal landforms and ecosystems (Roy, 2001). Climate models are used to develop multiple projections of the Earth's future climate. Drivers of these projections are social, economic and technical which will impact the future release of greenhouse gas emissions into the atmosphere. The most recent Intergovernmental Panel on Climate Change (IPCC) emissions scenarios used are described as Representative Concentration Pathways (RCPs) and range from very low (RCP2.6) to very high (RCP8.5) concentrations.

Sea level Rise (SLR) future climate information based on these RCP scenarios was produced for Australian coastal councils. Projections for Byron indicate a predicted median increase of between 0.42m (range 0.23 to 0.6 m) for RCP2.6 and 0.68m (range 0.46 to 1.02m) for RCP8.5 by 2100 (CoastAdapt, 2017). These scenarios are presented in Figure 3-8 with solid lines indicating median SLR and dashed lines indicating additional allowances based on projections and modelled scale parameters incorporating tides and storm surges (Haig *et al*, 2014).

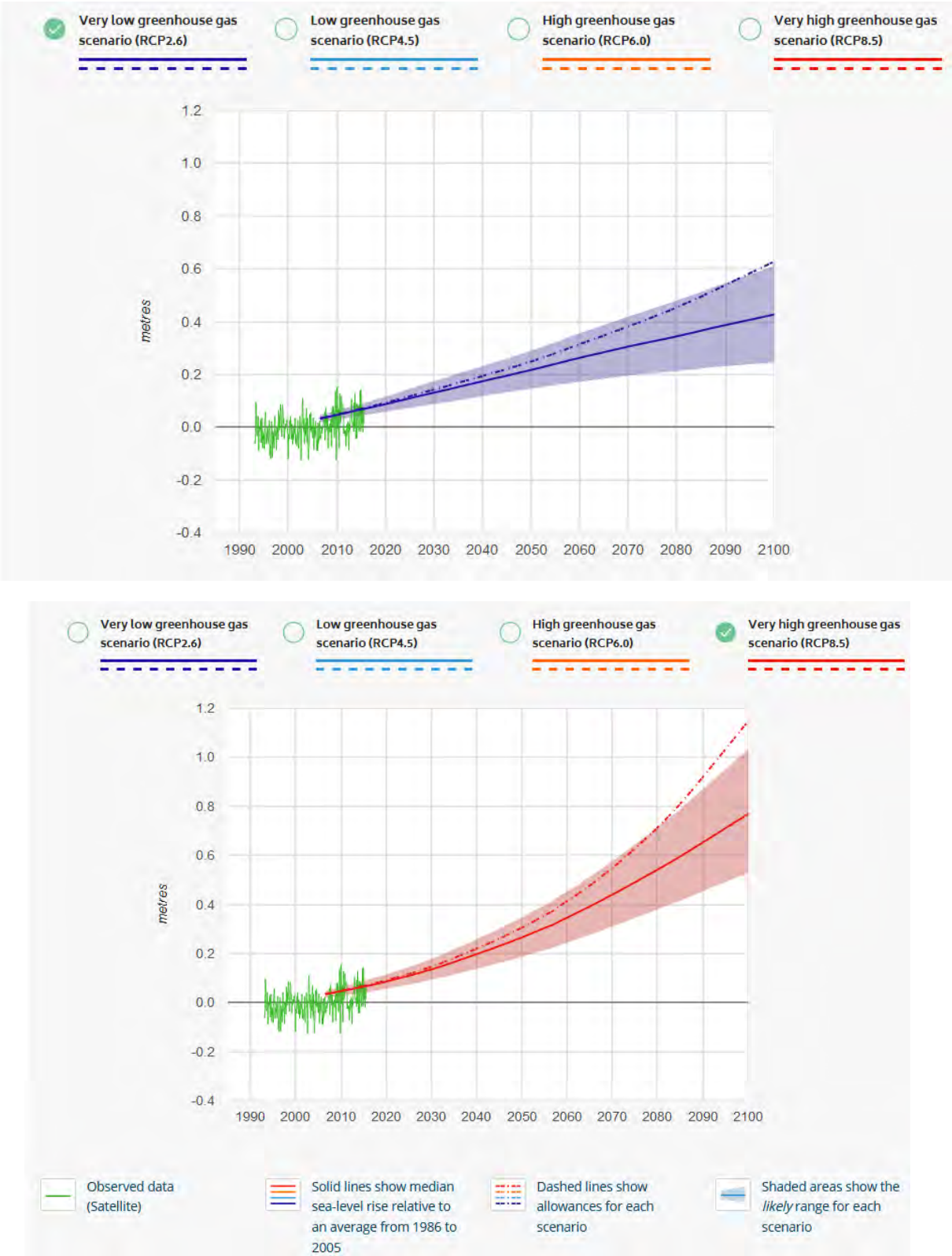


Figure 3-8 Predicted SLR for Byron for Very Low and Very High Scenarios

Byron Council in its Climate Change Strategic Planning Policy has adopted a sea level rise of 17 to 38 cm by 2065, and 26 to 82 cm by 2100. These are largely in line with those outlined above and generally consistent with the sea level rise provisions of 0.4m at 2050 and 0.9m at 2100 adopted within the Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013).

Sea level rise will have impacts on the coastal processes of the study area. The Byron Bay embayment is part of a coastal unit that experiences a continuous northerly average longshore transport of sand but has a series of controlling headlands, past which the sand is moved by the prevailing waves. Cape Byron is one such headland and the crescent shaped beach to the north of the Cape indicates that it has a significant influence on littoral sand transport. Even though the region is thought to be in dynamic equilibrium after the last sea level rise over 6000 years ago the significant influence of Cape Byron on the shoreline within the Byron embayment can show accretion and recession resulting from short term and longer-term processes. It is predicted that these fluctuations will increase in magnitude with future sea level rise as the headland becomes more prominent (BMT WBM, 2013).

3.10.1.2 Temperature

CSIRO investigated a range of future potential temperature extremes based on the same RCP scenarios and determined increases for:

https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/About-NARCliM

- **Hot days -** Mean annual number of days with a maximum temperature greater than 30˚;
- **Warm nights -** Mean annual number of nights with a minimum temperature greater than 25˚; and
- **Heatwaves -** Average of longest run of days in each year with maximum temperature greater than 30˚.

These are presented in Figure 3-9 and indicate the number of hot days is expected to increase to between 75 and 129 days (RCP4.5 and RCP8.5) for Byron by 2090 compared to the historic average of 33 days. The number of warm nights is expected in increase to between 3 and 18.4 days (RCP4.5 and RCP8.5) by 2090 compared to the historic average of 0.1. The length of heatwaves is expected in increase to between 12 and 24 days (RCP4.5and RCP8.5) by 2090 compared to the historic average of 6 days.

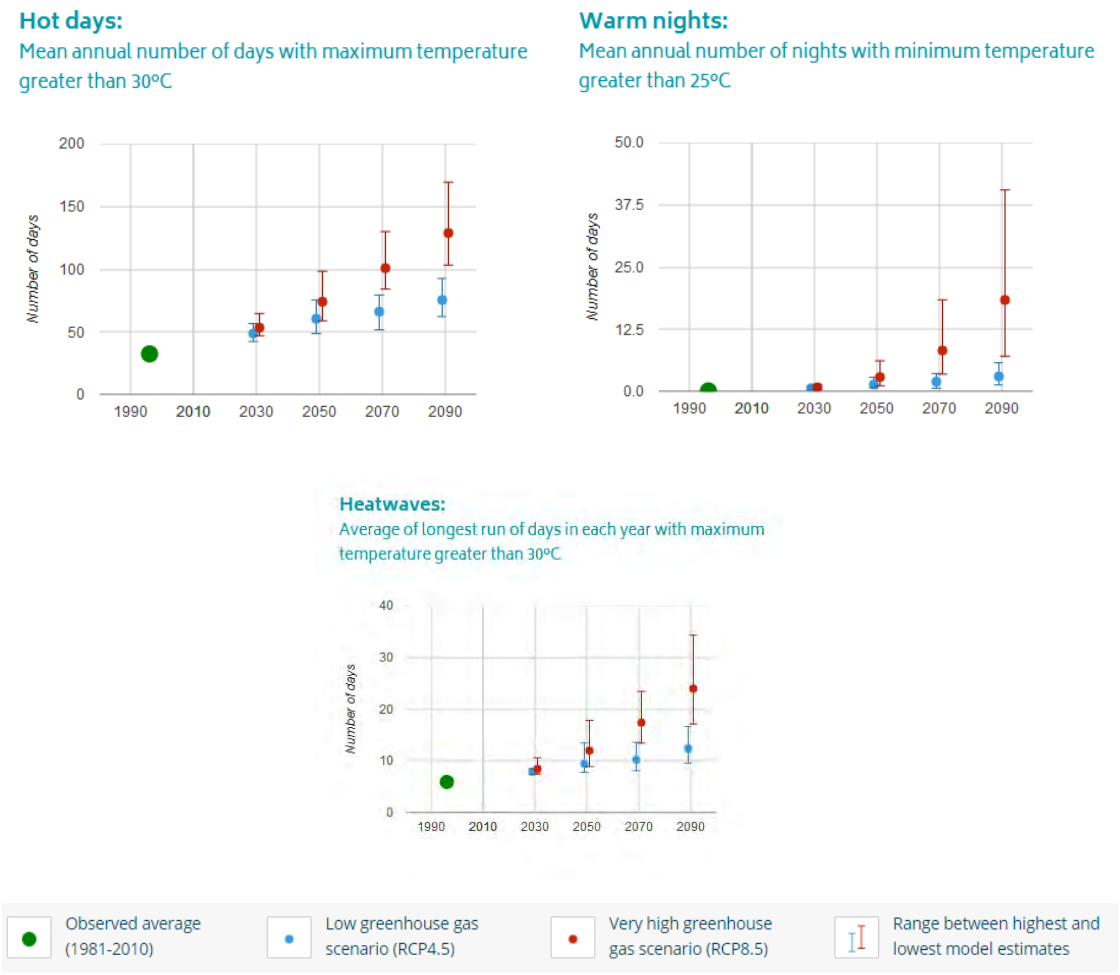


Figure 3-9 Future Temperature Information (CoastAdapt, 2017)

Sea surface temperatures around Australia are expected to rise by around 0.4-1.0˚C by 2030 and around 2-4˚C by 2030 under RCP 8.5 (CCIA, 2018).

3.10.1.3 Rainfall

Similarly, future rainfall projections have been determined based on the RCP scenarios including:

- **Very wet days –** mean annual number of days where rainfall exceeds the observed 99.9th percentile; and
- **Dry conditions –** mean annual (May to Apr) number of months when the total rainfall is less than the historic 10th percentile.

These results are presented in Figure 3-10 and indicate the middle range number of very wet days is expected to increase to between 0.7 and 0.8 days (RCP4.5 and RCP8.5) for Byron by 2090 compared to the current 0.5 days. The number of dry months is expected to increase to between 1.2 and 1.28 months compared to the historic average of 0.9 months.

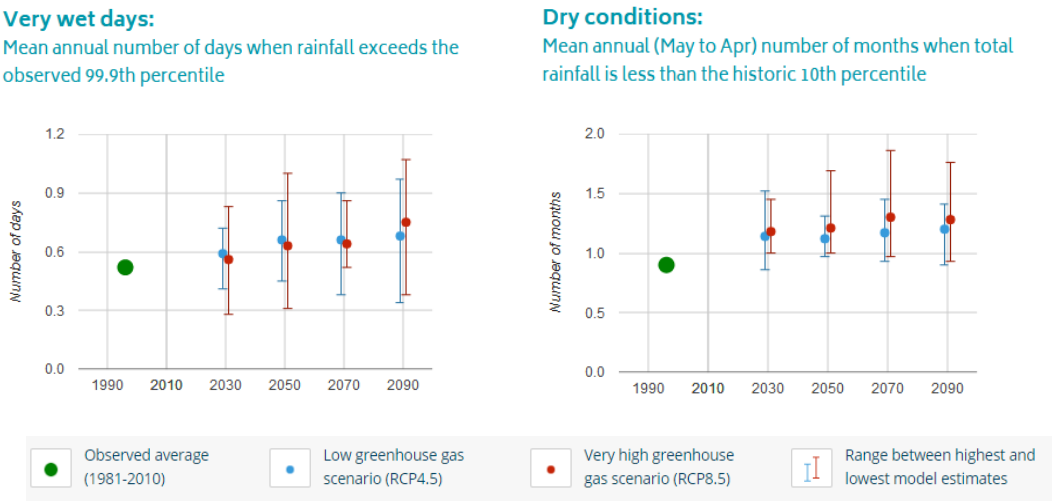


Figure 3-10 Future Rainfall Information (CoastAdapt, 2017)

3.10.1.4 Water Quality

Higher water temperatures and increases in extreme hydrological events, including floods and droughts, are projected to affect water quality and exacerbate many forms of water pollution – from sediments, nutrients, dissolved organic carbon, pathogens, pesticides and salt, as well as thermal pollution with possible negative impacts on ecosystems, human health, and water system reliability and operating costs (Climate Risk, 2010). Increasing atmospheric carbon dioxide concentrations are causing a global decline in oceanic pH leading to ocean acidity. Again, having a potentially negative impact on coastal ecosystems, for example a reduction in calcium carbonate availability for the protective shells of some species.

3.10.2 Population Growth

Various projections of population growth exist for the Shire with population at 38,140 at 2031 (BSC, 2016) and 37,950 at 2036 (NSW Government, 2017).

According to the North Coastal Regional Plan (NSW Government, 2017) this growth in the Byron Shire is to occur in the West Byron development and to be generally absorbed into the existing urban growth centres (focused on existing major towns in the Shire) and existing rural areas of the Shire through intensification of existing development areas. The regional plan also identifies the need for an additional 3,750-4,500 dwellings by 2036 (above the number of dwellings in 2011), which includes holiday dwellings.

The Byron Shire Draft Residential Strategy (BSC, 2018c 2016b) identifies that over the 2011 to 2036 period coastal localities with the highest predicted growth rate (in order) include Byron Bay/Sunrise (2,442), Mullumbimby (1,963), Ocean Shores (763), Bangalow (747), Brunswick (742) and Suffolk Park (413). This Strategy has completed analysis of possible dwellings by this 2036 timeframe, which considered developed on existing residential land, new release lands, rural dwellings and infill development. The analysis has identified that this housing supply could meet expected demand for dwellings. There are a variety of complex decisions which support considerations of future housing supply in terms of core services, potential environmental impacts (including cumulative impacts), housing styles (medium to high density options, affordable or

innovative housing, etc) and evolving community expectation for housing locations, types and locations over time.

In terms of potential demographic change, the following excerpt is provided from (OEH, 2016), "*An ageing population is a common trend across Australia and is predominantly driven by low birth rates and Australians living longer. This trend is compounded in regional areas, including the North Coast, through a loss of youth to the cities to pursue tertiary education and skilled jobs. In addition, the desirability of the North Coast as a retirement destination further exacerbates this trend with the region's population growth largely underpinned by immigration of inter and intra-state retirees. By way of contrast, by 2031 the NSW population over the age of 65 is projected to increase from 15% at present, to 20%, while for the North Coast this will increase from 20% to 30% (DPE 2014)*."

This implication of this demographic change could include changes in the local workforce, where the requirements of an aged or aging population result in restructuring of existing employment areas to service provision and health care. Additionally, it is possible that the retirees to the area if financially well supported may increase demand for exclusive or high-quality housing in the Shire, with a percentage of this being located in sought after coastal areas.

4 Setting the CMP Scope

4.1 Section Overview

As outlined in the Manual (Part B), the scope of a CMP needs to be determined through the course of the scoping study, and should identify for the CMP:

- The geographic scope, spatial extent or area to be covered;
- The coastal management areas to be included (mapping their extent, where possible); and
- The key coastal management issues to be addressed (considering values and threats).

This section summarises the definition of the above listed elements, to clarify the scope of the Cape Byron to South Golden Beach CMP.

4.2 Geographical Scope

The geographical scope assigned for the Cape Byron to South Golden Beach CMP will match the study area defined for this scoping study in Section 1.4, being the open beaches, foreshore and coastal waters from Cape Byron to the Shire boundary north of South Golden Beach. The geographical scope extends inland over the foreshore to the extent of the predicted maximum year 2100 coastal hazard as previously assessed by Council (BMT WBM, 2013). The study area includes coastal waters and extends to 3 nautical miles offshore.

The geographical scope shall exclude the catchments of the Belongil and Brunswick River estuaries but includes the entrances insomuch as they influence the condition and future management of the open coast, e.g. in defining beach erosion, shoreline recession and entrance stability hazards. The geographical scope matches the study area shown in Figure 1-4.

4.3 Coastal Management Areas included in the CMP

All four coastal management areas (i.e. as defined by the CM Act and mapped in the CM SEPP) are to be included in the scope of the Cape Byron to South Golden Beach CMP. All of the coastal management areas within the geographical scope of the study area are shown in a series of figures (refer Figure 1-6 to Figure 1-8) including a combined figure with all management areas overlaid (refer Figure 1-5).

Presently, there is no mapping for Coastal Vulnerability Areas (CVA) gazetted with the CM SEPP. A process for mapping the coastal vulnerability area for the Cape Byron to South Golden Beach CMP has been proposed as part of the forward program for this CMP in Section 6 (as was determined through the first pass risk assessment and review of data and current management arrangements). There currently exists suitable information to develop a CVA Map, and there is also scope to develop more detailed coastal hazard probabilistic mapping in key areas of the CMP geographical area, as part of preparing the Cape Byron to South Golden Beach CMP.

As discussed further in Section 4.4 the key threats to the Byron Coastline are able to be adequately managed within the Coastal Management Areas encompassed by the selected study area. The study area extent is cognisant of the areas of potential impact from a variety of coastal hazards, while other social, amenity, and environmental quality threats are generally

encompassed within the Coastal Management Areas. There are some issues which threats such as water quality which is unable to be fully considered within the selected Coastal Management Areas, as water quality issues can relate to catchment runoff, not only from surrounding catchments, but catchments further afield. Additionally, some identified threats are not specific to any Coastal Management Area, such as governance, compliance and education.

It should be possible to address any gaps and inconsistencies through the full implementation of the Coastal Management Program to the remainder of the Byron Shire, as is Council's intent as described more fully in Section 2.

4.4 Coastal Management Issues Considering Values and Threats

In order to undertake the first pass risk assessment, the values of the coastline and threatening processes or issues affecting the coastline and its values require definition. Understanding the values of the coastline in terms of environmental, social and economic assets and benefits provides a pathway to understanding activities or processes that threaten them and need to be managed through a program of management (i.e. CMP). The first pass risk assessment is used to determine the level of risk from these threats at present and in future, as a means to determine the issues of focus, or scope, of the CMP.

4.4.1 Values of the Coastal Zone

The values of the study area are expansive. Values relate to the physical assets of the coastline itself (e.g. the natural character and scenic beauty of the Byron coastline), the recreational and leisure activities that are highly prized by the community (residents and visitors), the way community interacts with the coastline, and the economic benefits of the coastline and its flow on effects through the Shire and further afield.

A classic "triple-bottom line" approach was used to define the environmental, economic and social values of the Byron coastline. The list of values across these categories was developed based upon the NSW Marine Estate Statewide Threat and Risk Assessment (TARA) (BMT WBM, 2017), and refined using outcomes from the data and information review, community information sessions, community survey, and feedback during the first pass risk assessment workshop as described in Sections 3.7.3. The assessed values of the Byron coastline are listed in Table 4-1.

4.4.2 Threats to the Byron Coastline

A substantial list of potential threats was developed from the same sources as used for the values (i.e. TARA, data and information review, community information sessions, community survey), plus the seven coastal hazards defined in the CM Act. The threats were initially determined to be high, medium or low based upon the consultation feedback (survey, information sessions) and data review, to derive a refined list for the first pass risk assessment workshop to allow workshop attendees to focus their time and attention towards the higher threats.

After further refinement using the workshop feedback and background knowledge, a final shortlist of 18 threats were identified under four themes, as below.

- Threat 1 - Beach erosion;
- Threat 2 - Shoreline recession;

- Threat 3 - Coastal inundation: wave run up and overtopping;
- Threat 4 - Coastal entrance instability;
- Threat 5 - Dune slope instability;
- Threat 6 - Coastal cliff instability;
- Threat 7 - Loss of amenity due to conflicts between user groups on the beach and foreshore;
- Threat 8 - Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities;
- Threat 9 - Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities;
- Threat 10 - Antisocial behaviour and unsafe practices (e.g partying, fires on the beach);
- Threat 11 - Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking;
- Threat 12 - Adverse social or environmental impacts resulting from recreational boating and fishing;
- Threat 13 - Loss of plant and animal species (habitat disturbance or loss) due to coastal development;
- Threat 14 - Reduced water quality in ocean due to run off from coastal development (new and old);
- Threat 15 - Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts;
- Threat 16 - Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action;
- Threat 17 - Impacts resulting from an insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment; and
- Threat 18 - Insufficient or inappropriate governance and management of the coastal environment.

Table 4-2 lists the identified values and the threats that may impact upon those values. In this manner, a clear link can be drawn between the values and objectives for the study area, the processes occurring that may threaten these values, and the likely future threat from these processes to known values.

The outcomes of the first pass assessment for the threats, assessment of adequacy of existing management arrangements, knowledge and data, and potential gaps, and the determination of further studies for Stage 2 is outlined in the following sections.

Table 4-1 Priority Coastal Values and Management Issues

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
Environ-mental	V1	Natural character and geodiversity	• Natural beauty and scenery of the beach, foredunes and shoreline • Sand dunes and vegetation, which provide natural character and protection to beach and foreshore erosion	T1 T2 T3 T4 T5 T6 T8 T13 T15 T17 T18	• Beach erosion • Shoreline recession • Coastal inundation: wave run up and overtopping • Coastal entrance instability • Dune slope instability • Coastal cliff instability • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities • Loss of plant and animal species (habitat disturbance or loss) due to coastal development • Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts • Impacts resulting from an insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment • Implications arising from insufficient or inappropriate governance and management of the coastal environment	I1 I2 I3 I4	Coastal hazards Recreational Activities Coastal development Engagement and governance and compliance
	V2	Biodiversity and	• Presence and health of habitat and wildlife on land and in the ocean, such as fish, turtles,	T1 T2	• Beach erosion • Shoreline recession		

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
		ecosystem integrity	dolphins, whales, nesting shorebirds, migrating birds, rainforest plants and more. • Healthy dune habitats that capture sand to improve the buffer for beach erosion • Healthy habitats that support nature experiences for residents and visitors (e.g. snorkelling, surfing, bushwalking, nature appreciation etc).	T3 T4 T5 T8 T11 T12 T13 T16 T17 T18	• Coastal inundation: wave run up and overtopping • Coastal entrance instability, noting that artificial entrance opening can modify natural processes in the lagoons, in turn affecting the ecology over time • Dune slope instability • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities • Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing • Loss of plant and animal species (habitat disturbance or loss) due to coastal development • Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action • Impacts resulting from an insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment		

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
					• Insufficient or inappropriate governance and management of the coastal environment		
	V3	Clean waters	• Healthy ocean environment with clean water, to support recreation activities and support lots of marine species	T11 T12 T14 T18	• Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing • Reduced water quality in ocean due to run off from coastal development (new and old) • Insufficient or inappropriate governance and management of the coastal environment		
Social and Cultural	V4	Accessibility and safety	• Multiple beach options, with safe access • No exclusion for beach access	T1 T2 T3 T4 T5 T6 T7 T8	• Beach erosion • Shoreline recession • Coastal inundation: wave run up and overtopping • Coastal entrance instability • Dune slope instability • Coastal cliff instability • Loss of amenity due to conflicts between user groups on the beach and foreshore • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the	I1 I2 I3 I4	Coastal hazards Recreational Activities Coastal development Engagement, governance and compliance

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
				T9 T10 T16	beach and associated infrastructure and facilities • Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities • Antisocial behaviour and unsafe practices (e.g partying, fires on the beach) • Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action		
	V5	Amenity and recreation	• Natural setting supports wellbeing and healthy lifestyle • Diversity and safety of passive and recreational opportunities (e.g. great surfing breaks, safe swimming beaches, sun bathing, etc. available to a people with diverse capability and interests) • Wide sandy beaches and recreational facilities on the foreshore • Healthy habitats that support nature experiences for residents and visitors (e.g. snorkelling, surfing, bushwalking, nature appreciation etc). • Views – mixture of ocean, beaches, dunes, vegetated	T1 T2 T3 T4 T5 T6 T7 T8 T9	• Beach erosion • Shoreline recession • Coastal inundation: wave run up and overtopping • Coastal entrance instability • Dune slope instability • Coastal cliff instability • Loss of amenity due to conflicts between user groups on the beach and foreshore • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities • Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities		

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
			foreshores/forest with the backdrop of coastal cliffs, Byron lighthouse and the Byron hinterland	**T10** **T11** **T12** **T16** **T17** **T18**	• Antisocial behaviour and unsafe practices (e.g partying, fires on the beach) • Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing • Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action • Impacts resulting from insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment • Insufficient or inappropriate governance and management of the coastal environment		
	V6	Socialisation and participation	• Coastal space provides opportunities for community and visitors to gather, socialise and participate in recreation and leisure • Great social vibe on the beach and beachside reserves	**T7** **T8** **T9**	• Loss of amenity due to conflicts between user groups on the beach and foreshore • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities		

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
				T10 T17	• Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities • Antisocial behaviour and unsafe practices (e.g partying, fires on the beach) • Impacts resulting from insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment		
	V7	Heritage and cultural	• Continuing cultural, heritage and spiritual connection of Aboriginal people • Presence of heritage places and features along the greater embayment • Surfing and beach culture	T1 T2 T3 T5 T7 T8 T11 T12	• Beach erosion • Shoreline recession • Coastal inundation: wave run up and overtopping • Dune slope instability • Loss of amenity due to conflicts between user groups on the beach and foreshore • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities • Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing		

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
				T13 T16 T17 T18	• Loss of plant and animal species (habitat disturbance or loss) due to coastal development • Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action • Impacts resulting from an insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment • Insufficient or inappropriate governance and management of the coastal environment		
	V8	Education / scientific	• Naturalness and biodiversity richness provides many educational opportunities	T8 T11 T12 T13 T18	• Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities • Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing • Loss of plant and animal species (habitat disturbance or loss) due to coastal development		

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
					• Insufficient or inappropriate governance and management of the coastal environment		
Economic	V9	Tourism	• Low-key coastal development which helps keeps the coast feel natural • Flourishing tourism industry providing direct and indirect employment and business opportunities	T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12	• Beach erosion • Shoreline recession • Coastal inundation: wave run up and overtopping • Coastal entrance instability • Dune slope instability • Coastal cliff instability • Loss of amenity due to conflicts between user groups on the beach and foreshore • Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities • Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities • Antisocial behaviour and unsafe practices (e.g partying, fires on the beach) • Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing	I1 I2 I3 I4	Coastal hazards Recreational Activities Coastal development Engagement, governance and compliance

Coastal Values				Coastal Management Issues			
Domain	Priority Values		What the local community praises	Main threats affecting values		Priority Issues	
	No.	Description		No.	Description	No.	Description
				T13 T14 T18	• Loss of plant and animal species (habitat disturbance or loss) due to coastal development • Reduced water quality in ocean due to run off from coastal development (new and old) • Insufficient or inappropriate governance and management of the coastal environment		
	V10	Fishing	• Mostly recreational fishing providing benefit to locals and visitors	T11 T12 T13 T14 T16 T18	• Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking • Adverse social or environmental impacts resulting from recreational boating and fishing • Loss of plant and animal species (habitat disturbance or loss) due to coastal development • Reduced water quality in ocean due to run off from coastal development (new and old) • Impacts resulting from a lack of compliance with regulations and competing priorities shire wide for regulatory action • Insufficient or inappropriate governance and management of the coastal environment		

4.5 First Pass Risk Assessment

4.5.1 Methodology

The first pass risk assessment provided the methodology for determining the severity of known threats in the study area, at present and in future (e.g. with climate change, population growth, urban development and so on).

In addition to this, the first pass risk assessment methodology for this Scoping Study was designed to provide an evaluation of current management arrangements and identify key knowledge gaps in managing the threats. Based on this information and other expert input, studies are designed for Stage 2 that target the high priority threats and focus on aspects of management and /or information that are needed to better treat the threat.

That is, the current management arrangements and knowledge basis are investigated and evaluated for each known threat. When combined with the level of threat, this information provides a sound basis for identifying studies to be completed in Stage 2, or to make recommendations for those threats or potential management actions that should be investigated in Stage 3 and 4 of preparing the CMP.

The first pass risk assessment is different to the full-scale risk assessment that will be conducted in Stage 3 of preparing the CMP. A full-scale risk assessment involves detailed analysis of the likelihood and consequence of the risks, using a range of sources and data inputs. The likelihood and consequence are combined to derive the level of risk.

The first pass risk assessment aims to recognise that data gaps may exist and that not all information may be available at the present time to adequately assess risks. Instead, the aim of the first pass risk assessment is to direct efforts for preparing the CMP to those risks that are likely to pose the greatest risk now or in the future, but also, towards filling data gaps or management information for threats that are not able to be adequately assessed or managed at present.

The first pass risk assessment does consider both consequence and likelihood in determining the level of threat. However, this is simplified in recognition that there may be gaps in data that preclude a full scale, separate analysis of consequence and likelihood at this early stage of preparing a CMP. In determining the level of risk in the first pass assessment, likelihood and consequence are considered intrinsically, and the risk is given a ranking of high, medium or low, see Figure 4-1.

Full Scale Risk Assessment

Likelihood		Consequence				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
	Almost Certain 5	Medium	High	High	Very High	Very High
	Likely 4	Medium	Medium	High	High	Very High
	Possible 3	Low	Medium	High	High	High
	Unlikely 2	Low	Low	Medium	Medium	High

First Pass Risk Assessment

	Level of Risk		
Risk / Issue / Threat	High	Medium	Low

Figure 4-1 First Pass Risk Assessment vs Full Scale Risk Assessment

4.5.1.1 Assessment Process and Scales

The first pass risk assessment process was as follows, with scales used illustrated in Table 4-2.

- Assess the level of risk from known threats as high, medium or low, considering intrinsically the likelihood and consequence of the threat.
- Assess the future trajectory of the risk (as high, medium or low) taking into account future pressures such as population growth, tourism, urban development and climate change, and considering intrinsically the likelihood and consequence of the threat in future.
- Determine an overall level of risk as high, medium or low, considering current and future risk.
- Assess the adequacy and effectiveness of existing management arrangements (i.e. controls, actions and governance) as adequate, moderate or inadequate by considering to what degree the action(s) may reduce or mitigate the risk (i.e. the level of risk remaining after a management action(s) is accounted for, or 'residual risk'). The assessment of management also considers governance complexity for each management theme (e.g. single vs multi Council and stakeholder governance).
- Consider the suitability of existing data as adequate, moderate or inadequate to support the management of the risk now and into the future, based on expert judgement, considering the temporal and spatial extent of existing information and data.
- The combination of level of risk, adequacy of management arrangements and adequacy of data to support management of the threat, and why, is used to develop further studies. The studies are considered in terms of their priority (high, medium, and low) for completion Stage 2 to support preparation of the CMP. That is, some studies are essential to preparation of the

CMP, and other studies are identified through the first pass risk assessment as potentially essential to management of the coastline but may not be needed to develop the CMP. These studies are still documented and are recommended for consideration in Stage 3 as actions to go into the CMP.

Table 4-2 Scales used in the First Pass Risk Assessment

Assessment	Scale		
Current Risk *(based on existing threats)*	**High**	**Medium**	**Low**
Future Risk *(based on projected threats)*	**High**	**Medium**	**Low**
Overall Level of Risk *(combination of current and future threat)*	**High**	**Medium**	**Low**
Adequacy of Existing Management Arrangements	**Inadequate**	**Moderate**	**Adequate**
Suitability of Existing Data **	**Inadequate**	**Moderate**	**Adequate**
Recommended CMP Studies *(for further CMP Stages)*	**High Priority**	**Medium Priority**	**Low Priority**

4.5.2 Inputs to the First Pass Risk Assessment

4.5.2.1 Data and Information Review

Outcomes of the data and information review were used in the first pass risk assessment to help identify coastline values and threats, and to help determine the adequacy of existing management and of existing information to manage known threats at present and in the future. The outcomes of the first pass risk assessment lead to the design of further studies to be completed in Stages 2 to 4 of preparing the CMP.

4.5.2.2 First Pass Risk Assessment Workshop and other Consultation

Feedback from the online survey and information sessions with the community were used to help identify and rank coastline values and threats.

A first pass risk assessment workshop was held, to provide input to the ranking of threats, and to existing management actions and information, particularly where this may not have been identified through the data review, and to provide insight as to how particular actions are enacted and implemented in practise.

Attendees to the workshop included stakeholders involved in the management of the Byron coastline, such as:

- Byron Shire Council staff from various departments (e.g. Coasts and Biodiversity, Open Space and Emergency Management, Environment and Economy Planning, Bush Regeneration,

Strategic Planning, Drainage, Stormwater Outlets and Assets, Environmental Health and Compliance);

- Members of Coastal Estuary Catchment Panel;
- Landcare and Dunecare;
- Traditional owners;
- Staff from Tweed Shire Council; and
- State agency representatives, such as from DPIE, NPWS, Crown Lands, Reflections Holiday Clarkes Beach.

First pass risk assessment worksheets with outcomes are provided in Appendix F.

Following the workshop, the assessment results were expanded upon using the information gathered from the data and information review. The results of the first pass risk assessment are used in the subsequent sections of this CMP Scoping Study and to inform forward works program.

4.5.2.3 Stakeholder and Community Consultation

Various stakeholder consultation activities were undertaken to capture information for use in this Scoping Study. These activities have the additional advantage of establishing the community consultation process that will be carried through the entire CMP preparation and implementation. Activities included:

- Regular contact with Council and DPIE representatives allowed for a flow of information relevant to the CMP;
- The First Pass Risk Assessment Workshop where activities were conducted to gather feedback from the state agencies and other stakeholders who are involved in coastal management; and
- Input from the community about how they use and enjoy the Byron Coastline, and their ranking of values and threats, through feedback to an online survey (reproduced in Appendix E), and a series of community information sessions.

Outcomes of consultation were used to develop sections of the strategic context (i.e. Section 3) and the first pass risk assessment, in particular, to identify and rank coastline values and threats, and to help determine the adequacy of existing management and existing information to manage known threats at present and in the future. The outcomes of this critical assessment lead to the design of further studies to be completed in Stages 2 to 4 of preparing the CMP.

4.6 Outcomes of the Assessment of Risk, Management Arrangements, Data Gaps and Recommended Studies

The following table provides the complete outputs of the first pass risk assessment, being the assessment of level of risk (current, future, overall), the discussion and then assessment of current management arrangements, discussion and assessment of information availability, and then outline of recommended studies, with priority for completion in Stage 2 or recommendation for future consideration during CMP development.

The recommended studies defined through this first pass risk assessment are then transferred to the forward program in Section 6 providing their priority, timing, cost and responsibility.

Table 4-3 First Pass Risk Assessment

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
I1	Coastal Hazards	T1	Beach erosion	Severity of beach erosion hazard varies along the study area, overall it is considered high, with key hotspots at: • Main Beach • The Pass • Clarkes Beach • Jonson Street Protection Works • Belongil Beach • Elements Resort • Tyagarah Beach • New Brighton Beach • South Golden Beach Consequences of beach erosion include: habitat disturbance and loss (especially dune habitats, but may also include littoral rainforest, coastal wetlands and associated fauna), unsafe access to the beach, loss of beach amenity and width (sand), loss of public foreshore reserves and access, loss of public assets and facilities, loss of private land and assets, loss or changes to existing surf breaks, etc.	High	High	High	• Coastal legislation (CM Act, CM SEPP) • LEP, DCP (Part J), CMA coastal Management SEPP and DA process • NPWS POM • Local Master Plans • Ad-hoc and formal protection structures e.g. Jonson St (seawall with spur groynes), rock and other materials at Belongil • Jonson St Protection Works currently being assessed for modification • Sand scraping at New Brighton • Dune management including revegetation, fencing (exclusion & sand catching) etc • Training walls - Brunswick River • Access management such as formal walkways and fencing • Existing court orders and approvals Gaps and improving management in the future: • Coordinated and consistent management approach for entire embayment • Funding • People's understanding of threat • Policy • Coordination of management between responsible parties • Place a value on natural area e.g. wetlands & rainforests • Understanding full impact of engineering solutions / avoid reactive (ad hoc) works • Viability of land acquisition (e.g. no current funding) • Downdrift management • Strengthen planning laws • Implications of relevant court orders and development approvals for management options • Coordination of management between responsible parties • People (education, cooperation and involvement)	Inadequate	• Coastal Hazard Management Study - Byron Bay Embayment - Final Revision 1.0 (2016 - ref 028). • Byron Shire Coastline Hazards Assessment Update (2013 - ref 021). Used latest modelling techniques and regional sediment compartment considered in assessment • Modification of Byron Shire Coastal Hazard Lines (2009 - ref 024). • Byron Bay Erosion Protection Structures – Risk Assessment (WorleyParsons, 2013) details condition and performance of existing structures. Gaps: • Hazard lines along National Parks and Reserves have not been mapped (although data would be available from 2013 study), and hazard lines have not been tied to known bedrock. • At high risk locations (i.e. The Pass through to Belongil, New Brighton Beach) a quantitative probabilistic approach may be required to extend to the 2100 planning horizon and include at risk areas (existing assessments in previous studies have covered part of the study area at risk to a 2050 timeframe, but may serve as a suitable base subject to review) in keeping with current NSW guidelines and to support a more rigorous and detailed risk based cost-benefit analysis of management options, given the known high risks at these locations.	Moderate	S2.01	Provide an Annexure to 2013 Hazard Update: use existing data to map the hazard lines for all unconsolidated shorelines in the Byron Bay Embayment (BBE) (e.g Tyagarah Nature Reserve), and tie hazard lines into areas of known bedrock to form a contiguous hazard map along the study area for each planning timeframe. Bedrock can be determined from existing quaternary geology mapping and site walkover (noting that if further resolution is required to determine bedrock extents, scope and costs to project may be enhanced such as per specified upper limiting fee). Existing hazard information for wave run up levels and overtopping and dune slope instability should also be used to extend coverage along the entire shoreline. **Note:** For cost saving purposes it is recommended that the Update / Annexure to 2013 Hazard Update be undertaken for the entire Shire coastline due to the commencement of the CMP for Southern Areas of the Coastline (incl Tallow and Belongil creek).	High	While the analysis and modelling undertaken for the Byron Shire Coastline Hazards Assessment Update (2013 - ref 021) remains a superior and cutting edge assessment of the region, the requirements for mapping outputs from hazards studies has changed. In particular: • Hazard mapping should capture all shoreline sections, including NPWS and Crown reserves (e.g. Tyagarah Nature Reserve), • Timeframes of present, 20, 50 and 100 years should be mapped, • New projections for sea level rise are now available, and • Hazard lines should be "tied" to areas of known bedrock to form a contiguous hazard map along the study area for each planning timeframe. Additional considerations for hazards assessment include: • Probabilistic modelling approaches are needed for highly challenging areas for management, • New data are available e.g. sea level rise projections, wave measurements, bathymetry (marine lidar etc), photogrammetry / lidar, risk assessment for erosion protection structures etc, • There are potential cost savings where this hazard line remapping can be combined with hazard assessments for beaches south of Cape Byron and / or beaches north of the LGA in the Tweed Shire, • If available, outcomes of the Entrance Stability Study for Belongil Creek (see Coastal Entrance Stability) should be included, to capture potential changes in the entrance channel and shoreline with sea level rise

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
															and with/without seawall structures (e.g. potential for breakthrough of Belongil spit), and • Assessment should include the new modification design of the Jonson Street Protection Works that is endorsed by Council. Based upon the above and recognising the high quality of existing information for coastal processes in the BBE, a shire-wide re-assessment of erosion and recession using probabilistic methods is recommended. Further details are given in the Forward Program.
		T2	Shoreline recession	Severity of beach shoreline recession varies along the study area, overall it is considered high, with key hotspots at: • The Pass • Clarkes Beach (holiday park, cabin, middens & stormwater infrastructure) • Main Beach (particularly if Jonson St Protection Works fail, park and township at risk) • Belongil Beach (Residential infrastructure, NPWS estate & Crown reserve) • Elements Beach • Tyagarah (wetland, rainforest, flora/fauna & access/ carpark) • Brunswick Heads Beach • New Brighton (roads, infrastructure and flora and fauna) • South Golden Beach • Little Wategos Beach • Wategos Beach Consequences of shoreline recession are as above for beach erosion, however there is ultimately no recovery of beach land after recession.	High	High	High	As above for beach erosion, noting that certain actions will become less effective overtime with recession e.g. beach scraping and dune management Gaps and improving management in the future: As above for erosion.	Inadequate	As above for beach erosion.	Moderate	S2.02	Probabilistic analysis of erosion and recession hazards for high risk locations (e.g The Pass to Belongil, New Brighton).	High	As above for “beach erosion”, shire-wide re-assessment of erosion and recession using probabilistic methods is recommended. Further details are given in the Forward Program.
		T3	Coastal inundation: wave runup and overtopping	Severity of coastal inundation varies along the study area, overall it is considered high, with key hotspots at: • Wategos Beach	High	High	High	• Monitor and respond under existing management structure • Ad-hoc and formal protection structures e.g. Jonson St (seawall with spur groynes), rock and other materials at Belongil Beach	Moderate	• Coastal Hazard Management Study - Byron Bay Embayment - Final Revision 1.0 (2016 - ref 028).	Adequate	S2.03	Mapping of a coastal vulnerability area identifying all applicable coastal hazards (e.g. see definition in the CM Act) and created in accordance with current	High	The erosion hazard mapping project may be a pre-cursor to the coastal vulnerability area mapping, or they may be conducted as a joint project. The outcomes of the cliff stability assessment will need

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
				• Clarkes Beach (carpark, cabins & Lawson St) • Jonson Street Protection Works • Main Beach • Belongil Beach (estuary, residential infrastructure, NPWS estate, & Crown reserves) • Tyagarah (Southern and car park) • Brunswick Heads Beach • New Brighton Beach • South Golden Beach Consequences of coastal inundation include wave impacts and water ingress over the period of storm (with water receding after the storm) into land and assets on top of and behind dunes and coastal barriers (e.g. revetments, breakwaters) and lower level bedrock outcrops. Damages may range from minor for habitats adapted to inundation, to major where a built asset requires fixing, removal or replacement after wave impacts and water ingress.				• Emergency response plan (inundation / disaster) • LEP, DCP (Part J), CMA coastal Management SEPP and DA process • Definition of flood levels (heights) • Sand scraping at New Brighton • Dune management including revegetation, fencing (exclusion & sand catching) etc • Training walls - Brunswick River Gaps and improving management in the future: • Coordinated and consistent management of threat • Consider raise and repair of protection structures • Acknowledge and prepare for sea level rise • Information and education about the threat (improve people's understanding) • Coordinated and consistent management approach for entire embayment • Funding • Policy • Coordination of management between responsible parties • People (education, cooperation and involvement)		• Byron Shire Coastline Hazards Assessment Update (2013 - ref 021). • Modification of Byron Shire Coastal Hazard Lines (2009 - ref 024). The above studies provide suitable information regarding dune and seawall wave run up and overtopping, and for the estuaries, of storm tide inundation and tidal (MHWS) inundation for current planning purposes. Gap relating to future CMPs at Belongil, Brunswick • In the future when flood modelling is updated for these locations, a flooding joint probability analysis (i.e. tide + storm surge + waves + catchment flood + sea level rise) in accordance with the latest guidelines, and also providing updated tidal inundation information should be completed.			guidelines. This will be used to support a Planning Proposal at a later stage of CMP preparation. A Planning Proposal will be prepared during Stage 2 of the CMP based on the outcomes of the hazard studies.		to be considered in determining if cliff stability is to be included in the coastal vulnerability area map.
		T4	Coastal entrance instability	Key hotspots threatened by entrance instabilities include: • Belongil Creek • Brunswick Heads (Breakwaters) The consequences of coastal entrance instability include erosion and loss of sandy areas, inundation and even sedimentation and shoaling within the zone where a coastal creek/river exits to the ocean. Belongil Creek has a natural entrance that is therefore able to move and meander in response to outflowing river and flood water and incoming coastal processes and storms (waves, tides etc). Allowing natural processes to operate effectively requires a wide buffer range for the location of the creek entrance and then minimal	Medium	High	High	• Strategic entrance opening (Belongil Creek) • Drainage Management Plan (in prep) • Training walls (Brunswick) Gaps and improving management in the future: • Coordinated and consistent management • Adaptable strategy for entrance management considering natural instability/dynamics and sea level rise • Maintenance and raising of training walls at Brunswick Heads	Moderate	Entrance stability and dynamics have been considered in previous assessments, such as in the context of interactions with the shoreline and resultant recession, and more generally for Belongil Creek in the Byron Shire Coastline Hazards Assessment Update (2013 - ref 021). A detailed study to investigate likely entrance dynamics and shoreline stability with sea level rise has not been conducted. DPIE - Crown Lands visually inspect the Brunswick Entrance Breakwaters on an annual basis and are currently considered in 'good' condition. The most recent condition assessment of the	Moderate	S2.04	Belongil Creek Entrance Stability Assessment, to assess geomorphic change to Belongil Creek entrance and adjacent shoreline with sea level rise (recession, inundation) and with/without seawalls on Belongil spit (e.g. potential for breakthrough of the spit).	Medium	This study shall investigate the change in morphology of the creek entrance (e.g. entrance position/meander, flood tide delta depth/width, sedimentation/erosion characteristics) sand adjacent shorelines for Belongil Creek and spit with sea level rise, under the interactions between the coast (i.e. waves and tides causing erosion and recession) and the catchment (i.e. flooding and drought on creek outflow). The study should also investigate the likely changes to entrance morphology and the potential for breakthrough of Belongil spit with and without seawall structures at adjacent shorelines (including as far south as Jonson St and as far north as Brunswick breakwater) and incorporating

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
				human intervention. At Brunswick Heads the entrance is permanently trained by breakwaters, however the natural ingress and movement of sand along, into and past the entrance does impact navigability for incoming/outgoing boats.						breakwaters was completed prior maintenance works in 2015/16. In the event that an annual inspection indicates an issue, more detailed investigations are triggered. Where major upgrades are proposed for breakwaters SLR projections are considered and incorporated into the design process.					Council's adopted entrance opening strategy. Under these scenarios, the study should also investigate the potential for wave progression through the estuary. This study is not required prior to preparation of the CMP (i.e. in Stage 2). Instead it could form an action to be considered for implementation through the CMP or future Belongil CMP. The outcomes of the assessment would feed into revised hazard assessments in future and management actions in future CMPs, including for Belongil.
												S2.05	A study on the impact of climate change projection (SLR) on the performance of the Brunswick Entrance Breakwaters.	Low	Study to consider performance under future sea level rise scenarios.
		T5	Dune slope instability	Where a steep erosion escarpment is left after a storm, the sand dries out and slips to return to the naturally stable angle of repose for sand (of around 30-35°) resulting in a further loss of land to the beach as the land slips. The area of land lost to land slip (zone of slope adjustment) and area of lower stability landward of this (zone of reduced foundation capacity) is directly related to the dune height of the erosion escarpment, with higher dunes resulting in greater land loss. Therefore, the potential severity of dune slope instabilities varies along the study area in relation to the varying dune height. Overall it is considered high, with key hotspots at: • Belongil & North Belongil (housing on dunes) • The Pass • Clarkes Beach (Holiday Park & Midden) Beach • Main Beach • Tyagarah Beach • New Brighton Beach	Medium	High	High	• Coastal legislation (CM Act, CM SEPP) • LEP, DCP (Part J), CMA coastal Management SEPP and DA process • Dune management including revegetation, fencing (exclusion & sand catching) etc • Access management such as formal walkways, fencing and stabilisation • Sand scraping at New Brighton • Ad-hoc and formal protection structures e.g. Jonson St (seawall with spur groynes), rock and other materials at Belongil Beach Gaps and improving management in the future: • Coordinated and consistent management • Information • Funding • People (Education, cooperation and involvement)	Inadequate	• Coastal Hazard Management Study - Byron Bay Embayment - Final Revision 1.0 (2016 - ref 028). • Byron Shire Coastline Hazards Assessment Update (2013 - ref 021).	Adequate		Allowances for reduced foundation capacity given in BMT WBM (2013) are sufficient for planning purposes.	n/a	No further studies recommended. Annexure to 2013 Hazard update to document hazards for currently unmapped areas should include dune stability hazards information from existing studies.
		T6	Cliff instability	Key hot spots threatened by cliff instabilities include: • Little Wategos Beach • Wategos Beach	Medium	Medium	Medium	• LEP & DCPs Gaps and improving management in the future:	Moderate	Gap in local (documented) information: • Cliff stability	Inadequate	S2.06	Localised cliff stability and risk assessment: to (a) determine if cliff stability is likely to pose a coastal hazard in the	High	The potential for cliff instability hazards in the study area has not been specifically assessed to date. In accordance with the CM Act and Manual, an

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
				• The Pass • Clarkes Beach The consequence of cliff instability is land slip and rock falls at cliff and bedrock outcrops adjacent to the ocean and beach. In some cases the landslip is a result of rainfall and weathering, and in some cases related to wave impacts at the base of a cliff (i.e., at or on top of a rock platform). Such risks may be exacerbated by higher water levels and wave impacts with sea level rise.				• Information • Public safety risk management • Coordinated and consistent management		• Consideration of impact of sea level rise on cliffs • Public safety risks and management			study area at present and in future with sea level rise, and determine if there are location(s) requiring further detailed assessment to define, map and project the hazard and (b) conduct a risk assessment for public safety (e.g. risk to life) from proximity to cliff edges, rock/land slip etc risk.		assessment is required to determine if and where cliff instability hazards may exist in the study area, with the focus at cliff or rocky outcrop areas. The study should identify if and where further detailed studies are required to better define the hazard. This includes consideration of whether cliff instability risks may arise or intensify in future with sea level rise. The second part of the study is to conduct a risk assessment for public safety in relation to cliff areas, to support coastal management actions for public safety.
I2	Re-creational Activities	T7	Loss of amenity due to conflicts between user groups on the beach and foreshore	Conflicts can occur between residents and/or visitors and will be enhanced by population growth (residents and visitors). Known hotspots include: • Tyagarah and Belongil Beaches (nudist and horses, illegal camping) • Main Beach (people, dog exercise areas, illegal camping) • The Pass (surfing etiquette) • Wategos Beach • The Wrecks • Brunswick Beach	Medium	High	High	• Active community initiatives and council policies to reduce illegal camping, plastic and waste "Plastics and Cigarette free beaches" • Police action to manage antisocial behaviour when it occurs. • Dogs walking zoned areas/ dedicated dog beaches/ dog bags • Signage • Rangers • Surf etiquette and signage • Compliance and policy (NSW) • Maintenance and asset / infrastructure investment, e.g. routine maintenance of beach ramp, beach accessways etc • Code of conduct - boat launching at The Pass • Licences for commercial tourist operators • Dune management including revegetation, fencing (exclusion & sand catching) etc (Council and volunteers, e.g. Byron bird buddies (fencing)) **Note**: Council has limited resources (compliance officers and rangers) and are constrained in the area of the coastline able to be effectively managed. Gaps and improving management in the future:	Moderate	The North Coast Regional Plan (ref 059) and North Coast Local Strategic Plan 2016-2021 (ref 060). Population and tourism statistics, community surveys. Prior CZMP has a subplan of recreational assets (e.g. accessways) and facilities (Part C Community Uses of the Coastal Zone). Shortly: LSPS will occur within the next 2 years. Gaps: • Shire-wide policy for beach use, access, congestion and overcrowding management (illegal camping etc) - and funding to implement • Up-to-date population and visitor statistics and projections for specific locations, to appropriately project and manage population growth, development and tourism pressures in these locations • Plan(s) of Management for public recreation areas (coming out of shire-wide policy) • Clear decision pathway / information from police on what is and how to report and seek	Inadequate	S2.07	Review and update Part C of the CZMP (Community Uses of the Coastal Zone), to ensure compliance with IPR Framework and inclusion of beaches, public reserves, recreation facilities, accessways etc in Council (and other State Agencies) in Asset Management Plans.	Medium	The 2016 CZMP provided a detailed inventory of public recreation assets. This study shall review this information, check its accuracy (e.g. in terms of data capture and asset condition), confirm the information is included appropriately in Asset Management Plans, and confirm a consistent approach / criteria for logging data and condition across the study area, to keep the information updated overtime. In order to support maintenance, replacement and renewal of recreational assets on the coastline, the asset management plan should include all coastline recreational infrastructure, facilities and reserves, including the beaches themselves, e.g. beach access ways / ramps, carparks, surf clubs, toilets, beach showers, playgrounds, picnic tables, bbqs, boat ramps (noting boating is typically RMS responsibility), fish cleaning tables etc. Up to date asset information will assist with planning for current and future recreational demand (residents and tourists).
		T8	Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated infrastructure and facilities	Increasing use and overuse is a result of increased tourism, coastal development and population. Existing infrastructure and facilities that support beach use include carparks, toilets, showers, picnic tables, boat ramps, beach accessways, and parkland. Increasing use and demand can exacerbate the creation of informal accessways in public reserves and from private properties and trampling, in turn leading to dune damage and disruption to shorebirds and other habitat. Illegal camping can occur all year round but increases during holiday periods. High risk locations include: • Wategos Beach • The Pass • Clarkes Beach	High	High									

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
				• Main Beach inc Jonson St works • Belongil Beach • Brunswick Beach • South Brunswick surf club • New Brighton Beach • South Golden Beach				• Coordinated and consistent management and provision of infrastructure • Asset management: maintenance, upgrades, renewal projects • Currently no management plan for the Old jetty -crown reserve (no facilities, no management) • Additional resources for compliance and monitoring		assistance for antisocial behaviour • Evidence based research on the potential effects on wildlife from various recreational uses, and how to manage the impacts sympathetically					
		T9	Loss of amenity due to poorly located, poorly maintained or inappropriate beach access and supporting facilities	• Old Jetty (erosion of dune area at crown reserve) • Belongil Beach • Main Beach • Clarkes Beach	Medium	High						S2.08	Economic valuation of the coastal zone (ie all natural and built assets, including beaches themselves) based upon the combined social, environmental and economic benefits of/from the asset. The study should also evaluate site / location specific population and visitor statistics and projections as part of determining the economic value of the coastal zone. This information shall provide important information for the analysis (MCA, CBA) of options during CMP Stage 3-4. It shall also support the provision of appropriate facilities in appropriate locations to cater for current and projected recreational demand (e.g. S2.10). The study could also ultimately support future consideration of a 'carrying capacity' concept that attempts to limit overuse of areas subject to high occupation and use during peak times (linked to action S2.09).	Medium	The study should provide key data about the economic value derived from beaches, dunes, and associated facilities in terms of their combined social, cultural, environmental and economic benefit, including estimating the economic value of coast-dependant industries such as tourism. Population projections and resident/tourism statistics shall also be developed, to support the economic valuation, and to provide the economic basis for provision of recreational facilities to meet the recreational demand from current and future residential and visiting populations (e.g. such as through a shire wide beach policy, and supporting subplans/masterplans/POMs, asset management plan and asset renewal plans). This study would feed into the cost benefit analysis of management options during CMP Stage 3-4. This study is not vital to the preparation of the CMP as a Stage 2 or 3 study but should be considered as a potential action when preparing the CMP.
		T10	Antisocial behaviour and unsafe practices (e.g partying, fires on the beach)	The behaviour results in broken glass, hot coals & parties on the beach, which are unsafe for other beach users and may disturb habitat. Occurring at the following key hotspots: • Belongil Beach • Main Beach • Clarkes Beach • South Golden Beach • Tallow Creek • Cosy Corner (Tallow Beach)	High	High										
		T11	Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking	Uncontrolled beach access can result in dune habitat degradation and shorebird nesting disturbance. Recreational use can result in litter and plastics on the beach and in the ocean. Hotspots include: • New Brighton • Belongil Beach (nesting sea birds disturbed by public) • Brunswick Heads	Medium	Medium						S2.09	Evidence based research on the potential effects of various recreational uses on wildlife and habitats in coastal areas, and how to manage the impacts sympathetically (in alignment with BC Act and MEM Act objectives)	Medium	Research project may be through a partnership with a local university. Project shall seek to deliver an evidence basis for potential impacts from various recreational activities on wildlife in coastal regions, particularly in dunes and on the beaches. Through same or second part of project, investigate novel solutions to manage impacts sympathetically should be investigated. The findings would support the development and delivery of

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
															access and other facilities on the coastline, such as implemented through the shire-wide beach policy, masterplans/POMs, or asset management plan. This study is not vital to the preparation of the CMP as a Stage 2 or 3 study but should be considered as a potential action when preparing the CMP.
		T12	Adverse social or environmental impacts resulting from recreational boating and fishing	The following locations are impacted by speeding and speed boats: • Marshalls Creek • Brunswick River • Simpsons Creek • Recreational fishing can also be a source of litter and plastics in the marine environment if not properly managed (e.g. ready access to bins, regular emptying, education etc).	High (during holidays) Low to Medium (outside holidays)	High						S2.10	Shire-wide policy for beach use, access, congestion and overcrowding management, with site specific subplans / masterplans outlining asset replacement, and new facilities to meet current and future recreational demand (i.e. residents and tourists).	Low	This study is not vital to the preparation of the CMP, and instead could form an action for consideration in the CMP. However, the significant and ongoing growth in tourism in Byron is certainly an issue for the coast that will need to be specifically investigated and managed, in order to protect the substantial values associated with Byron. The shire-wide policy and supporting subplans/masterplans, POMs (new, updated), asset renewal plans and update to Asset Management Plans may form separate studies, or two parts to a single project. It is noted that POMs are now to be completed in line with the Crown Land Management Act 2016 reforms and Local Government Act 1993 (i.e. as community land). In developing the policy, explore opportunities to provide environmentally sensitive, controlled access to environment areas so that the community can enjoy the amenity and develop a greater sense of 'ownership' of the natural assets of their area.
I3	Coastal Development Expansion and Intensification	T13	Loss of plant and animal species (habitat disturbance or loss) due to coastal development	Increasing visiting and resident populations results in intensification and expansion of coastal development. The consequence of this is increased potential for habitat disturbance and loss particularly on greenfield sites. There is also increased pressure on recreational resources and beach amenity. If not properly managed, coastal development can also reduce water quality	High	High	High	• CM SEPP (wetland and littoral rainforest protection) • Biodiversity Conservation Act • NPWS Plans of Management (Tyagarah, Clarkes Beach) • LEP, DCP (Part J), CMA coastal Management SEPP and DA process • Existing residential and land use zoning • Education	Moderate	Vegetation mapping, species and habitat characterisation studies, are variously available across the study area, and are regularly updated	Adequate		No stage 2 studies are required.	n/a	Preparation of the CMP will greatly assist with this issue by indicating land at risk from coastal hazards and supporting the planning system to better plan for coastal risks and population growth on the coast (e.g appropriate buffers to allow dune transgression and shoreline recession). In addition to this, actions to specific appropriate buffers for habitat for developments, biobanking

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
				and increase quantity of runoff into creeks, and increase litter and plastics entering the creeks and ocean. While water quality issues occur mostly within the estuaries, coastal rivers and lagoons (which may run into the ocean and largely be dispersed) there is also the potential for direct impacts from development via stormwater outlets onto the beach (e.g. at The Pass through to Main Beach). Urban development pressure is evident at the following beachside locations: • Little Wategos Beach • Wategos Beach • The Pass • Clarkes Beach • Main Beach • Belongil Beach (inc. intensifying of development within coastal hazard zone) • Elements Resort • New Brighton Beach • South Golden Beach				• Signage Gaps: • Need for stronger legislation and policy • Need for greater awareness of planning information and documents						and offsets etc should be considered for inclusion when preparing the CMP.
		T14	Reduced water quality in ocean due to run off from coastal development (new and old)		Medium	High	Medium	• Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (herein termed 'OEH's Risk Based Framework') is a mandated OEH process for assessing impacts to waterways from urban runoff, for both new and existing development. • With respect to the Creeks and Lagoons (to be covered by a future CMP), the following information was collected. Existing management arrangements: • Barricading and use of signs to stop swimming in the lagoons due to poor water quality • EPA has requested Council to implement Beach Watch to monitor E.coli levels in Lagoons • Standard Asset management practises for stormwater assets (e.g. outlets to the beach) Gaps include: • Education on importance of vegetating river banks to filter agricultural run off • Council implementation of new/best practise methods (e.g. OEH's Risk Based Framework) in landuse planning and asset management to manage existing stormwater runoff issues • Funding	Moderate	Beach Watch WQ monitoring program (100 samples/data, testing of E. coli), however this program doesn't require sampling for other indicators or other toxic algae (Cyanobacteria or Blue green algae). Potential Council investigation into cross connection of sewage to stormwater network.	Moderate		No further stage 2 studies are specified.	n/a	OEH's Risk Based Framework is the currently mandated method for testing and specifying stormwater management requirements for new and existing developments. A wealth of information relating to the RIsk Based Framework such as modelling of waterways is already available from DPIE. When preparing the CMP, an action could be considered that requires the implementation of DPIE's Risk Based Framework as part of the DA process (e.g. as a requirement for subdivisions/major developments) and as part of the asset management plan process (i.e. for replacing stormwater infrastructure by Council).
		T8	Coastal development contributing to T8: Loss of amenity and habitat disturbance due to increasing use, overuse, and overcrowding at the beach and associated		Medium	High	Medium	See above for T8	Moderate	See above for T8	Inadequate		Various, see above for T8	n/a	n/a

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
			infrastructure and facilities												
		T15	Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts	Poorly sited coastal development - and associated works such as revetments etc - may negatively interact with natural coastal processes, which may result in enhanced hazards impacts (particularly to the poorly sited coastal development or adjacent coastal land and natural/built assets. Poorly sited coastal development may also enhance pressure for hard engineering and protection works, further damaging the natural coastal environment. This threat relates to historical developments (e.g. Belongil, Main Beach etc) and future developments (as yet unspecified).	High	High	High	As for coastal hazards above	Inadequate	As for coastal hazards above	Moderate		As for coastal hazards above	n/a	As for coastal hazards above
I4	Engage-ment, Govern-ance and Compliance	T16	Impacts resulting from a lack of compliance with regulations or lack of regulatory action taken for compliance	Examples of non-compliance may include: • Belongil sea walls • Destruction of dune vegetation • Development or use of land in breach of conditions of development consent or restrictions as to use	Medium	High	High	• LEP, DCP (Part J), CMA coastal Management SEPP and DA process • CM Act and CM SEPP • Rangers • Education campaigns • Volunteer groups Gaps: • Shire wide competing priorities for resourcing of compliance action • Insufficient finance allocation for compliance officers • Fact sheets and easily digestible information (digital format and hard copies), e.g. to support people's understanding of values and threats • Coordinated and consistent management approach for entire embayment • Coordination of management between responsible parties • Funding	Inadequate	There is information available associated with community awareness, engagement and governance including for the Community Strategic Plan, and past community surveys, community information sessions, and consultation activities.	Adequate		No stage 2 studies are required.	n/a	While no studies are specified for Stage 2, it is recommended that actions to increase/enhance community education efforts to support key coastal values and management objectives be considered in preparing the CMP. Likewise, actions to support / expand compliance, and to support/improve governance and implementation of the CMP should also be considered for inclusion, when the CMP is being prepared. The Community and Stakeholder Engagement Plan to be implemented throughout the CMP development process.
		T17	Impacts resulting from insufficient community awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment	• Absentee landlords and leasing of properties for holiday rental can exacerbate the disconnection of the community with their coastal environment Key coastal environments of high value include: • Dunes • Nature reserves • National parks • Riparian areas • Buffer areas	High	High									
		T18	Insufficient or inappropriate governance	Where governance and management is lacking or inappropriate, this may	High	High									

Issues		Threats / Hazards			Risk			Current Management Arrangements		Information and Data Available		Recommended Studies (Stage 2)			
No.	Name	No.	Description	Key "hotspots" threatened	Current	Future	Overall	Description	Adequacy	Key references, Gaps	Adequacy	No.	Name	Priority*	Type of study / Level of detail / Comments
			and management of the coastal environment	exacerbate all of the other threats noted above, e.g. insufficient, inappropriate or ineffective land use planning for coastal development that cannot ameliorate potential impacts, lack of appropriate management and provision for recreation on the coast, which may exacerbate damage to coastal environments (particularly the dunes) and conflict between users, or a lack of management of coastal hazards may exacerbate offsite or ongoing negative impacts, and so on.										

*Priority is in terms of the need for the study in Stage 2, to support delivering the subsequent stages of the CMP. This may be different to the priority or need for the study itself, which may still be high-medium-low in terms of its value to managing the coastline at Byron.

4.7 Limitations

Section 3 provides the strategic context of the study area and in particular details a variety of 'hard' and 'soft' management strategies that have been applied as coastal management approaches over the past 50 years.

The FPRA considers these as 'Current Management Arrangements' in the context of the issues, threats/hazards currently faced by the study area. Additionally, a subjective assessment of the current and future risks to the coastline was completed. Overall the FPRA provides an indication of the overall current and future resilience of the coastline against the identified issues and threats/hazards.

A potential limitation of the review of management arrangements and the FPRA is a critical analysis of the existing management strategies to identify their individual effectiveness in managing the identified issues and threats/hazards. The availability of this information would remove the need for subjective assessment of likely effectiveness of past approaches to the management of the coast.

It is suggested that during the preparation of the CMP and prior to the identification of management options via the CMP process (i.e. Stage 3), that the past and likely future effectiveness of existing management strategies be determined. This consideration of existing management options should include opportunity and vulnerability considerations, particularly due the expected variability of conditions along the coast over the planning timeframe. Some options are likely to be more effective under current conditions, but potentially less so in the future under changed circumstances. This vulnerability aspect of options is an important consideration to enable potential 'programming' or 'sequencing' of management options. Such a review if undertaken should establish a consistent assessment framework to enable a measure of comparability amongst options, noting that they are extremely varied (i.e. planning controls vs hard coastal protection, etc).

5 Preliminary Business Case

A CMP aims to provide for the coordinated, strategic and integrated coastal zone management of the coastal zone of the study area over the immediate and medium term with consideration of long-term vision and trends (i.e. 10 years plan, considering hazards to 2100). By providing a consolidated and coordinated management strategy for the Byron coastline, from Cape Byron to South Golden Beach, a CMP will provide the action plan for maintaining and improving the health of the coast and the environmental, social and economic values underpinned by this.

Reforms to the NSW coastal management legislative and regulatory framework present a unique opportunity to build on the existing coastal management work considering lessons learnt, and improved engagement and collaboration with relevant stakeholders and agencies, preparing a holistic, inclusive CMP for the Cape Byron to South Golden Beach area.

The reasoning for preparing a CMP is further described herein including:

- Economic, environmental and social basis;
- Governance basis; and
- Evidence and analysis supported coastal management.

Followed by and outline of:

- Benefits of preparing a CMP;
- Risks of preparing and not preparing a CMP; and
- Funding and Financing Considerations of Preparing the CMP.

5.1.1 Economic, Environmental and Social Basis

The Byron coastal area contains a rich diversity of desirable, valuable and sometimes rare natural, cultural and built assets. The apparent density of these values in a relatively small location provides it with unusual value and status. In terms of social recognition Byron Bay is the most highly recognised region in NSW (excluding the City of Sydney) (BSC, 2014) and it has higher levels of visitation that of much larger cities (.id 2018). Linkages between tourism to Byron Bay and the coastline are identified in many texts (BSC, 2014, WRL, 2016).

The natural environment is highly bio-diverse and is also locally enriched by a long history and ongoing connection of Aboriginal people with this coast, post-European settlement heritage and a unique modern surfing culture. However, the coastline is used for a wide variety of passive and recreational pursuits beyond surfing.

As such the coastline supports many significant and important environmental, economic, socio-cultural values and community benefits. These values and benefits are threatened by increasing pressures including coastal hazards, climate change, sea level rise, population and tourism growth and coastal development.

A CMP will provide comprehensive strategic vision and action plan, locally contextualised and enabled through a government supported process, for managing the priority issues affecting the study area.

5.1.2 Governance Basis

The challenges and opportunities outlined above and throughout this scoping study have been considered previously. A large body of work has been undertaken by Council and state agencies developing significant knowledge of the coastal dynamics and threats to the Byron coastline (particularly of coastal hazards including shoreline erosion and recession). In addition, the recently refreshed NSW coastal management framework and grants program, provides a platform to build on existing work and prepare an inclusive, collaborative CMP for the area.

As described in the strategic context section of this Scoping Study (refer Section 3), there are many organisations from the federal, state, regional to local level that are involved and have responsibilities in governing and managing the Byron coastline (full listing providing further described in Appendix C). Current land ownership within the study area is presented in Figure 3-1 to Figure 3-3, illustrating the study area is comprised of a complex mixture of private freehold land, Crown land reserves, conservation areas, nature reserves, marine park, road and rail reserves. Collaboration¸ cooperation and resource support amongst the land owners and managers is required to provide effective coastal management outcomes, particularly in consideration of management options which may influence coastal processes and create associated impacts to the coastal environment.

The preparation of the CMP represents a significant strategic opportunity to improve engagement with the various land owners, coastal managers and stakeholders and establishing their commitment to contribute towards the necessary studies and implementation of management actions as agreed within the final CMP.

Furthermore, engagement and consultation with the local community and key stakeholders conducted as part of this scoping study has highlighted the expectations of the community to progress with coastal management; as well as the willingness of key stakeholders and the support from relevant public authorities. A coordinated and collaborative approach to managing the study area will result in additional benefits to the Council, and state agencies, compared to these stakeholders undertaking the CMP process in isolation.

5.1.3 Evidence and Analysis Supported Coastal Management

Effective coastal management is often impeded by gaps in data and information to allow for necessary analysis required for well-informed decision making. The preparation of a CMP provides an excellent opportunity and an operationalised process for filling data and information gaps around the environmental, social-cultural, economic and governance of a study area. For example, the extent and level of coastal hazards, the ongoing changes of community and tourism use and pressures and the changing economic activity and trends at the local and regional scale.

A CMP will require a detailed risk assessment and fit-for-purpose cost benefit analysis be undertaken to guide the selection of management options. Thus, the CMP process provides a mechanism for developing effective management of short-term risks, and for developing adaptation pathways for long term risks; such as shoreline recession and tidal inundation from sea level rise; or effective planning schemes to manage the expected population and tourism pressures and changes to community structure along the coastal area that threaten coastal and marine health.

The CMP process allows for the continuing development of information and knowledge to fulfil its needs but will as a priority build upon the significant body of information and knowledge of processes, values and issues that has been developed for the region over a long period of time.

5.2 Benefits of Preparing a CMP

Key benefits of preparing a CMP for the Cape Byron to South Golden Beach coastline include informing decision making for coastal management options; which involves deep uncertainty and complexity through:

- Numerous uncertain processes and a large number of future scenarios (including sea level rise, increased storm intensity and frequency, and development and tourism pressures); and
- A large number of potential mitigation and management options (including statutory planning, policy development and structural interventions).

Therefore, within the coastal management framework and specifically a CMP, it is critical that decision-makers have a proper understanding of the risks and opportunities within the coastal zone and the consequences of specific courses of action. Accurate and detailed information about risk and consequence is necessary to assist decision makers generate effective management strategies which identify and prioritise future actions and investment or justify a business-as-usual approach.

Working collaboratively to attract supporting funding and investment; a robust and comprehensive CMP will help to provide a clear and strategic value proposition for achieving the shared vision for the coast. It will support the necessary partnerships with local government, state agencies, the private sector and other key stakeholders to better align their priorities and investments, seeking and raising additional funding collaboratively to achieve identified strategic objectives.

Improved capacity to address strategic and sediment compartment-wide issues and interests; the study area forms part of a secondary coastal sediment compartment (Point Danger – Cape Byron), which includes the coastline of the Tweed LGA. Further, this secondary compartment is encompassed by a larger primary sediment compartment (Point Danger – Richmond River) which includes coastlines of Tweed, Byron and Ballina LGAs). Collaboration between Councils within the sediment compartment (as directed via s16, CM Act, 2016) should result in benefits that contribute to improved environmental, economic and social outcomes through strategically addressing regional issues and interests such as:

- Resilience generated by improved networks and relationships;
- Improved knowledge and capacity building;
- Improved access to skills, expertise, experience and specialist services;
- Adequate consideration and agreed approaches to cross-boundary issues; and
- Improved communication, advocacy and promotion.

5.3 Risks of Not Preparing and Preparing the CMP

5.3.1 Key Risks of Not Preparing the CMP

Risks include:

- Limitation of funding for coastal management actions – Not preparing a CMP, will prevent Council from applying for and thus obtaining funds from the NSW Coastal and Estuary Program. This will significantly limit the ability to implement actions for coastal management of the Byron coastline.
- Immediate loss or damage to coastal areas - the 'Byron Bay Erosion Protection Structures – Risk Assessment' (Worley Parsons, 2013) identified that every structure assessed in the Main/Belongil Beach Study Area had some effect (or risk of effect) on resilience (i.e. wave impact, overtopping and geotechnical stability), coastal processes (effects on sand transport and beach form), coastal ecology and public use and amenity. Nine structures were assessed as having a high or extreme rating in one or more categories. Most of the works were identified as having impacted on local coastal processes through outflanking/dislodgement of rocks and end-wall erosion effects. This includes the Jonson Street Protection Works which were identified as degraded and not compliant with contemporary coastal engineering design standards and thereby presented an immediate threat to the structural integrity of the works and structures in the areas such as the Byron Bay Memorial Pool, Byron Bay Town Centre, adjacent lands and reserves, development and infrastructure.
- Reduced values and cost implications – Risk of reduction of the values of the Byron coastline (naturalness, amenity, ecological, socio-cultural, economic, etc.), due to increasing pressure on the Byron coastline from coastal development, tourism, habitat disturbance, population growth and coastal hazards exacerbated by sea level rise and climate change. Without a comprehensive management plan (i.e. CMP) for the study area, the community and stakeholders risk to lose part of the values they hold dearly. In turn, this is likely to result in additional cost in the long term, especially along sections of the coastline (e.g. beaches and dunes) being 'squeezed' between coastal development on the land side and a rising sea level on the ocean side.
- Opportunity cost – Failing to develop a long-term strategic plan could result in a long-term missed opportunity cost, i.e. the opportunity to reduce future risks and associated financial costs through planning for future outcomes is diminished or lost. The preparation of a CMP provides an excellent mechanism for assessing these risks, and developing actions relating to strategic land use planning and development controls.
- Adaptation cost – Substantial costs are expected for failing to prepare a CMP with thorough consideration and assessment of coastal and climate change adaptation options. According to the Australian Business Roundtable for Disaster Resilience and Safer Communities (November 2017) current insurance and damage costs of natural disasters in Australia is $9B per year, while in NSW over the past decade these costs have averaged $3.2B per year, with storms accounting for 49% of this cost and flooding 23%. Climate change is projected to increase the frequency and severity of climate-related natural disasters. It is predicted that annual costs of natural disasters in Australia will be $33B by 2050 with the total economic cost

of natural disasters in NSW predicted to reach $10.6B per year by 2050, a growth rate of 3.4% per year. A CMP provides a mechanism to assess the risks to existing assets (natural and built) from coastal and climate related hazards and provide a subset of adaptation outcomes. The CMP should serve as a basis for suitable, practical and most affordable actions to manage the risks to existing assets, and a pathway for when and how such actions shall be implemented over the short to long term. Stage 3 of preparing a CMP enables potential actions to be subject to detailed cost benefit analysis, such that the economic cost savings from avoided damages to natural and built assets can be estimated.

- Limitation of liability for coastal management – Section 733 of the *Local Government Act 1993* provides statutory exemption from liability for Councils in respect of advice, actions or omissions in good faith relating to the likelihood of land being affected by a coastal hazard. Actions covered include the making of a Coastal Management Program. Acting substantially in accordance with the principles and mandatory requirements set out in the Coastal Management manual is also relevant to the indemnities afford by s.733. Pursuing a CMP, in accordance with the Manual may reduce the exposure to liability for decisions made or not made relating to coastal risk. This inherently includes climate change related threats, especially sea level rise (e.g. coastal hazards), as climate change related hazards are a core element of the CM Act and the Manual's requirements for CMPs.

5.3.2 Key Risks of Preparing a CMP

Risks include:

- Expectations of the local community and stakeholders – The community and stakeholder engagement and consultation to support preparation of the CMP is likely to create (or exacerbate) expectations in the community for implementation of actions for coastal management. An inherent risk lays thereafter if the CMP process then fails to deliver the actions, or if these actions do not achieve the vision and objectives of the CMP.
- Council accountability and obligations for implementing the CMP – As the leading entity preparing and driving the CMP process, once gazetted Council has accountability and implementation obligations, which include:

  Under Division 4 section 22 of the Coastal Management Act:

  (1) A local council is to give effect to its coastal management program and, in doing so, is to have regard to the objects of this Act.

  (2) In particular, without limiting subsection (1), a local council is to give effect to its coastal management program in:

  (a) the preparation, development and review of, and the contents of, the plans, strategies, programs and reports to which Part 2 of Chapter 13 of the Local Government Act 1993 applies, and

  (b) the preparation of planning proposals and development control plans under the Environmental Planning and Assessment Act 1979.

- Conflict with other resource commitments and demands of Council and agencies – Preparing a CMP may result in conflict within Council and contributing agencies, in terms of competing

need for scarce resources (including but not limited to funding and staff). However, the CMP preparation process should be thorough, so any potential conflicts are identified, and controls are implemented to mitigate associated risks.

5.4 Funding and Financing Considerations of Preparing the CMP

5.4.1 Estimated Cost of Preparing the CMP

The total cost of preparing the CMPs is estimated to be between $405,000 and $750,000. The range provides for uncertainty in the costs of certain activities as recommended in the forward program, particularly items such as the cost benefit analyses (CBA) which may be required to assess preferred options which are currently unknown. The costs of the CBA will be more for more expensive and complex management options. The reasoning and benefits of conducting the CMP are evident, as outlined in the preceding section. Funding opportunities, responsibilities and cost sharing opportunities are detailed below.

5.4.2 Utilisation of Previous Investment in Technical Investigations

Byron Shire Council has invested significant time and resources into coastal management over the past few decades. Despite not having a certified coastal management plan, this earlier investment in the completion of technical and management investigations is still largely relevant and will be utilised going forward to achieve both time and cost saving within the new CMP framework.

Review of the content of these earlier studies have identified that the following information will likely be relevant and of utility going forward (please note the list is not exhaustive):

- Hazards modelling completed as part of the Hazards Update (BMT WBM 2013). This study had a shire wide focus, but did not map hazard lines for all areas, i.e. NPWS lands and some beaches. It will be possible to utilise existing methodologies and models, augmented with additional information as required to extend and improve hazard lines within the study area.
- Probabilistic hazards modelling completed as part of the Coastal Hazard Management Study for Byron Bay Embayment. This modelling has been completed for the Byron Bay Embayment (Clarkes to North Beach) out to a 2050 framework. As such its coverage excludes the northern extent of the study area and its planning timeframe is truncated relative to the requirements of this study.
- Identification and assessment (condition, vulnerability, etc) of coastal structures/assets (such as houses, sheds, sewer, stormwater, beach accesses, footpaths, roads, etc) has been completed as part of the Coastal Hazard Management Study (WRL, 2016). This information may be of utility going forward subject to review of information if new hazard lines are developed as a result of revised or updated modelling, and as influenced by any management options ultimately selected. Valuations completed in the study may also be of use, subject to update. It is worth noting the coverage excludes the northern extent of the study area.
- Preliminary selection and review of management options. A number of previous studies have identified, reviewed and assessed physical and planning based management options for the study area. Elements of the supporting work used in these assessments are likely to have

utility, subject to verification of the assumptions that have underpinned the assessment (i.e. coverage, modelling, financial analyses, etc). Management options have been outlined with the previous Coastal Hazard Management Studies for sections of the Byron Bay Embayment (WRL, 2016, 2018) and potentially within earlier technical publications.

- Community uses assessment have been completed for the Byron Bay Embayment (WRL, 2016) and includes a detailed review of public beach access and walkways. This information will likely be of use for the southern sections of the study area subject to review and update noting that recent erosion has impacted on accesses at Clarkes Beach and other accesses in the study area have been subject to upgrade and modification. The assessment will need to be extended to the northern sections of the study area.
- A few Emergency Action Subplans have been prepared in preceding Coastal Hazard Management Studies (WRL 2016, 2018) focused on the southern portions of the study area. Depending on management options selected and the effects of legislative changes, portions of these emergency action subplans may be able to be adapted to form a new plan for use going forward.

While the full utility of these works has not been assessed at this stage, the Forward Plan considers their potential use in providing its cost estimate range, i.e. with high utility of existing information some cost saving may be achieved. It is acknowledged that these earlier studies generally had a different focus area to that of this CMP and as such the information may not be comprehensive across the current study area. Additionally, there has been extensive development of new methodologies (such as for Cost Benefit Analysis) developed to support the Coastal Management Program which makes earlier assessment methodologies redundant, however, some of the supporting information used within the studies may still remain relevant.

5.4.3 Funding

5.4.3.1 Opportunities

Major reforms have recently taken place and associated government funding has been allocated for coastal management ($87M package) and managing the marine estate (an initial $46M package). These funding packages should be available to support preparation of CMPs, and further studies that support the management of the marine estate. Most of the state funding to prepare the Cape Byron to South Golden Beach CMP is expected to come from the NSW Coastal and Estuary Grants Management Program, with the expectation that this will match the monetary contribution from Council.

There are other grant programs that may be suitable for funding further studies associated with preparing the CMP. Many of these programs, such as the NSW Environmental Trust, may also be available to fund implementation of actions specified in a CMP. Funding contributions may also be available through partnerships aligned groups and individuals. Supporting in-kind resources may also be available via community participation and input from other interests particularly research institutions.

5.4.3.2 *Constraints*

Although there are funding opportunities (outlined above) available to support CMP preparation and further studies, funding for implementation of management strategies is reliant on certification of the CMP. Over the preceding years, Council attempted numerous times to prepare a certifiable coastal plan (CZMP) but all plans developed remain uncertified. This has meant that most funding and resourcing for implementation of coastal projects including general repairs and maintenance (accessways, dune restoration etc.) has relied on internal funding which is minimal.

Funding the actions in the CMP will be an important consideration as NSW Coastal and Estuary Grants Management Program generally only fund on a 50% basis. Funding and resource constraints will need to be considered in more detail in Stage 3 of the process depending on the management approaches determined by Council through the CMP process. Resolving issues related to funding may require, for example, targeted discussions with the community, landholders, businesses, or investigations into fund raising mechanisms.

5.4.4 Opportunity for Multi-LGA Combined Studies

Section 1.4.2 identifies that the study area of this CMP (Byron coastline, from Cape Byron to South Golden Beach) is part of larger sediment compartments, i.e. secondary compartment (Point Danger – Cape Byron) and primary compartment (Point Danger – Richmond River). This includes coastline of three LGAs in the Far North Coast Region (Tweed, Byron and Ballina). Therefore, a possibility worth exploring for completion of certain studies recommended for Stage 2 of the CMP is that of extending the area of those studies to cover portions or the entire sediment compartment. It is noted that this approach has been utilised in previous studies of such as the Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013). The approach can provide a variety of benefits.

6 Forward Plan

6.1 Section Overview

As stated in the Manual and as outlined in Section 1.3, preparation of the CMP is to be completed following a staged process (illustrated in Figure 1-2). The subsequent stages in this process after this Stage 1 Scoping Study are:

- *Stage 2 – Determine risks, vulnerabilities and opportunities* (through further detailed studies);
- *Stage 3 – Identify and evaluate options* (through risk assessment and cost, benefit analysis);
- *Stage 4 – Prepare, exhibit, finalise, certify and adopt a CMP* (leading to implementation); and
- *Stage 5 – Implement, monitor, evaluate and report* (to feedback to the cycle).

This section provides:

- CMP Implementation obligations for Councils and public authorities;
- A summary of the requirements, process and expected outcomes for Stages 2 to 4 outlined from the Manual (Part B);
- A section with considerations, analysis of options and recommendations related to governance of the CMP project going forward; and
- A summary of the recommended studies, investigations and assessments proposed forming the forward program, as an outcome of this Stage 1 Scoping Study.

The section summarises with details of the way forward for Council through the CMP.

6.2 CMP Implementation obligations for Councils and public authorities

Obligations for Councils and public authorities for implementation of the CMP are defined with Division 4 (22 and 23) of the Coastal Management Act, 2016. These are:

- **Councils**

  (22). Implementation of coastal management program by local councils

  (1) A local council is to give effect to its coastal management program and, in doing so, is to have regard to the objects of this Act.

  (2) In particular, without limiting subsection (1), a local council is to give effect to its coastal management program in:

  (a) the preparation, development and review of, and the contents of, the plans, strategies, programs and reports to which Part 2 of Chapter 13 of the Local Government Act 1993 applies, and

  (b) the preparation of planning proposals and development control plans under the Environmental Planning and Assessment Act 1979.

- **Public Authorities**

(23). Other public authorities to have regard to coastal management program and coastal management manual

(1) Public authorities (other than local councils) are to have regard to coastal management programs to the extent that those programs are relevant to the exercise of their functions.

(2) In particular, those public authorities are to have regard to relevant coastal management programs and the coastal management manual in the preparation, development and review of, and the contents of, any plans of management that those public authorities are required to produce and, in doing so, are to have regard to the objects of this Act.

6.3 CMP Stages 2 to 4 Key Requirements – from the Manual

6.3.1 Stage 2 – Determine risks, vulnerabilities and opportunities *(through further detailed studies)*

Stage 2 of the CMP process involves undertaking detailed studies that will assist Council in identifying, analysing and evaluating risks, vulnerabilities and opportunities in the study area. The studies conducted during Stage 2 are to provide information to support decision-making in the subsequent stages of the CMP planning process.

In summary, the Coastal Management Manual identifies Stage 2 as including the following:

- Engaging with the community and stakeholders;
- Refining understanding of key management issues;
- Identifying areas exposed to coastal hazards and threats to coastal values;
- Analysing and evaluating current and future risks (detailed risk assessment);
- Identifying scenarios for social and economic change and related opportunities for coastal communities;
- Preparing a planning proposal to amend maps of coastal management areas, to commence the Gateway process; and
- Identifying timing and priorities for responses, thresholds and lead times.

6.3.2 Stage 3 – Identify and evaluate options *(through risk assessment and cost, benefit analysis)*

Stage 3 of the CMP process requires Council to identify and evaluate possible management options in order to select preferred coastal management actions to address the issues identified as affecting the CMP study area. The aim of Stage 3 is to develop strategies and actions that reduce exposure to coastal hazards, address coastal management issues and take advantage of opportunities.

In summary, the Coastal Management Manual identifies Stage 3 as including the following:

- Identifying and collating information on management options;
- Evaluating management actions, considering:
    - Feasibility (is it an effective and sustainable way to treat the risks?);

- Viability (economic assessment);
- Acceptability to stakeholders;

- Engaging public authorities about implications for their assets and responsibilities;
- Evaluating mapping options and implications if a planning proposal is being prepared;
- Identifying pathways and timing of actions; and
- Preparing a business plan for implementation.

6.3.3 Stage 4 – Prepare, exhibit, finalise, certify and adopt a CMP *(leading to implementation)*

Stage 4 of the CMP process involves a draft coastal management program being prepared, exhibited and then submitted to the Minister for certification. It is a mandatory requirement of the Coastal Management Manual that a draft CMP be exhibited for a period of at least 28 calendar days. It is also a requirement under Section 16 of the CM Act that consultation is carried out during the preparation of the draft CMP.

Once the CMP is certified by the Minister, Council must publish it in the Gazette. The CMP takes effect on the date on which it is published in the Gazette (or on a later date if specified in the CMP).

6.4 CMP Project Governance Considerations

This section informs the governance arrangements for the preparation and delivery of the CMP. It reviews and provides recommendations for CMP Governance, Roles and Responsibilities.

6.4.1 CMP Structure and Project Governance

The NSW Coastal Management Framework provides flexibility around the scope, structure and governance arrangements of a CMP.

A CMP provides a unique opportunity for Council, state government agencies and their communities to achieve a strategic and coordinated approach to manage coastal risks and improve coastal habitats and environments, for both environmental and social (community) benefit within the Byron Shire.

Council will manage the CMP development, implementation and reporting process(es). This includes the preparation, development and review of, and the contents of, the plans, strategies, programs and reports to which Part 2 of Chapter 13 of the *Local Government Act* 1993 applies, and the preparation of planning proposals (if required) and development control plans under the *Environmental Planning and Assessment Act* 1979.

Potential governance and management arrangements for the CMP are outline in Table 6-1.

Table 6-1 Potential CMP Governance and Management

Entity	Responsibility
Byron Shire Council	Lead agency, coordination, implementation
State Agencies/Land Managers Department of Planning, Industry and Environment Department of Industry– Crown Land and Water Department of Primary Industries – Fisheries National Parks and Wildlife Services NSW Environment Protection Authority Roads and Maritime Services Transport for NSW Maritime Infrastructure Delivery Office NSW Crown Holiday Park Land Manager (T/a Reflections Holiday)	Sign off on CMP, collaboration and action(s) implementation (as defined)
Coastal Advisory Committee Byron Shire Council Agencies (above who have direct land ownership and management responsibilities the CMP area) Regional Bodies (LLS, RDA, LALC,etc) Selected community and user group(s)	Non-statutory committee to assist facilitating local community and stakeholder involvement and oversight of the planning and implementation process(es). (Advisory only, potentially a committee of council under S355 of the *Local Government Act* 1993)

6.5 The Way Forward: CMP Stages 2 to 4 Recommended Studies, Investigations and Assessments – Indicative Cost and Timeline

The recommended studies, investigations and assessments for Stages 2 to 4 of the CMP are listed in Table 6-2, as derived from the first-pass risk assessment, review of current management arrangements and data and information review.

Table 6-2 provides indicative costs for the studies, and a combined cost for undertaking the CMP stages. The table also provides a timeline for completion of the studies.

In relation to the timeline for the Forward Plan (refer Table 6-2) it has been prepared insomuch as possible to align with the Integrated Planning and Reporting (IP&R) Framework espoused by the NSW Office of Local Government and reproduced in Figure 6-1.

The Delivery Program is where the community's strategic goals are translated into actions. In the IP&R framework, the Delivery Program is a fixed four-year plan, which is a statement of commitment from each newly elected Council. Council presently has a Community Strategic Plan for 2018-2028 with a Delivery Plan for 2017-2021. The Operational Plan (OP) is based on a yearly financial year cycle. Local Government elections have been postponed until September 2021 following which will be an opportunity to revise the Community Strategic Plan and associated Delivery and Operational Plans.

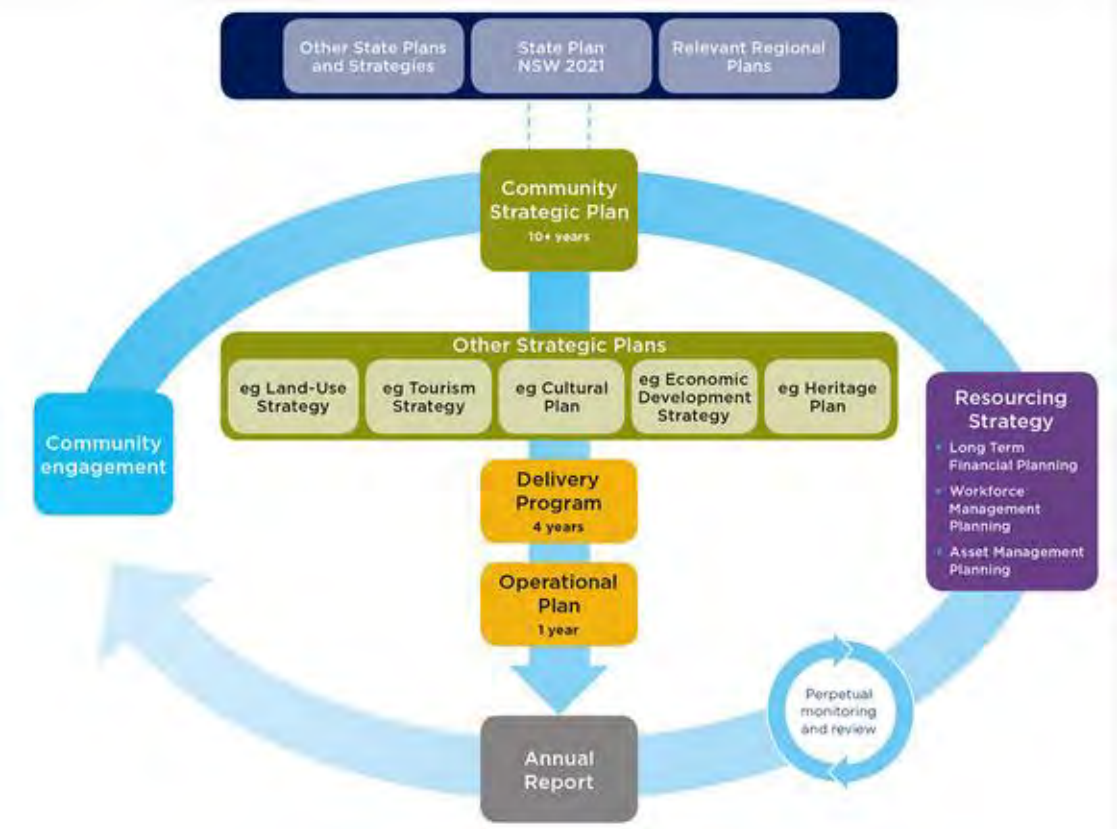


Figure 6-1 Integrated planning and reporting framework (Source: Office of Local Government)

In Table 6-2 it should be noted that cost estimates are based on available information, experience, and expert judgement. A range of cost (Low – High) is provided to account for uncertainty regarding application and level of detail required to provide sufficient detail of management action purposes (i.e. fit for purpose).

Table 6-2 includes recommendations of responsibilities and partnerships for those actions. Actions will have a Lead Agency assigned to a Forward Plan action, this is the agency which is best placed to undertake or facilitate the action in partnership with relevant state funding agencies and other project outcome beneficiaries. The Lead Agency will generally be the sole resource/funder for delivery of the action. The actions also identify Support Agencies which may be required and/or requested to assist in the delivery of the action, either through their regulatory role or land management function, information source (data and literature) or as a potential funding source.

6.6 Engagement and feedback from public authorities

During the development of the draft Scoping Study staff liaised with key representatives of relevant agencies to discuss the Scoping Study and seek preliminary feedback and comments on the draft study in general. In accordance with the NSW Coastal Framework and CMP process there is no prescribed requirement for or formal public exhibition process of a Scoping Study, however the study was put on Council's website welcoming public feedback from 20 December 2019 to 3 February 2020.

It is critical to the success of the CMP development process that relevant state agencies have early involvement and understanding of the CMP Scoping Study recommendations to ensure they endorse their future role and/or responsibility in later stages of CMP development and actions outlined in the Forward Plan. As such more detailed feedback was provided to Council by the relevant state agencies and these comments were considered and incorporated into this Scoping Study.

The additional studies identified and prioritised through the course of this scoping study (refer Table 4-3) are listed with indicative costings in Table 6-3. This list is a starting point for actions to be assessed during the preparation of the CMP as funds and requirements permit. The additional studies generally add extra layers of context and support information to inform options selection and overall cost benefit analyses processes.

Table 6-2 Forward Plan, Indicative Costs, Timeline and Responsibility for Preparation of the CMP

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support agency
Stage 2: Risks, Vulnerabilities and Opportunities							
Coastal Hazard Studies							
S2.01	Update the beach erosion and shoreline recession hazards assessment using a probabilistic approach for the entire shire coastline, as follows. • Utilise key findings from the Byron Coastal Hazard Assessment Update (2013) as core inputs to the probabilistic models (e.g. for LST, storm demand, wave energy transformation coefficients etc). • Involve key experts from the NSW Government, academia and the various consultancies who have studied Byron's coastal processes over the last 50 years in finalising the inputs to parameters for the models. The probabilistic approach allows for the full range around the "mean" values presented in BMT WBM (2013) to be investigated and qualified (e.g. the mean and + / - ranges for LST, etc). • Incorporate the latest SLR projections into the model(s). • Consider how the probabilistic model(s) will need to be designed to capture alongshore variations in key inputs and processes. For example, there may be separate models south and north of Cape Byron, to enable the distinct variation in shoreline structure and its effect on shoreline hazards to be captured. • Incorporate correlations into the probabilistic approach. For example the extreme erosion observed at the southern end of the BBE in recent years is due to a more "north/easterly" wave direction that more directly impacts the southern shoreline and slows (or even stops) LST around Cape Byron into the southern shoreline, enhancing erosion. Such correlations (e.g. between beach erosion and LST under certain wave conditions) would need to be included in the probabilistic model. • Hazard mapping output should be provided for all sandy shoreline sections, and tied into areas of known bedrock, to ensure a contiguous hazard "line" for the LGA. The advantages of a shire wide probabilistic approach are as follows.	High	Op. Plan 2020-2021	$ 80,000	$ 140,000	Council	DPIE-EES NPWS

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support agency
Stage 2: Risks, Vulnerabilities and Opportunities							
Coastal Hazard Studies							
	• Conducting the assessment for all shire beaches (i.e. South and North of Cape Byron) is more cost effective for Council (and DPIE as the main funding partner). • There is not a substantial cost difference for conducting the probabilistic assessment for specific beaches compared with for all beaches in the shire. • A shire-wide assessment enables new timeframes for hazard output to be applied consistently across the LGA (i.e. present, 20, 50 and 100 years). • A shire-wide assessment enables mapping to be undertaken for all shoreline sections, i.e. capturing NPWS reserves also. This ensures the hazard mapping is contiguous and developed with a consistent methodology across the entire LGA. Given NPWS is now part of DPIE, co-funding by DPIE may be considered to cover NPWS's component for mapping, noting that the cost of mapping NPWS sections when done in concert with the remainder of the shire will be substantially lower than conducting for NPWS alone. New SLR projections and other key considerations for input parameters (e.g. LST past Cape Byron) can be incorporated into the hazard re-assessment, consistently for the entire shire.						
S2.02	Mapping of a coastal vulnerability area identifying all applicable coastal hazards (e.g. see definition in the CM Act) and created in accordance with current guidelines. This will be used to support a Planning Proposal at a later stage of CMP preparation (if selected for preparation).	High	Op. Plan 2020-2021	$ 5,000	$ 10,000	Council	DPIE-EES, NPWS
S2.03	Localised cliff stability and risk assessment: to (a) determine if cliff stability is likely to pose a coastal hazard in the study area at present and in future with sea level rise, and determine if there are location(s) requiring further detailed assessment to define, map and project the hazard and (b) conduct a risk assessment for public safety (e.g. risk to life) from proximity to cliff edges, rock/land slip etc risk.	High	Op. Plan 2020-2021	$ 10,000	$ 20,000	Council	DPIE, Crown Lands, NPWS
S2.04	Community and Stakeholder Engagement Strategy (CSES). Apply the overall CSES to develop an engagement plan for Stage 2. The overall	High	Op. Plan 2020-2021	$ 10,000	$ 20,000	Council	DPIE-EES

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support agency
Stage 2: Risks, Vulnerabilities and Opportunities							
Coastal Hazard Studies							
	CSES provides for internal and external engagement activities for all stages of the CMP. Indicatively, Stage 2: workshops, presentations, fact sheets, website updates, meetings.						
S2.05	Continue design investigation for the modification of the coastal protection works at Main Beach, Byron Bay (Main Beach Shoreline Project)	High	Op. Plan 2020-2021	$0 (already funded)		Council	DPIE-EES
S2.06	Assessment of the past effectiveness and likely future utility of existing coastal management strategies (hard and soft) and the legal and factual matrix including planning frameworks, court orders and development approvals, on the likely viability and/or feasibility of key management options (i.e. in Stage 3) that may be considered for future coastal management in the study area.		Op. Plan 2020-2021	$ 20,000	$ 30,000	Council	
S2 01-06	**Estimate Stage 2 Subtotal**			**$ 125,000**	**$ 220,000**		

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support agency
Stage 3: Identify and Evaluate Options							
S3.01	Full Scale Risk Assessment The assessment should utilise and build upon existing elements of the WRL (2016) study that have been determined to be fit for purpose through detailed review e.g., • Asset condition assessment • Coastal protection works assessment • Overview / explanation of coastal management options.	High	Op. Plan 2021 - 2022	$ 20,000	$ 30,000	Council	DPIE-EES
S3.02	Identify Potential Management Options and evaluate through Multi-Criteria Analysis (MCA) of Options and determine actions for detailed BCA. The assessment should utilise and build upon existing elements of	High	Op. Plan 2021 - 2022	$ 25,000	$ 35,000	Council	DPIE-EES

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support agency
Stage 3: Identify and Evaluate Options							
	the WRL (2016) study that have been determined to be fit for purpose through detailed review.						
S3.03	Benefit Cost Assessment (BCA) of Options requiring detailed analysis (e.g. required for options >$1M) (based on estimated 10-15% of capital cost).	High	Op. Plan 2021 - 2022	$ 100,000	$ 250,000	Council	DPIE-EES
S3.04	Draft Business Plan for CMP Implementation.	High	Op. Plan 2021 – 2022	$ 15,000	$ 30,000	Council	DPIE-EES
Community and Stakeholder Engagement Strategy							
S3.05	Community and Stakeholder Engagement Strategy (CSES). Apply the overall CSES to develop an engagement plan for Stage 3. The overall CSES provides for internal and external engagement activities for all stages of the CMP. Indicatively, Stage 3 activities may include: fact sheets, information sessions, presentations, surveys, workshops/meetings, targeted key stakeholder and community investigation into 'Willingness to Pay/Funding'	High	Op. Plan 2021 - 2022	$ 50,000	$ 75,000	Council	DPIE-EES
S3 01-05	**Estimate Stage 3 Subtotal**			**$ 210,000**	**$ 420,000**		

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support Agency
Stage 4: Identify and Evaluate Options							
S4.01	Prepare CMP (draft) document, including: Executive summary; Introduction; A snapshot of issues; Actions to be implemented by the local council; Actions to be undertaken by public authorities; A business plan; A coastal zone emergency action subplan; Mapping; Reference list; and Supporting documentation.	High	Op. Plan 2022 - 2023	$ 30,000	$ 40,000	Council	DPIE-EES
S4.02	Planning Proposal (only as required) to adopt the coastal vulnerability mapping (see S2.03) as a "Coastal Vulnerability Area" of the coastal zone in the CM SEPP. The advice of DPIE – Planning is that the planning proposal can only be assessed and approved after the CMP is certified, however the	High	Op. Plan 2022 - 2023	$ 10,000	$ 20,000	Council	DPIE-EES, DPIE - Planning

Item	Recommended Studies / Components	Priority	Timing	Cost (Low)	Cost (High)	Lead Agency	Support Agency
Stage 4: Identify and Evaluate Options							
	community consultation conducted through the course of the CMP can also be conducted in tandem for the planning proposal.						
S4.03	Finalising the CMP (with Community and Stakeholder public exhibition feedback).	High	Op. Plan 2022 - 2023	$ 10,000	$ 20,000	Council	DPIE-EES
Community and Stakeholder Engagement Strategy							
S4.04	Community and Stakeholder Engagement Strategy (CSES). Apply the overall CSES to develop an engagement plan for Stage 4. The overall CSES provides for internal and external engagement activities for all stages of the CMP. Indicatively, Stage 4 activities include public exhibition sessions and surveys, fact sheets, presentations, workshops, consultation with DPIE and Coastal Council finalising CMP, meetings activities may include: fact sheets, information sessions, presentations, surveys, meetings.	High	Op. Plan 2022 - 2023	$ 20,000	$ 30,000	Council	DPIE-EES
S4 01-04	**Estimate Stage 4 Subtotal**			**$ 70,000**	**$ 110,000**		

Table 6-3 Additional Recommended Studies for Consideration in the CMP(s)

Item	Recommended Studies / Components	Priority	Cost (Low)	Cost (High)	Lead Agency	Support Agency
Stage 2 Determine risks, vulnerabilities and opportunities	Belongil Creek Entrance Stability Assessment, to assess geomorphic change to Belongil Creek entrance and adjacent shoreline with sea level rise (recession, inundation) and with/without seawalls on Belongil spit (e.g. potential for breakthrough of the spit).	Medium	$ 20,000	$ 50,000	Council	DPIE - Crown Lands, DPIE-EES, NPWS
	Review and update Part C of the CZMP (Community Uses of the Coastal Zone), to ensure compliance with IPR Framework and inclusion of beaches, public reserves, recreation facilities, accessways etc in Council (and other State Agencies) in Asset Management Plans.	Medium	$20,000	$30,000	Council	DPIE - Crown Lands
	Economic valuation of the coastal zone (ie all natural and built assets, including beaches themselves) based upon the combined social, environmental and economic benefits of/from the asset. The study should also evaluate site / location specific population and visitor statistics and projections as part of determining the economic value of the coastal zone. This information shall provide important information for the analysis (MCA, CBA) of options during CMP Stage 3-4. It shall also support the provision of appropriate facilities in appropriate locations to cater for current and projected recreational demand. It could also ultimately be used to support future consideration of establishing the 'carrying capacity' concept that attempts to limit overuse of areas subject to high occupation and use during peak times (linked to action on recreational use impacts).	Medium	$ 80,000	$ 150,000	Council	DPIE - Crown Lands
	Evidence based research on the potential effects of various recreational uses on wildlife and habitats in coastal areas, and how to manage the impacts sympathetically (in alignment with BSC Act and MEM Act objectives)	Medium	$30,000	$60,000	Council	DPIE-EES, NPWS, DPI (Fisheries)
	Shire-wide policy for beach use, access, congestion and overcrowding management, illegal camping, with site specific subplans / masterplans outlining asset replacement, and new facilities to meet current and future recreational demand (i.e. residents and tourists), linkage with Crown Land Plans of Managements and existing Council Asset Management Plans.	Low	$ 50,000	$ 100,000	Council	DPIE - Crown Lands
	A study on the impact of future climate change projections (sea level rise) on the performance of the Brunswick Entrance Breakwaters.	Low	$ 40,000	$ 50,000	DPIE -Crown Lands (MIDO)	Council, DPIE-EES

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Appendix A Stakeholder and Community Engagement Strategy

Byron Shire Council Coastal Management Program

Stakeholder & Community Engagement Strategy

Client: BMT/Byron Shire Council
Date: 24 October 2019

A Veris Company

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Prepared by	
Reviewed by	
Date	24 October 2019
Version	9

Contents

TABLES

APPENDICES

Introduction

This engagement strategy has been prepared in accordance with:

- *The Coastal Management Act 2016*, and related *Guidelines for community and stakeholder engagement in preparing and implementing a CMP* (May 2018) (the Guidelines).
- Byron Shire Council *Community Engagement Policy* (2018) (the Policy).

Project Context

Byron Shire Council is preparing a Coastal Management Program (CMP) for the Byron coastline, from Cape Byron to South Golden Beach.

The *Coastal Management Act 2016* (CM Act) includes a requirement for Council's to consult with the community and stakeholders before adopting a CMP. Part A of the coastal management manual (the manual) prescribes statutory provisions and mandatory requirements relating to the design and delivery of community and stakeholder engagement. These mandatory requirements relate solely to the minimum period of 28 calendar days the CMP must be exhibited for. This mandatory requirement does not preclude or prevent additional community engagement, which is encouraged in the Guidelines.

Structure of this Engagement Strategy

This engagement strategy outlines:

» Preliminary stakeholder analysis
» Study Area Context
» Stages approach and engagement implementation strategies.

The engagement strategy provides a staged approach, aligning with the five-stage process for preparing a coastal management program. An evaluation framework is incorporated, and it is envisaged that the strategy will be reviewed and revised on a stage-by-stage basis, particularly on conclusion of Stage 4.

Approach & Principles of Engagement

The approach and principles of engagement for this project are supported by both the Guidelines and the Policy. These are underpinned by the International Association for Public Participation (IAP2) approach to engagement and specifically the IAP2 engagement spectrum.

The principles for this engagement strategy are outlined in Table 1, and include the principles contained within the Guidelines for Community Engagement in Preparing and Implementing a CMP (the Guidelines) as well as Council's Community Engagement Policy 2018 (the Policy).

Table 1 Principles of Engagement

IAP2 Core Values	Council's Community Engagement Policy Values
1. Public participation is based on the belief that those who are affected by the decision have a right to be involved in the decision. 2. Public participation includes the promise that the public's contribution will influence the decision. 3. Public participation promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers. 4. Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision. 5. Public participation seeks input from participants in designing how they participate. 6. Public participation provides participants with the information they need to participate in a meaningful way. 7. Public participation communicates to participants how their input affected the decision.	1. Council will improve understanding of communities through engaging with them in new and different ways that reflect community diversity. 2. Information is accessible, timely, relevant, balanced and easy to understand. 3. Identify and seek contributions, feedback and ideas from people/groups that may have an interest in specific issues. 4. Ensure everyone understands the purpose of each engagement and how their contributions will be considered. 5. Inform people about Council's decisions, how and why they were made and how community input was considered. 6. Regularly review and update Council's engagement techniques to learn and improve.

The Study Area – Community & Stakeholders

Understanding the Study Area

The importance of considering the social characteristics of the study area is embedded in the CM Act through the Guidelines. This section outlines a high-level analysis of the study area, and implications for the community and stakeholder engagement strategy.

Table 2 Contextual Analysis (South to North)

Suburb	Description
Byron Bay	Byron Bay is a prominent coastal / beachside holiday destination. The town comprises significant scenic beaches, and coastline including Cape Byron lighthouse. The urban form is characterised by a relatively low density, compact commercial access with direct access to the coastline. The sensitive coastal environment with hazards and flooding, has influenced how the town has expanded over the years. The community actively contributes to the protection, enhancement and maintenance of important local habitats.
Brunswick Heads	Brunswick Heads is smaller than Byron, located in an area of natural significance, adjacent to the mouth of the Brunswick River. The natural landscape is made up of beaches, rivers and green spaces, with development surrounding this. Current residents are keen to identify ways to refresh and bolster the aging resident population.
New Brighton and South Golden Beach	New Brighton and South Golden Beach are developed within a protected coastal wetland. Few properties have views of the beach due to the height of dunes, resulting in frequents conflicts with informal beach access points over dunes, removal of vegetation and dumping. Key values include the use of the beach, while coastal zone issues include dog management, use of the aerial aspect over beaches and severe erosion during storm events.

Source: Byron Shire Council Community Strategic Plan - Our Byron Our Future: Draft Community Strategic Plan 2028

Implications for the Engagement Strategy

The diverse and complex coastal environment, and unique social characteristics of the distinct sub-areas within the study area point to the need for an adaptive, flexible and robust engagement strategy.

Consultation tools, and specifically face-to-face engagement will need to be well designed and facilitated to manage conflicting and divergent perspective, expectations, and varying degrees of appetite to manage risk.

The high level of holiday / part-time residents supports the use of online engagement and mailouts to registered owners, to ensure the needs of non-resident users are captured and incorporated into the CMP.

Stakeholder Analysis

Table 3 outlines the high-level stakeholder analysis for the project, including level of engagement on a stage-by-stage basis.

The specific outcomes of the CMP and related coastal management actions may involve collaboration with agencies or stakeholders listed below, and as such the level of engagement should be reviewed at the commencement of each stage of the project.

The stakeholder analysis, including level of influence outlined in Table 3 has been completed during the Stage 1 – Scoping Stage step of the project. The consultation strategy is designed to be iterative, with updates following evaluation at the conclusion of each stage. This may include level of engagement on a stage by stage basis.

Table 3 Stakeholder Analysis

Type	Organisations	Engagement level by Stage				
		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Government (State and Federal)	Federal and state members of Parliament	-	Inform/ Consult	Inform / Consult	Inform	-
Councils	Byron Shire Council	Empower	Empower	Empower	Empower	Empower
	Tweed Shire Council		Inform	Consult	Consult	Consult
State / Federal Government Agencies	Office of Environment and Heritage	Inform/ Involve	Inform/ Involve	Inform/ Involve	Consult	Inform/ Involve
	Department of Industry – Crown Land and Water	Involve/ collaborate	Involve/ collaborate	Involve/ collaborate	Involve/ collaborate	Involve/ collaborate
	Department of Primary Industries – Fisheries	Involve / Consult	Involve / Consult	Involve / Consult	Involve / Consult	-
	Department of Planning and Environment	-	Consult	Consult	Consult / Empower	-
	National Parks and Wildlife Services	-	Involve/ Consult / collaborate	Involve/ Consult / collaborate	Involve/ Consult / collaborate	Involve/ Consult / collaborate
	NSW Environment Protection Authority	-	Inform/ Consult / Involve	Inform/ Consult / Involve	Inform/ Consult / Involve	-
	Roads and Maritime Services	-	Consult / Involve	Consult / Involve	Consult / Involve	-
	Transport for NSW	-	Inform / Consult	Inform / Consult	Inform / Consult	-
	Police / SES	-	Inform / Consult	Inform / Consult	Inform / Consult	Involve
Advisory bodies	Regional Advisory Committee	-	Involve / Empower	Involve / Empower	Involve / Empower	Involve / Empower

Type	Organisations	Engagement level by Stage				
		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Scientific Committee	-	-	Involve (pre-draft)	-	-
Aboriginal	Local Aboriginal Land Councils (LALC) (Including Arakwal)	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve
	Other Land Councils/ Corporations	-	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve
	Government	-	Involve	Involve	-	-
	Individuals	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve
Community organisations	Chambers of commerce/ local business groups	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve
	Residents groups/ Progress associations	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve
	Heritage	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve
	Local conservation/ landcare / dunecare organisations	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve
	Recreation/ user groups	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve	Consult / Involve
	Peak bodies	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult
Private organisations	Commercial operators	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve
	Local businesses	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve
	Education/ research facilities	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve	Consult/ Involve
Individuals	Landowners	Inform / Consult	Inform/ Involve	Inform / Involve	Inform / Involve	Inform/ Involve
	Volunteers	Inform / Consult	Involve / collaborate	Inform / Consult	Inform / Consult	Inform / Consult
	Community members (registered)	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult
	Visitors	-	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult
	Community members (not registered)	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult	Inform / Consult

1 STAGE 1: Identify the Scope of the CMP

This stage sets the scene for the broader coastal management program development.

Consultation will support the development of the CMP by:

- Collecting information about the coast, including community perception, values and lived experience.
- Identifying affected stakeholders and individuals, and map level of interest and influence.
- Through active stakeholder engagement, identifying:
  - Issues and opportunities
  - Perceptions and experiences of existing management arrangements
  - Known knowledge gaps and studies required to support a CMP.

Table 4 Stage 1 Engagement Strategy – Identify the Scope of a CMP

Timing	November 2018 – March 2019
Status	Complete
Consultation Aims & Expected Outcomes	**Awareness / Information Sharing** » Increase community awareness for the project, why it is required (the need, and the legislation) » Explain why the process is being repeated for the Byron Coastline due to the introduction of the new legislation. » Clearly outline coastline management roles, and the responsibility of Byron Shire Council. » Increase community and stakeholder understanding of the dynamic nature of coastal processes (sea level rise, etc), risks and opportunities. **Relationship building** » Develop good working relationships with key stakeholders. » Establish a transparent dialogue with the community, including key community organisations such as Dunecare. **Information Gathering** » Understand community goals and aspirations for the coastal area within the study area, from Cape Byron to South Golden Beach. » Distinguish the differences and identify shared community aspirations, goals and priorities across the various areas, including Byron Bay, Brunswick Heads, New Brighton/Ocean Shores and South Golden Beach. **Scope Consultation** » Understand how the community prefers to engage, which tools work, timing, and location. » Determine consultation activities for future stages of engagement (this report, Sections 2 through 5).

Engagement Policy & Framework	This engagement strategy has been prepared to align with the existing Byron Shire Council Policy: Community Engagement 2018.
Level of Engagement	Inform, Consult, Involve
Level of Influence	**Council** » Decision Making – what will the process looking like? **Stakeholders** » Participation, provision of information, sharing perspectives. **Community** » Participation, provision of information, sharing perspectives, sharing values and lived experience.
Engagement Tools	Tools identified in accordance with Byron Council's Engagement Policy: » Council website » Social media » Media releases » E News » Advertising » Foyer displays » Mailouts » Written submissions » YoursayByronShire.com.au » Stakeholder groups (risk workshop and invites to Pop-ups) » Pop-up shops, stalls, drop-in events » Surveys and opinion polls » Community Roundtable and Project Reference Groups » On-site meetings/tours

2 Stage 2: Determine Risks, Vulnerabilities & Opportunities

This stage involves the detailed scientific, engineering, economic and social studies to support the technical knowledge base underpinning development of the CMP.

Consultation will support the development of the CMP by:

- Continuing to build awareness in the community, including educating and informing on the complexity of coastal processes such as climate change.
- Prepares the community for subsequent stages, including the detailed review of and decision-making surrounding options and solutions.
- Begins to outline the differences in coastal processes in the varied parts of the study area (e.g. South of Brunswick Heads, vs New Brighton Beach).

Table 5 Stage 2 Engagement Strategy – Determine Risks, Vulnerabilities & Opportunities

Timing	Commencing July 2020
Status	Pending
Consultation Aims & Expected Outcomes	**Community Awareness / Understanding** » A shared understanding of the extent and nature of risks and opportunities. » Clearly articulated types of actions that could be implemented, and the risks / benefits of each. » Shared understanding or acknowledgement of different opinions and perspectives on coastal management, e.g. Belongil vs New Brighton. » Increased community trust and acceptance of technical input, based on their direct input into the process and technical studies. » Community understanding of vulnerability, risk and opportunity studies, including technical aspects such as scenarios for sea level rise, hazards and impacts. This including understanding assumptions, methods and limitations of studies. » Clearly outline coastline management roles, and the responsibility of Byron Shire Council. **Internal Understanding** » Council understands the community's risk 'appetite' and extent of action likely to be supported. » Council has refined and understands the community social and economic characteristics, and how this relates to management actions in Stage 3, particularly the differences in the study area from Cape Byron to South Golden Beach. **Relationship building** » Continued good working relationships with key stakeholders. » Ongoing transparent dialogue with the community, including key community organisations such as Dunecare.

Engagement Policy & Framework	This engagement strategy has been prepared to align with the existing Byron Shire Council Policy: Community Engagement 2018.	
Level of Engagement	Inform, Consult, Involve	
Level of Influence	**Council** » Decision Making, educating **Stakeholders** » Participation, provision of information, sharing perspectives, identifying risk, educating. **Community** » Participation, provision of information, sharing perspectives, identifying risk, sharing values and lived experience.	
Engagement Activities – Why and How? Tools identified in accordance with Byron Council's Engagement Policy	**Engagement Elements**	**Tools and Techniques**
	Explaining Coastal Hazards, risk and threats: » Explaining technical terminology. » Explaining concepts associated with risk management, including hazard vulnerability, resilience, sensitivity, exposure, threat, probability and risk. » Exploring the dynamic nature of coastal processes and coastal ecosystems. » Relating this directly to the various localities within the study area.	» Council website » E News » Foyer displays » Mailouts » YoursayByronShire.com.au » Stakeholder groups (risk workshop and invites to Pop-ups) » Pop-up shops, stalls, drop-in events » Surveys and opinion polls » Community Roundtable and Project Reference Groups » On-site meetings/tours » Establish Coastal Management Advisory Group
	Explore Socio-economic issues » Improve understanding of how user groups use the various beaches and coastal areas within the study area. » Map preferred access points. » Understand how communities' access coastal information. » High level economic impact analysis on business dependence on the coastline. » Source historical and anecdotal evidence of past coastal processes (e.g. photos)	» Mailouts » Written submissions » YoursayByronShire.com.au » Stakeholder groups (risk workshop and invites to Pop-ups) » Community Roundtable and Project Reference Group**s** » Pop-up shops, stalls, drop-in events » Surveys and opinion polls » On-site meetings/tours
	Detailed landholding analysis » Explore impacts of coastal risks on affected properties / landholders. » Review scenarios, including timeframes, impacts of major storms and climate change.	» Mailouts » Written submissions » YoursayByronShire.com.au » Stakeholder groups (risk workshop and invites to Pop-ups) » **Community Roundtable and Project Reference Groups**

	» Review risk and actions, and test landholders' appetite for each alternative.	
	Project Awareness » Continue to build project awareness and understanding about coastal risk assessment processes.	» Council website » Social media » Media releases » E News » Advertising » Foyer displays » Mailouts » Written submissions » YoursayByronShire.com.au » Stakeholder groups (risk workshop and invites to Pop-ups) » Pop-up shops, stalls, drop-in events » Surveys and opinion polls » Community Roundtable and Project Reference Groups » On-site meetings/tours
	Impact on Adjacent Jurisdictions In consultation with adjacent Councils and National Parks, explore: » Coastal hazard and risk assessment within coastal sediment compartments, including the implications of separate studies relating to catchments of coastal lakes and estuaries. » Coastal wetland and littoral rainforest communities that cross council boundaries. » Land use or coastal access arrangement for continuous coastal settlements	» Stakeholder groups (risk workshop and invites to Pop-ups) » On-site meetings/tours

3 Stage 3: Identify & Evaluate Options

This stage involves the identification and evaluation of management options to address the coastal risks and opportunities identified in Stages 1 and 2.

Consultation will support the development of the CMP by:

- Involving the community and stakeholders in considering options at both the regional and local scale for management of coastal risks and opportunities.
- Ensure options are understood, and that preferred arrangements are consistent with the principles of the CM Act.

Table 6 Stage 3 Engagement Strategy – Identify & Evaluate Options

Timing	TBC
Status	Pending
Consultation Aims & Expected Outcomes Aiming to build on the relationships and outcomes of Stage 1 and 2.	**Feasible and Viable Options are understood** » The community and stakeholders understand the scope and cost of feasible and viable options in managing the identified risks. **Community & Stakeholder Understanding and Participation** » Community and stakeholders understand the need to prioritise actions, and how this will be done. » Stakeholders, including public authorities, contribute to the identification and evaluation of management options. » The community understand the cost and benefits of management options. » The community and stakeholders are aware of, and understand the consequences of any planning proposal prepared to amend mapping of coastal management areas in the CM SEPP 2018 (to be confirmed through stage 2). **Internal Understanding** » Key stakeholders within Council have contributed to identifying the management options within their area of responsibility, and have an understanding of how coastal management activities will bridge varied departments within Council. » Council understands community and stakeholder views about the beneficiaries of management actions, and distribution of costs and benefits, willingness to pay, and potential trade-offs. **Relationship building** » Continued good working relationships and strong partnership with both key stakeholders and the community. » Ongoing transparent dialogue with the community, including key community organisations such as Dunecare. » Stakeholders, including public authorities, are willing to work collaboratively with Council in execution of management options.

Engagement Policy & Framework	This engagement strategy has been prepared to align with the existing Byron Shire Council Policy: Community Engagement 2018.	
Level of Engagement	Inform, Involve, Collaborate	
Level of Influence	**Council** » Decision Making, collaborate **Stakeholders** » Collaborate, provision of information, sharing perspectives, identify action. **Community** » Collaborate, provision of information, sharing perspectives, identifying action.	
Engagement Activities – Why and How? Tools identified in accordance with Byron Council's Engagement Policy	**Engagement Elements**	**Tools and Techniques**
	Engagement within Council » Develop evaluation criteria relevant across council to facilitate consideration of the CMP in the context of whole of council business. » Raise awareness within Council of adaptive processes proposed in the CMP, why these processes are necessary, and the scope of management transitions. » Raise awareness of how CMP funding will integrate with council's budget, and which agreed projects are delivered. » Facilitate decisions about investment in asset management to avoid and mitigate identified risks for the Byron coastline. » Brief councillors on how strategic and development assessment decision about land-use can be aligned with coastal risks.	» Council intra-net » Stakeholder groups » Staff briefings » Staff working groups » On-site meetings/tours » Coastal Management Advisory Group
	Engagement with adjoining Council and National Parks » Consider and workshop appropriate land use planning provisions in coastal vulnerability areas. » Agree on a coordinated approach to coastal access » Identify joint asset upgrade projects » Provide consistent priority to wetland and other coastal environment remediation projects.	» Stakeholder groups (workshops) » On-site meetings/tours
	Stakeholder Engagement » Identify whether proposed actions relate to, affect or impacts any land or assets owned or managed by a public authority.	» Written notification » Stakeholder briefing » Workshop » Written submissions

	» If this occurs, undertake appropriate consultation in accordance with the Section 16 of the CM Act.	
	Community Engagement » Explore and educate on the relative importance of management objectives, noting the locations differences between Byron Bay, Brunswick Heads, New Brighton and South Golden Beach. » Review and outline timing options including thresholds/triggers, community projects and staging. » Discuss distribution of costs across state, council, public and private interests. » Discussing willingness of landholders/beneficiaries to pay. » Review and consult on funding options.	» Council website » Social media » Media releases » E News » Advertising » Foyer displays » Mailouts » Written submissions » YoursayByronShire.com.au » Stakeholder groups (risk workshop and invites to Pop-ups) » Pop-up shops, stalls, drop-in events » Surveys and opinion polls » Community Roundtable and Project Reference Groups » On-site meetings/tours

4 Stage 4: Prepare, Exhibit, Finalise, Certify & Adopt CMP

This stage involves the preparation of the draft CMP including components outlined in the Manual and the CM Act.

Consultation will support the finalisation of the CMP by:

- Providing a genuine opportunity for the community and stakeholders to comment on the draft CMP.
- Mediate and resolve complex issues with specific stakeholder groups (if relevant).
- Comply with the requirements of the Act.

Table 7 Stage 4 Engagement Strategy – Prepare, Exhibit, Finalise, Certify and Adopt CMP

Timing	TBC
Status	Pending
Consultation Aims & Expected Outcomes Aiming to build on the relationships and outcomes of Stage 1, 2 and 3.	**Understanding and Support** » Increased community and stakeholder understanding of, and support for actions and priorities in the CMP. » The community is satisfied with their role, input and participation in preparation of the CMP. » The community is willing to participate in the implementation of the CMP. » The community understands the role of the State Government, public authorities and the NSW Coastal Council in the finalisation and certification of the CMP. **Awareness of funding** » Community and stakeholder awareness of the funding streams that will be applied for / available for implementation. **Statutory Compliance** » The draft CMP is exhibited for a minimum of 28 calendar days, providing an opportunity for stakeholders to obtain information about the draft CMP, and to provide feedback. » Where complex, high impact or high-cost management proposals are foreseen, engage directly with an increased level of stakeholder and community involvement, to improve confidence in decision-making.
Engagement Policy & Framework	This engagement strategy has been prepared to align with the existing Byron Shire Council Policy: Community Engagement 2018.
Level of Engagement	Inform, Consult (Involve)
Level of Influence	**Council** » Decision Making **Stakeholders & Community** » Review and comment

Engagement Activities – Why and How?	Engagement Elements	Tools and Techniques
Tools identified in accordance with Byron Council's Engagement Policy	**Public Authorities** » Identify whether proposed actions relate to, affect or impacts any land or assets owned or managed by a public authority. » If this occurs, undertake appropriate consultation in accordance with the Section 16 of the CM Act.	» Written notification » Stakeholder briefing » Workshop » Written submissions
	Exhibit the Draft CMP » Place the draft CMP for public inspection at main offices and other key Council locations (library, etc). » Exhibit the draft CMP for a period not less than 28 Days. » Undertake direct engagement on complex, high impact or high-cost management proposals (if applicable)	» Council website » Social media » Media releases » E News » Advertising » Foyer displays » Mailouts » Written submissions » YoursayByronShire.com.au » Stakeholder group presentations » Pop-up shops, stalls, drop-in events » Surveys and opinion polls » Community Roundtable and Project Reference Groups » Coastal Management Advisory Group
	Feedback » Collate all feedback, prepare response report, and publish. » Provide feedback to the Coastal Advisory Group.	» Council website » Social media » Media releases » E News » Advertising » Project Reference Groups
	Certification and Adoption » Council reviews and adopts. » Following adoption by Council, submit to the Minister. » After the CMP is certified by the Minister, Council to publish in the gazette. » Notify the community and stakeholders that the CMP is certified, adopted and gazetted. » Ensure a copy of the CMP is available, free of charge, at Council offices and online within 7 days of publication in the gazette.	» Council Meeting » Council website » Social media » Media releases » E News » Advertising » Mailouts

5 Stage 5: Implement, Monitor, Evaluate and Report

This stage involves the implementation of the draft CMP over time, including monitoring and evaluation of the CMP success.

Consultation during this stage will:

- Continue to increase the awareness of the CMP, actions, implications and funding, as well as individual land owner obligations.
- Involve the community in the delivery of management actions.

Table 8 Stage 5 Engagement Strategy – Implement, Monitor, Evaluate and Report

Timing	TBC	
Status	Pending	
Consultation Aims & Expected Outcomes Aiming to build on the relationships and outcomes of Stage 1, 2, 3 and 4.	**Build Relationships and Understanding** » Increase community understanding of action in the CMP and how they will be implemented, including linkages to Council's budget, land use planning and actions to be taken by other public authorities. » Provide opportunities for the community to be involved in implementing, monitoring, evaluating and reporting on the effectiveness of the CMP to generate a sense of community ownership. » Strengthen partnerships with public authorities, and Tweed Shire Council and National Parks. **Awareness of Progress** » Community and stakeholder awareness of progress on actions and projects is maintained. » Continuous communication and awareness raising of changes to the coastal condition, coastal risk profile and community satisfaction.	
Engagement Policy & Framework	This engagement strategy has been prepared to align with the existing Byron Shire Council Policy: Community Engagement 2018.	
Level of Engagement	Inform, Involve, Collaborate	
Level of Influence	**Council** » Decision Making **Stakeholders & Community** » Advice, participation, resources.	
Engagement Activities – Why and How?	**Engagement Elements**	**Tools and Techniques**
	Action Implementation	» Council website » Social media

Tools identified in accordance with Byron Council's Engagement Policy	» Update the community on the implementation of specific coastal management actions, including detailed costs and outcomes. » Report to the community on progress in achieving coastal management outcomes. » Project specific working groups overseeing the implementation of large-scale works. » Continued operation of the Coastal Management Advisory Working Group.	» Media releases » E News » Advertising » Foyer displays » Mailouts » Targeted stakeholder group presentations » Pop-up shops, stalls, drop-in events » Annual report » Project specific working groups (landowners, community groups, businesses, council, OEH, other relevant public authorities) » Coastal Management Advisory Group
	Community Monitoring Programs » Engage community groups such as Dunecare, or tailored community groups, to undertaken "citizen science" including dune monitoring through photography, and general monitoring of the coastal zone. This could include beach profiles, litter monitoring, turtle monitoring and other relevant projects.	» Council website » Social media » Citizen Science Programme
	Evaluating and Reporting » Consistent feedback on progress and reports on environmental outcomes and implementation of actions.	» Council website » Social media » Media releases » E News » Advertising » Foyer displays » Mailouts » Targeted stakeholder group presentations » Pop-up shops, stalls, drop-in events » Annual report
	CMP Review » Develop a detailed engagement strategy for the review of the CMP, when applicable, including: > Informing the community and stakeholders about the review, and how they can be involved. > Conducting surveys of satisfaction, and to gauge shifts in values and how people use the coast zone. > Identifying any new or emerging risks. > Assessing community satisfaction with the engagement process, and how it could be done better.	» Council website » Social media » Media releases » E News » Advertising » Foyer displays » Mailouts » Targeted stakeholder group presentations » Pop-up shops, stalls, drop-in events » Annual report

6 Evaluation

This strategy is an evolving document, which will be updated regularly in-line with program stages, media analysis and learned knowledge though on the ground engagement. This approach will ensure the strategy continues to respond to changing demands of the program.

The following steps will be undertaken at regular intervals to test the effectiveness of the strategy and its implementation:

Were we successful?

The first step in determining the genuine outcomes of a strategy is to test whether we are achieving our purpose. The following questions have been developed to guide this initial step:

Purpose	Focus question
Awareness	» How many people are visiting the project website? » How many enquiries are being received via the project email / online surveys or formal exhibition processes? What are we hearing? » How have we provided tailored and timely communications to stakeholder groups about the program, and coastal management more broadly? » Is the community indicating an awareness of coastal management, risks associated with climate change, and land use/development responses to this?
Consultation	» What concerns are we hearing from key groups, stakeholders and property owners, and how are we addressing them? » How have we been working with relevant NSW Government departments and agencies regarding coastal management?
Enthusiasm	» What sentiment are we hearing across the media, key stakeholder groups and the community? » Who is driving favourable messaging in the public sphere?

Was our approach the right one?

Based on our answers to the above questions, we will evaluate whether our approach hits the mark:

» Were the activities appropriate?

» Did the stimulus or program materials work?

» Did we have enough time?

» How was the AV, the location and other logistical elements of particular events?

» Did the right people attend/participate?

» Did the right messages reach the right audience?

How can we use the results?

This is the 'where to from here?':

» How does our strategy need to change or adjust?

» What elements should we stop, start or keep based on the findings?

Appendices

A Byron Shire Council Policy: Community Engagement 2018

A Byron Shire Council Policy: Community Engagement 2018

Policy:

Community Engagement

2018

INFORMATION ABOUT THIS DOCUMENT

Date Adopted by Council	27 August 2015	**Resolution No.**	15-395
Policy Responsibility	General Manager		
Review Timeframe			
Last Review Date:	13 December 2018	**Next Scheduled Review Date**	September 2020

Document History

Doc No.	Date Amended	Details Comments eg Resolution No.
#DM630640	24 November 1998	Policy 3.38 Community Consultation and Participation in Council's Decision Making
#E2015/13070	28 August 2015	As per resolution 15-395
#E2015/90484	September 2017	Draft for Consultation
#E2018/10445	April 2018	Revised Draft for Consultation
#E2018/10445	13 December 2018	Resolved 18-782

Further Document Information and Relationships

Related Legislation*	Local Government Act 1993 Environmental Planning and Assessment Act 1979 Privacy and Personal Information Protection Act 1998 Government Information (Public Access) Act 2009
Related Policies	Communication Policy 2013 (E2013/72429) Social Impact Assessment Policy 2009 (DM906183)
Related Procedures/ Protocols, Statements, documents	Byron Shire Council's Community Strategic Plan 2028

TABLE OF CONTENTS

Introduction

Byron Shire Council is fortunate to serve a community that is interested in Council's activities and keen to be involved in our decision-making processes. We value this passion and Council is committed to working with residents to make better decisions.

This Community Engagement Policy aims to provide a clear understanding of how and when Council will engage with residents and other stakeholders. It acknowledges the value of engaging the community and involving people in decision-making and dialogue that shapes and influences outcomes and develops partnerships.

The Policy also recognises the demands on local government under NSW legislation and our obligations in relation to participation, consultation and engagement. Legislation that has a direct impact on Council's community engagement practices include:

- NSW Environmental Planning and Assessment Act 1979
- NSW Local Government Act 1993

Council also has legislative responsibility under the Native Title Act and Land Rights Act to engage with Aboriginal stakeholders to protect cultural heritage and the rights of traditional owners to self determination on their traditional homelands. We have developed a number of processes to ensure these rights are upheld.

Time and again Byron Shire residents have demonstrated their passion, enthusiasm and ability to come up with imaginative and innovative ideas and solutions to a wide range of issues. Council acknowledges the value of this community knowledge and that people in our Shire want community-led governance and to be involved in decision-making.

Council is committed to this relationship with the community and intends to continue to partner with groups and individuals on a wide range of projects and issues and realise community led-governance and decisions that reflect the desires of residents. This is embedded in our Community Strategic Plan, *Our Byron Our Future*, through objectives 5.1 and 5.2:

- 5.1 – Engage and involve community in decision making
- 5.2 – Create a culture of trust with the community by being open, genuine and transparent.

Consistent with this commitment, in March 2018 Council resolved to adopt key principles to assist Council to 'play a valued and effective role in a new system of community-based governance' including:

- *Deepening our understanding of communities, listening to all and engaging with in new and different ways that reflect community diversity*
- *Empowering citizens through participatory and deliberative democracy.*

The elected Council and the Executive Team see good and effective engagement as the foundation of a relationship with the community that is based on honesty, trust and transparency. Meaningful communication and engagement means better outcomes for communities, residents, ratepayers, Councillors, staff and other stakeholders.

Our commitment to working with indigenous stakeholders

Byron Shire acknowledges and is committed to working with the Bundjalung of Byron Bay – Arakwal People as the traditional custodians of land in the Shire. Council also recognises the Widjabal and Mindjungbul people as traditional custodians within the Shire.

Building and maintaining strong, respectful partnerships with Aboriginal owners and the organisations that represent them is a key component of engagement activities undertaken by Council.

Our commitment to working with an informed and engaged community

In addition to our legislative requirements to consult with the community Council recognises that effective community engagement can build trust between Council and the community and help people feel confident their views will be heard and taken into account.

Importantly the community will be better informed about the decision making process, and we will provide explanations as to how and why decisions are made.

This Community Engagement policy is Council's commitment to:

- Strengthen relationships with the community to promote continued conversations.
- Give residents and stakeholders a voice in decision-making whilst acknowledging time, resources and legislative limits.
- Provide people with timely information that is easy to understand and encourages them to make a contribution in a number of ways.
- Explain why, how and when Council will engage.
- Where community has provided input, Council will give feedback on how that has been considered and the reasons for decisions.

This policy aims to:

- Improve understanding of local government responsibilities, structure, functions and decision-making processes.
- Improve the quality of decision-making processes.
- Enable the community and stakeholders to express their views and participate in Council's decision-making.
- Enhance the relationship between Council and the community and support effective partnerships.
- Keep elected representatives informed about local concerns and the possible impact of their decisions on the community.
- Support Council and community in working together in a mutually supporting relationship and securing outcomes that ensure the sustainable future of the Byron Shire.
- Achieve outcomes through consensus rather than adversarial processes.
- Ensure that community consultation is guided by principles of honesty, accessibility, equity and transparency.

What is community engagement and what are the benefits?

Community engagement takes in a wide range of activities that are designed to inform, consult, involve, collaborate with or empower the community. Effective community engagement has many mutual benefits including:

- Empowering community to become involved in and influence decisions that affect them.
- Building a better understanding of the community's wants, needs and concerns.
- Strengthening relationships between the community and Council as a result of transparency in decision-making.
- Increasing trust in public administration with community confidence in Council's ability to provide feedback about decisions.
- Building mutual respect for the views of the community and Council's need to make decisions to respond to present and future needs of residents.
- Supporting a valued and proactive community that builds partnerships and a greater sense of ownership.

Council still has to make difficult decisions

Council recognises that community engagement does not replace appropriate decision making by elected representatives but that these decisions can be enhanced through understanding the needs of the community and the impact of these decisions.

Principles for engagement

Council's engagement for projects and processes will be informed by the following principles:

1. Council will improve understanding of communities through engaging with them in new and different ways that reflect community diversity.
2. Information is accessible, timely, relevant, balanced and easy to understand.
3. Identify and seek contributions, feedback and ideas from people/groups that may have an interest in specific issues.
4. Ensure everyone understands the purpose of each engagement and how their contributions will be considered.
5. Inform people about Council's decisions, how and why they were made and how community input was considered.
6. Regularly review and update Council's engagement techniques to learn and improve.

Following the recent success of Council's first Community Solutions Panel deliberative democracy process, Council will develop a "Byron model" for deliberative democracy to empower communities and support community-led governance. This work is currently underway and will be integrated into this Policy when it is complete.

How and when will we engage?

Council is not able to engage on all matters and the level of community involvement in decision making will vary according to the nature of the project or issue. It is acknowledged that people will

have different views on what projects and issues are important. Council will take into account a range of factors when deciding how and when to involve the community. These include the:

- need to involve communities in matters that will affect them
- complexity of the issues, the history of a project or extent of stakeholders
- degree that issues are of importance across the Shire
- need to build trust and respect
- desire to be community-led and making space for communities to develop local initiatives and solutions
- legislative requirements

Examples of projects where we will engage include:

- Corporate plans including the Community Strategic Plan, Resourcing Strategy, Delivery Plan, budget and annual Operational Plan.
- Strategic plans and policies that will have a significant impact on residents, community, the environment, business and the economy.
- Land-use and development plans including the Local Environmental Plan, and Development Control Plans.
- Where legislation requires community notification or consultation.
- When the trigger in the deliberative democracy model that is currently under development applies.

The level of engagement with the community will be determined according to:

- High impact on Local Government Area
- Low impact on Local Government Area
- High impact on local area or group
- Low impact on local area or group

For example:

Level of impact	Examples
High impact on Local Government Area	Community Strategic Plan Coastal Zone Management Plan Rural Land Use Strategy Decisions that could a major environmental impact
Low impact on Local Government Area	Changes to opening times for facilities Street sign strategy
High impact on local area or group	Improvements to playgrounds Changes to specific services Local traffic management
Low impact on local area or group	Minor bridge and road repairs Renewal of street furniture

Council acknowledges it is important to give people time to get informed, become involved and consider their input in Council matters and, when possible, Council will endeavour to go beyond

the minimum timeframes and requirements for engagement to give everyone a chance to contribute to the conversation.

Planning for community consultation and engagement

Council has adopted the community engagement principles of the International Association of Public Participation (IAP2) which is considered the best practice benchmark in the world. IAP2 outlines five different levels of public participation:

- Inform
- Consult
- Involve
- Collaborate
- Empower

The level of engagement is appropriate for a project, will depend on the nature of the project. Council will use the factors detailed above to determine what level of engagement will be used in each case. The table below describes in detail the five levels of participation.

IAP2	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
WHY ARE WE DOING THIS?	To provide the public with balanced and objective information to help them understand solutions, alternatives, opportunities and/or problems.	To obtain public feedback on decisions or ideas on alternative approaches	To work directly with the public throughout the process so public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
WHAT WE WILL DO	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
HOW WILL WE DO THIS?	- Council website - Social media - Media releases - E News - Advertising - Foyer displays - Mailouts - Site signage	- Council website - Social media - Media releases - E News - Advertising - Foyer displays - Mailouts - Site signage	- Written submissions - YoursayByronShire.com.au - Stakeholder groups - Pop-up shops, stalls, drop-in events - Surveys and opinion polls - Community	- Charette - Deliberative processes - Community Reference Group	Polls & referendum

		- Roundtable and Project Reference Groups - On-site meetings/tours

When considered appropriate, a community consultation/engagement plan will be written for projects and Council will identify the appropriate level of participation depending on the nature and complexity of the project.

Each plan will include:

- An overview/background of the project
- Aims/objectives
- Key messages
- Challenges
- Evaluation
- Key staff involved
- The relationship of the project to the IAP2 spectrum
- Detailed program and budget for engagement activities
- Stakeholders
- Timeframes for consultation and engagement

Council-prepared community consultation and engagement plans for projects can be reported to Council's Communications Panel.

Engagement for land use planning and development control

Council is committed to broad and transparent engagement but when it comes to land use planning and development controls, our ability to engage is limited by State Government requirements set out the NSW Environmental Planning and Assessment Act.

- Local Environmental Plans and Development Control Plans must be advertised for a minimum of 28 days and submissions considered. If possible Council will seek to extend this timeframe and use additional forms of engagement in accordance with this policy but compliance with statutory obligations will be the determining factor.

- Some development applications are classified as 'exempt' or 'complying' development and some development may be assessed by private certifiers rather than Council staff. In these cases there will be little or no consultation. Most classification is done by the NSW Government and cannot be changed by local government or Byron Shire Council.

NOTE: THIS IS UNDER REVIEW AS PER CHANGES TO NSW ENVIRONMENTAL PLANNING AND ASSESSMENT ACT. Consultation on other development applications (DAs) is carried out in accordance with Council's Development Control Plan and varies according to the scale and expected impacts of each application. Typically DAs are advertised for at least 14 days and submissions are considered before decisions are made, usually by a senior staff member under delegated authority. However, for a small percentage of applications they may be required to be reported to the elected Council or the elected Council may call them up to a Council meeting in order to make the decision.

- Proposals for large and/or costly developments are determined by the Joint Regional Planning Panel (JRPP) or by the State Government. Consultation on these proposals is determined by the JRPP or State Government, not council. Normally it is guided by the statutory minimum requirements. In some cases the consultation provisions of Council's Development Control Plan may be applied but Council has no authority to make the final decision.

As our commitment to this Community Engagement Policy, Council will provide a statement of reasons for decisions made with respect to the adoption of land-use plans and policies, for DA decisions made by Council and for the determination of DAs under delegated authority where the proposal has been judged to have substantial impacts.

The NSW Government is reviewing consultation processes under the Environmental Planning and Assessment Act which may result in some changes to the above.

Where do development applications sit in this Community Engagement Policy?

Certain types of development applications in specific locations give rise to debate about consultation and engagement. Different DAs trigger different consultation and engagement processes and Byron Shire Council is bound by the NSW Environmental Planning and Assessment Act with respect to public notification and exhibition.

This information including displays, letters to landowners, public exhibition etc is detailed in the Byron Shire Development Control Plan, specifically section A14. It is important to note that there will be changes to the EP&A Act that set strict minimum guidelines for Councils including the development of community participation plans (CPPs) to detail how a council will engage its community in the planning decisions it makes.

In preparing these plans councils will have to take into consideration new community participation principles, which set the standard for how the community should be engaged.

Councils may choose to incorporate it into the broader community engagement strategies they prepare under local government legislation but need to ensure the document meets the requirements of the updated EP&A Act.

The CPP will set out when and how planning authorities will engage with their communities across all the planning functions they perform. While the plans must meet the minimum requirements for

community participation that are set out in Schedule 1 to the Act, they can go beyond the minimum requirements if they decide it is appropriate.

The CPP requirements will override the application of this Community Engagement Policy and it will need to be updated when the exact details are known.

Appendix 1 - Engagement Matrix – this matrix is a guide. Depending on the issue/project methods will be adapted to reach stakeholders.

	What to do? 1 = every time 2 = in most circumstances 3 = on specific occasions 4 = on rare occasions	When you are dealing with…			
		Shire wide High impact	Shire wide Low impact	Locality based High impact	Locality based Low impact
INFORM	Byron Shire Council website	1	1	1	3
	Media Release	1	2	2	2
	E-News	1	1	1	2
	Social media (Facebook)	1	2	1	2
	Newspaper advertising	1	1	2	3
	Radio advertising	3	4	4	4
	Street signage (VMS boards)	3	3	3	3
	Flyer	3	3	3	3
	Fact sheet/FAQ	1	3	2	4
	Letterbox drop	3	3	3	3
	Targeted direct mail	3	4	3	4
	Targeted direct email	3	4	3	4
CONSULT	Surveys	3	4	2	4
	Pop-up/market stall	3	4	2	3
	Workshops	2	3	2	4
	Drop-in session	2	3	2	4
	Public meeting	3	4	2	4
	Focus group	3	3	3	3
	Public Exhibition	1	3	1	4
	Site meeting/tour	3	3	3	3
	Personal briefing	2	2	2	2
INVOLVE COLLABORATE	Meetings by invitation	4	3	3	4
	Meetings with Council committees/advisory groups	3	4	3	4
	Large group / stakeholder collaboration	3	4	4	4

Appendix 2 – Example of Community Engagement and Communication Plan

Communication and Engagement Plan

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

Project name	XXXXXXXXXXXXXXXXXXXXXXXX
Goal	
When	
Background	
Governance	
Objectives	
Sensitivities and	

challenges		
Key messages		
Media spokesperson		
Work contact		
Potential level of impact	Level 1 – high impact on local government area Level 2 – low impact on local government area Level 3 – high impact on local area/group Level 3 – low impact on local area/group	
Our promise **IAP2 Public Participation Spectrum**	**Inform –** We will keep you informed. **Involve** – We will keep you informed, listen to and acknowledge concerns and aspirations. **Consult** – We will work with you to make sure your concerns are considered and provide feedback on how public input influenced our decision. **Collaborate** – We will look to you for advice and innovation in formulating solutions and where possible incorporate your advice and recommendation into the decision.	
Stakeholders	Internal	External

Evaluation		
Internal staff		
Submitted to Director or Manager		
Reported to ET		
Reported to Comms Panel/Council		

Task	Audience	Details	Who is doing it?	Cost	Date to start/finish
Briefing of Communications Panel					
Formation of internal working group					
Briefing of Arakwal					
Briefing with Police					
Website information					
Online engagement					
Facebook					

promotion					
Facebook advertising					
Letters to nearby stakeholders residents)					
Stakeholder meeting if necessary					
Briefings					
Media Release					
School visits					
School newsletter advertising					
E-news / E-flash					
Video content for social media/website					

Graphic design					
Staff update and promotion of project					
Q&As					

Appendix 3 – Community Charter for Good Planning in NSW

thecommunitycharter.org

PLANNING FOR PEOPLE

A COMMUNITY CHARTER FOR GOOD PLANNING IN NSW

Our Vision

A planning system that thinks of both today and tomorrow; is built on fairness, equity and the concept of Ecologically Sustainable Development; guides quality development to the right places; ensures poorly designed developments and those in the wrong place don't get built; and protects the things that matter, from open spaces, bushland and productive agricultural land to much-loved historic town centres and buildings.

Principles

Good planning is governed by the following principles:

- The well-being of the whole community, the environment and future generations across regional, rural and urban NSW.
- Effective and genuine public participation in strategic planning and development decisions.
- An open, accessible, transparent and accountable, corruption-free planning system.
- The integration of land use planning with the provision of infrastructure and the conservation of our natural, built and cultural environment.
- Objective, evidence-based assessment of strategic planning and development proposals.

These principles will guide a planning system that:

- Respects, values and conserves our natural environment and the services it provides.
- Facilitates world-class urban environments with well-designed, resource-efficient housing, public spaces and solar access that meet the needs of residents, workers and pedestrians.
- Provides housing choice, including affordable housing and sufficient housing for the disadvantaged, in a diversity of locations.
- Celebrates, respects and conserves our cultural (including Aboriginal) and built heritage.
- Protects and sustainably manages our natural resources, including our water resources, fragile coastlines and irreplaceable agricultural land for the benefit of present and future generations while maintaining or enhancing ecological processes and biological diversity.
- Retains and protects our crown lands, natural areas, landscapes and flora and fauna for the benefit of the people of NSW.
- Gives local and regional communities a genuine and meaningful voice in shaping their local area and region, its character and the location, height and density of housing. Provides certainty and fairness to communities.

I support the Charter:

Signed: ..... Date: .....

Name: .....

Address: .....

Email: ..... *The principles are interpreted overleaf:*

☐ Please tick this box if you do not want your name published as having endorsed the Charter.

When signing this Charter you acknowledge that an email message will be sent on your behalf to: the Hon. Pru Goward, MP, Minister for Planning, the Hon. Luke Foley, MLC, Shadow Minister for Planning, Mr David Shoebridge, MLC, The Greens NSW Spokesperson for Planning, the Hon. Robert Borsak, MLC, Shooters and Fishers Party, Reverend the Hon. Fred Nile, MLC, Christian Democratic Party and the Hon. Rob Stokes, MP, Assistant Minister for Planning and Minister for the Environment and Heritage.

Individuals can fill in the Charter and return it to us at thecommunitycharter@gmail.com or endorse the Charter online at thecommunitycharter.org. Organisations can only endorse the Charter via email.

thecommunitycharter.org

The well-being of the whole community, the environment and future generations across regional, rural and urban NSW

We call for a planning system that integrates short and long term social, environmental and economic considerations to create lasting benefits for communities, now and in the future. This is the concept of Ecologically Sustainable Development (ESD) as currently defined in the *Protection of the Environment Administration Act 1991*. ESD must be the overarching objective of the planning system. *For more information about ESD refer to the Charter Companion document.*

Effective and genuine public participation in strategic planning and development decisions

Everyone has the right to participate in decisions that affect their lives. People affected by a planning or development proposal have the right, knowledge and experience to contribute to the final decision. The role of planning authorities includes facilitating community input into the preparation of strategic plans prior to public exhibition and genuine, open dialogue between stakeholders. The role of consent authorities is to consider public comments on development proposals and ensure compliance by developers.

An open, accessible, transparent and accountable and corruption-free planning system

Decision processes must be transparent and accountable. Decisions must be made in public, respond objectively to issues raised in submissions, provide reasons and be subject to the rules of procedural fairness.

The community's ability to seek review of a decision is important in preventing corruption and poor decision-making. All information considered when assessing a proposal must be publicly available and accessible prior to the decision being made. So called 'fast-tracking'of development does not benefit the public interest. Anti-corruption measures must be effective and enforceable.

Disproportionate influence from vested financial interests has no place in planning decisions. The ability to lobby decision makers is a democratic right. However, it is inappropriate to allow companies, wealthy individuals or lobbyists a greater level of access than is available to the public.

The integration of land use planning with the provision of infrastructure and the conservation of our natural, built and cultural environment

An integrated approach is the key to achieving the kind of sustainable settlement patterns that are needed now and into the future. This type of approach will allow future planning to maintain the integrity of natural areas, take into account natural hazards and constraints, locate employment and key social infrastructure in accessible locations, and ensure the provision of sustainable infrastructure systems that use less energy and resources.

Objective, evidence-based assessment of strategic planning and development proposals

The foundation stone of a good planning system is a sound knowledge base that is publicly accessible and is updated and maintained by government in the public interest. The current system in which the developer pays for reports, such as environmental impact statements, creates conflicts of interests. Whilst it is equitable for developers to pay for reports, the objectivity of reports must be ensured by requiring professional standards and keeping the appointment of consultants at arm's length from developers.

This Charter is accompanied by a Companion document that details how this Charter could be implemented.

elton consulting

Appendix B Data and Information Review

B.1 Listing of Documents and Relevance

To provide a quick reference within the review tables, the following colour-coded assessment of the data and reports was applied:

	Priority Data or Report: contains information/data directly relevant to developing the CMP.
	Secondary Data or Report: contains information/data indirectly relevant to developing the CMP, such as data useful for comparison with results, a CMP for adjacent area etc.
	Data or Report not relevant: contains little or no information/data relevant to preparing the CMP, the report need not be reviewed at later stages of the CMP's preparation.
	Data gap: data or report is not currently known to exist.

Table B-1 Spatial and Technical Data Review and Availability

Datasets	Do you own / collect this data?	Can you provide details? (e.g. dates, data coverage, locations…)
Aerial Imagery	Byron Shire Council	GIS dataset - provides a 20cm gridded dataset of the study area collected April 2015.
Topography (Lidar, ALS)	Byron Shire Council	GIS dataset - provides a 1m gridded dataset of the study area collected August / September 2010.
Bathymetry / hydrosurvey	Department Planning Industry and Environment (DPIE)	
Water quality monitoring data	Byron Shire Council	Belongil Creek Water Quality Data and Entrance Opening Monitoring Data
Habitat mapping or data, e.g. EECs, macrophytes, riparian coverage, wetlands, threatened species, etc.	Byron Shire Council	GIS dataset providing updated vegetation mapping for the Shire, collected 2017
Beach erosion mapping or data (including long term recession and coastal entrance instability)	Byron Shire Council	GIS dataset - Coastal Erosion Hazard Lines, from Byron Shire Coastline Hazards Assessment Update (BMT, 2013)
Beach profile mapping	Byron Shire Council	GIS dataset – escarpment points throughout the study area over 2010 to 2013
Flood mapping	Byron Shire Council	Available for Belongil Creek catchment and North Byron catchment (i.e. Brunswick / Marshalls / Simpson) from Belongil Creek Flood Study North Byron Flood Study and FRMS (BMT, 2015), and Belongil Creek Flood Study (SMEC, 2009)
Coastal inundation mapping	Byron Shire Council	GIS dataset - Coastal Erosion Hazard Lines, from Byron Shire Coastline Hazards Assessment Update (BMT, 2013)
Wave data measurements	Manly Hydraulic Laboratory (MHL)	
Water level data (tides, etc)	DPIE, MHL	
Land ownership and use data	Byron Shire Council	GIS dataset – Cadastre, Crown Land Dataset (tenures, reserves, s34 tenures), Community Land, Operational Land, Public Facilities, Roads
	Byron Shire Council, Department of Industry Land and Water	GIS dataset – Crown Structure Point/Polygon, Enclosure Permit, Lease, Licence, Non-Account, Reserve. Preferable to use Council datasets due to presentation style.
Other?		
Assets	**Do you own / manage these assets?**	**Are the assets mapped (e.g. a GIS database)?**
Stormwater (Pipe, outlets, culverts etc)	Byron Shire Council	GIS dataset mapping stormwater easements, drains, flood pump, floodgates, levee, mains, nodes, overland footpaths and WSUD assets

Datasets	Do you own / collect this data?	Can you provide details? (e.g. dates, data coverage, locations…)
Wastewater (pipes, pump stations, etc)	Byron Shire Council	GIS dataset mapping Recycled Water Layers (Flowmeters, water monitor, water vales, water mains, water hydrants, water irrigation); Sewer Layers (pump stations, sewer outfall, sewer junctions, manholes, gravity valves, gravity mains etc.).
Water (pipes, reservoirs, etc)	Byron Shire Council	GIS dataset mapping of Water Layers (watermains, meter mains, reticulation areas, water pressure etc
Coastal structures e.g. revetments, groynes, seawalls, etc	Byron Shire Council	GIS dataset – Crown Land Dataset (tenures, reserves, s34 tenures)
	Department of Industry Land and Water	GIS dataset – Crown Structure Point/Polygon, Enclosure Permit, Lease, Licence, Non-Account, Reserve
Council buildings, e.g. community halls, libraries, scout halls, surf clubs, etc	Byron Shire Council	GIS dataset – Cadastre, Crown Land Dataset (tenures, reserves, s34 tenures), Community Land, Operational Land, Public Facilities, Roads
Railways, railway stations, etc	Byron Shire Council	Byron Shire Council has GIS layer for the railway corridor.
Hospitals, schools, nursing homes	Byron Shire Council	GIS dataset – public facilities
Other waterway infrastructure		
Roads: minor, local	Byron Shire Council	GIS dataset – Cadastre, Crown Land Dataset (tenures, reserves, s34 tenures), Community Land, Operational Land, Public Facilities, Roads
Shared paths / cycleways	Byron Shire Council	GIS datasets
Walking trails / tracks	Byron Shire Council	GIS datasets
Parks, playgrounds, sportsgrounds	Byron Shire Council	GIS dataset – Cadastre, Crown Land Dataset (tenures, reserves, s34 tenures), Community Land, Operational Land, Public Facilities, Roads
National parks, nature reserves	NPWS	GIS Data – NPWS Estate
Council natural areas / reserves	Byron Shire Council	GIS dataset – Cadastre, Crown Land Dataset (tenures, reserves, s34 tenures), Community Land, Operational Land, Public Facilities, Roads
Heritage assets		

Table B-2 Documentation Review

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
1	Draft Coastal Zone Management Plan for Byron Shire Coastline PART A - The Plan	BSC	2010	Plan	Received	Potentially worth reviewing for specific details	The 2010 draft CZMP, covering the full Byron Shire coastline, has been overwritten by subsequent CZMP for different sub-areas of management. The draft Coastal Zone Management Plan for Byron Shire Coastline (CZMP) was intended to address the various management issues for the Byron Shire coastline. The CZMP outlines management actions to address issues such as management of the natural environment, public access to the coast, cultural heritage, development and infrastructure, and coastline hazards. These management actions are aimed at achieving a set of management goals based on the adopted goals of the NSW Coastal Policy 1997. The CZMP area is within the coastal zone of the complete Byron Shire, extending from the Tweed-Byron Shire border in the Billinudgel Nature Reserve in the north to the Byron-Ballina Shire border in the south. Its focus is the coastline of Byron Shire and includes both marine and terrestrial lands. Note, the preface of the report provides a chronological history (from 1888 to 2009) of Coastal Erosion and Coastal Planning in the Byron Shire, NSW
2	Draft Coastal Zone Management Plan for Byron Shire Coastline PART B - Emergency Action Plan	BSC	2010	Plan	Received	No further review required	This Emergency Action Plan (EAP) was prepared as part of the Coastal Zone Management Plan for Byron Shire Coastline, 2010 (CZMP) under the requirement of the Coastal Protection Act 1979, Section 55C. The EAP relates to Byron Shire Council's role in protecting public safety along the Byron Shire coastline during coastal erosion events. Actions identified in both the EAP and CZMP are based on Byron Shire Council's coastal management approach (refer CZMP, s.4), consisting of the planned retreat policy, and protection of Byron Bay town centre (referred to as Jonson Street protection works).
3	Coastal Zone Management Plan Byron Bay Embayment - Part A General Information	BSC	2016	Plan	Received	Review in further detail	The purpose of this Coastal Zone Management Plan (CZMP) is to describe proposed actions to be implemented by Byron Shire Council, other public authorities and the private sector, to address priority management issues in the coastal zone of the Byron Bay Embayment (BBE). The CZMP has been prepared in accordance with the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013). This CZMP covers the BBE, i.e. coastline from south of Tyagarah Nature Reserve to Cape Byron; made up of several precincts (from north to south): North Beach; Belongil Beach; Cavvanbah; Main Beach; Clarkes Beach; The Pass; Wategos Beach; and Little Wategos Beach. This CZMP is Open Coast focus and does not address estuarine ecosystem health or management within the geographical region of the BBE, except where the Belongil Creek interfaces with the Open Coast. This CZMP comprises 5 parts: Part A sets the context including previous studies, land ownership/management, legislation framework and consultation undertaken in the CZMPs development.

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
4	Coastal Zone Management Plan Byron Bay Embayment - Part B Coastal Hazards and Risk Management	BSC	2016	Plan	Received	Review in further detail	Part B of the CZMP, deals with 'Coastal Hazards and Risk Management'. The Belongil Beach area has been identified as a 'coastal erosion hot spot' by the NSW State Government. This is because there are: "…five or more houses and/or a public road are located in a current (or immediate) coastal hazard area, as identified in a coastal hazard study (OEH, 2011)." Given the immediacy of the coastal erosion risk at Belongil Beach, strategies for their mitigation are addressed in Part B along with other areas of the BBE subject to coastal hazard risks.
5	Coastal Zone Management Plan Byron Bay Embayment - Part C Community Uses	BSC	2016	Plan	Received	Review in further detail	Part C 'Community uses of the coastal zone' addresses social issues relating to coastal zone management in the BBE. These issues have become more apparent in recent times, largely as a result of pressures from population growth, development and tourism - symptoms of the iconic and popular status of the BBE, as both a place to live and visit.
6	Coastal Zone Management Plan Byron Bay Embayment - Part D Open Coast Ecosystem Health	BSC	2016	Plan	Received	Review in further detail	Part D 'Open coast ecosystem health' addresses environmental issues relating to coastal zone management in the BBE. These issues have become more apparent in recent times, largely as a result of pressures from population growth, development and tourism - symptoms of the iconic and popular status of the BBE, as both a place to live and visit.
7	Coastal Zone Management Plan Byron Bay Embayment - Part E 8Emergency A9ction Sub Plan	BSC	2016	Plan	Received	Review in further detail	Part E Emergency Action Sub Plan (EASP) details Intended Emergency Actions to be carried out by Byron Shire Council (BSC), subject to the provisions of the EASP, before, during and after an Emergency. The Intended Emergency Actions in the EASP apply to the whole of the Byron Shire coastline including the BBE.
8	Coastal Zone Management Plan for the Brunswick Estuary - Issue No 5.1	BSC	2018	Plan	Received	Potentially worth reviewing for specific details	The CZMP for the Brunswick River was last updated in 2018 by Byron Shire Council after a review of earlier versions of the plan (originally prepared in 2008). The Brunswick River CZMP focuses on the tidal waters, foreshores and adjacent lands of the Brunswick estuary, extending from the ocean entrance at Brunswick Heads upstream to the tidal limits. Given the extent of the study area the Brunswick River CZMP intersects with the study area for the Cape Byron to South Golden Beach Coastline CMP (i.e. this document). The intersection occurs along the fringing coastal section as the predicted maximum year 2100 erosion extent for the

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
							coastline progresses inland into the catchment of the Brunswick River. The focus of this CMP is on management of the open coastal areas. Issues noted through the preparation of this CMP that are relevant to the future management of the estuary and its catchment will be noted as it is Council's future intent to prepare a CMP for the Brunswick River. As required, the CZMPs includes a review of the study area including its values and issues. Management objectives are established supported by a range of management strategies in the areas of planning, economics, on ground works, investigation / research and other.
9	Draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment	BSC	2018	Plan	Received	Review in further detail	In October 2017 meeting, Council resolved (Res 17-521) to develop a newly formed CZMP for the Eastern Precincts of the Byron Bay Embayment which includes the precincts of Wategos/Little Wategos Beaches, The Pass, Clarkes Beach and Main Beach. The Main Beach to Cape Byron section of the Byron Bay coastline is an iconic and internationally regarded part of the NSW coast, with Cape Byron forming the most easterly point of the Australian mainland. Management actions consist of a combination of studies, investigation and on-ground works and have been developed for a 15 year implementation period. The upgrade of the Jonson Street Protection Works is a significant capital works project and Council will require a significant funding source/s for implementation of the project, for which Council has committed an allocation of $150,000 to commence the pre-construction phase of the project (refer Res 18-429, Adoption of the Delivery and Operational Plan). The Implementation Schedule (Table 1) includes a list of actions to address coastal hazards, community uses in the coastal zone and open coast ecosystem health which have been developed to address the identified management issues and align with the desired management objectives for the CZMP.
10	Draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment - Emergency Action Sub Plan	BSC	2018	Plan	Received	Review in further detail	This Emergency Action Sub Plan (EASP) details the Intended Emergency Actions to be carried out by Byron Shire Council (BSC), subject to the provisions of this EASP, in response to an Emergency. This EASP is related to the draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment (CZMP) detailing intended actions as they relate to Management Objective 7 of the plan, which is: To minimise and manage risks to beach access, recreational amenity and public safety by preparing for and responding to coastal erosion emergencies in a planned and coordinated manner.
11	Byron Coastline Values Study - Background	BSC	2000	Report	Received	Potentially worth reviewing for	The Byron Coastline Values Study consists of background information on the main ecological, social and economic values of the coastline in Byron Shire. It covers the intertidal zone, flora and fauna, cultural heritage, landscape, recreation, economic and residential values. The Study Area is

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
	Information for the Byron Coastline Management Study and Plan					specific details	limited to the immediate coastline and any parcels of land that adjoin the high water mark or the 50-year erosion hazard line.
12	Byron Flora and Fauna Study 1999	BSC	1999	Report	Received	Potentially worth reviewing for specific details	The Byron Flora and Fauna Study was initiated in response to a strong community desire to preserve flora and fauna through the promotion of ecologically sustainable land use planning and decision making. The Study provides detailed ecological information, including the occurrence and distribution of the Shire's vegetation associations and flora and fauna species (with particular regard to Threatened and significant species). The Study provides excellent information for Shire-wide planning. However, at the property level further field validation by expert practitioners is required to validate vegetation mapping and to undertake targeted flora and fauna surveys. OVERALL - Byron Shire is an area of extremely high biodiversity (ecosystems, species and genetic diversity). - Many plant and animal species with origins in the tropics and temperate zones occur in the Shire. That is, many species are at their southern limit of distribution (tropical species) while others are at their northern limit (temperate species). Additionally, the Shire provides important relictual habitat for subtropical rainforest species. - Several primitive rainforest plant species which are related to ancient families are found here. - The Shire has one of the highest numbers of Threatened flora and fauna species in NSW.
13	Byron Shire Coastline Management Study	WBM Oceanics Australia	2003	Report	Received	Potentially worth reviewing for specific details	This report recommends strategies for the long term future management of the Byron coastline and forms the basis of the Coastline Management Plan for Byron Shire. The recommended strategies are consistent with the New South Wales Coastal Policy 1997 (the coastal policy) and seek to promote ecologically sustainable use of the coastal zone. Coastal management issues are categorised into either 'erosion' issues, or 'land management' issues in this report. Strategies are recommended for each issue. ...this report sets a coordinated direction for action, such that no further strategic decisions are necessary to prepare the Coastline Management Plan. - there are no immediate significant threats to ecological sustainability arising from land management issues; - there are immediate threats to urban land uses arising from coastal erosion (immediate erosion hazards exist at Belongil Beach and New Brighton; longer term erosion hazards exist at South Golden Beach and Suffolk Park);

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
14	Scoping Study on the Feasibility to Access the Cape Byron Sand Lobe for Sand Extraction for Beach Nourishment	Patterson Britton & Partners	2006	Report	Received	Potentially worth reviewing for specific details	The Byron Bay Coastline Management Study, adopted by Byron Shire Council in 2004, identified two 'hot spots' for erosion and recession in the Byron Shire, namely Byron Bay / Belongil Beach and New Brighton Beach and recommended the following measures to manage the erosion and recession hazards: · Byron Bay / Belongil Beach – beach nourishment with end control structure and rock seawall; · New Brighton Beach – beach nourishment. The proposed sand source was offshore, from within the Cape Byron sand lobe, a large body of sand located within water depths of about 20 m to 55 m near Cape Byron. The main items in the scope of work for the Scoping Study were: · issues analysis; · literature review; · approval process; · data collection and interpretation; · detailed cost estimation and cost sharing arrangements; and · identification of data gaps.
15	Summary of Byron Bay - Hastings Point Erosion Study	PWD	1978	Report	Received	Potentially worth reviewing for specific details	Summary of a comprehensive study of coastal processes driving the erosion issues in the Byron Bay-Hastings Point region. Completed in 1978 by the Coastal Engineering Branch of the Department of Public Works NSW. The investigation established the occurrence of a long-term erosional trend (shoreline recession), due to the offshore current loss and coastal alignment unfavourable to the dominant wave condition. Shoreline recession rate was estimated to be as high as 2.0m per year at New Brighton and 1.5m per year at Byron Bay. The study identified the need of an overall management plan. Some immediate actions were recommended.
16	Byron Bay - Hastings Point Erosion Study	PWD	1978	Report	Received	No further review required	Full version of item 015
17	Towards adaptive coastal management: Lessons from a "legal storm" in	Frohlich M. F, et al.	2019	Paper	Recieved	Potentially worth reviewing for specific details	Provides a detailed description of legal proceedings in Byron Shire and how these have and are likely to continue to influence decision making in terms of coastal management. The paper particularly investigates the influence of the legal proceedings on the adaptive coastal management, i.e. coastal retreat, which has been Council's adopted management process for an extended period of time.

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
	Byron Shire, Australia						
18	Byron Shire Coastline Hazard Definition Study - Final Report	WBM Oceanics Australia	2000	Report	Received	Review in further detail	This report outlines the coastal processes and individual hazards impacting on the coastline of Byron Shire. It also describes the procedure for assessing the projected landward limit of back beach erosion escarpments for different planning periods and presents cumulative hazard zones for these periods.
19	Byron Bay Beach Resort - Coastline Hazard Assessment	WBM Oceanics Australia	2002	Report	Received	Review in further detail	This report is an addendum to Ref 018. This report includes a presents a (local) coastal hazard assessment (including data, analysis and hazard zones) for the Belongil Creek entrance and the Byron Bay Beach Resort area, following the definitions, processes and methodology presented in Ref 018.
20	Report on Modelling Byron Bay Erosion and Effects of Seawalls	BMT WBM	2010	Report	Received	Potentially worth reviewing for specific details	This report summarises work completed to assist Council in gaining a better understanding of the shoreline processes of erosion at Byron Bay using a shoreline evolution modelling package. providing a range of insights and quantitative information about the erosion and the incremental effects each of the seawall sections has had to date and would have into the future. As well, the seawall effects under the projected sea level rise scenario have been modelled. The report includes a brief background discussion about the Byron beach system and the wave regime that affects it, particularly in relation to the nature and behaviour of the erosion processes. It then describes the basis and establishment of the model to simulate those processes. Once established with the observed erosion trend, the seawalls have been added progressively and their incremental effects determined. Similarly, the shoreline changes due to future sea level rise have been simulated and the effects of the seawalls on the predicted recession identified.
21	Byron Shire Coastline Hazards Assessment Update	BMT WBM	2013	Report	Received	Review in further detail	This study has reviewed and re-assessed the coastal hazards along the Byron Shire coastline for the coastline extending from Seven Mile Beach in the south to South Golden Beach in the north. The previous Byron Coastline Hazard Definition Study (CHDS, 2000 - Ref 019) was completed on the basis of data and knowledge available to 1999. Since then, new projections for sea level rise have been adopted, changes to the Coastal Protection Act 1979 have been made and new Guidelines for Preparing Coastal Zone Management Plans (OEH 2013) prepared. In particular, the study analyses the coastal processes affecting the Byron Shire coastline from a range of spatial and temporal perspectives, establishing the broader regional context and, within that, a consistent local Byron Shire context and detailed behaviour of each of the local study compartments. This report provides an update of potential coastal hazards extents in comparison to the CHDS, 2000 - Ref 019. The study defines the hazards that impact along the Byron coastline and determines likely landward limits of back-beach erosion escarpments inundation and shoreline

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
							movements at entrances due to the cumulative effects of these hazards for the immediate, 2050 and 2100 planning periods.
22	Byron Shire Coastline Management Study Peer Review Report	WBM Oceanics Australia	2003	Report	Received	Potentially worth reviewing for specific details	This report presents the peer review of Ref 013. Ref 023 corresponds to Section 2 of this peer review. This report includes peer review of the Byron Shire Coastline Management Study, in particular of chapter: 1. INTRODUCTION 2. REVIEW OF EXISTING INFORMATION 3. COASTLINE MANAGEMENT ISSUES
23	Byron Shire Coastline Management Study Peer Review Report Section 2	WBM Oceanics Australia	2003	Report	Received	Potentially worth reviewing for specific details	This report presents the peer review of Ref 013. This report corresponds to Section 2 of Ref 022. This report includes peer review of the Byron Shire Coastline Management Study, in particular of: 4. DETERMINING OPTIONS AND THE DECISION CRITERIA 5. COASTLINE MANAGEMENT OPTIONS – GENERAL CONSIDERATIONS 6. COASTLINE MANAGEMENT OPTIONS – INDIVIDUAL BEACH PRECINCTS (Seven Mile Beach; Broken Head Nature Reserve; Broken Head; Tallow Beach; Cape Byron/Wategos Beach/The Pass; Clarks Beach/Byron Main Beach; Belongil Beach; Tyagarah Nature Reserve; Brunswick Heads; New Brighton and South Golden Beach) 7. COASTLINE MANAGEMENT OPTIONS – IMPLEMENTATION CONSIDERATIONS 8. RECOMMENDATIONS
24	Modification of Byron Shire Coastal Hazard Lines	Water Research Laboratory - University of New South Wales	2009	Report	Received	Potentially worth reviewing for specific details	The NSW Government (1990) “Coastline Management Manual” identifies seven separate coastal hazards, namely: - Beach erosion - Shoreline recession - Coastal entrance behaviour - Sand drift - Coastal inundation - Slope and cliff instability - Stormwater erosion. The hazards of beach erosion and shoreline recession (due to ongoing underlying processes and future sea level rise) are generally combined into a “coastal hazard line” for various planning periods.

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
							The NSW Government Draft Sea Level Rise Policy (2009) states a projected sea level rise of up to 0.4 m for 2050 and 0.9 m for 2100. This recent draft policy necessitated a revision of the WBM hazard lines, which was undertaken by WRL at the request of Council. The purpose of this exercise was to show whether the Part J planning lines used by Council remain landward of hazard lines calculated using revised sea level projections from the NSW Government (DECC, 2009). This report is limited to the hazards of beach erosion and shoreline recession. The Jonson Street protection works for the Memorial Pool are not considered to meet current coastal engineering standards. They will require upgrading or rebuilding to meet their required function. The hazard lines developed in this report assume that the protection works for the Memorial Pool do not fail, however, intervention is required for this to be met.
25	Peer Review of Report on Byron Bay Coastal Modelling by Dean Patterson (2010)	Water Research Laboratory - University of New South Wales	2011	Letter	Received	Potentially worth reviewing for specific details	This report corresponds to a peer review of Ref 020 This letter report provides a technical peer review by senior coastal engineers of the Water Research Laboratory (WRL) of the University of New South Wales. The report reviewed is entitled “Modelling Byron Bay Erosion and Effects of Seawalls” by Dean Patterson of BMT WBM, their reference: B17963.001.01, dated 2 November 2010, hereafter referenced as Patterson (2010). The general comment of this peer review is: Much of the technical basis of the modelling will be written up in Patterson’s proposed PhD thesis, so is not yet available. Due to the limited scope of the Patterson (2010) study, additional studies are needed before using it as the basis of decision making.
26	Coastal Hazard Management Study - Byron Bay Embayment - Interim Draft V 1.0	Water Research Laboratory - University of New South Wales	2014	Report	Received	No further review required	Interim Draft Version 1.0 of Ref 028
27	Coastal Hazard Management Study - Byron Bay Embayment - Interim Draft V 2.0	Water Research Laboratory - University of New South Wales	2014	Report	Received	No further review required	Interim Draft Version 2.0 of Ref 028
28	Coastal Hazard Management Study - Byron Bay	Water Research Laboratory - University	2016	Report	Received	Review in further detail	This study constitutes a further Coastal Hazard Management Study, following up from the one completed by WBM Oceanics Australia (2003) - Ref 013. The Byron Bay embayment has had a long history of development within the active coastal zone, with jetties, seawalls, groynes, shipwrecks and dune management on the open coast, and bridges

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
	Embayment - Final Revision 1.0	of New South Wales					(road and rail), seawalls and entrance management for Belongil Creek having altered coastal processes for over 100 years. Land subdivisions undertaken in the 1880s still remain. Planned Retreat as a response to this legacy would allow a return to a more natural ecological beach state. The Planned Retreat (Public-Private) model option within this study would also involve high economic cost, low economic viability, social disruption and unresolved, funding, equity and logistical issues. A publically-funded Planned Retreat (Public) model (effectively a "buyout") may resolve many of these issues but would involve substantially higher economic cost to the public sector. All management options including Planned Retreat will involve sand being transferred from one location to another. Due to the predominantly developed nature of much of the urban environment in the Byron Bay embayment, engineered management which improves upon the status quo is recommended in the most vulnerable locations, with continued soft management (through dune works and planning controls) recommended for those areas where sufficient buffer exists to separate urban areas from coastal hazards.
29	Byron Shire Council Local Environment Plan 2014	BSC	2014, 1988	Plan	Received	Review in further detail	This Plan aims to make local environmental planning provisions for land in Byron in accordance with the relevant standard environmental planning instrument under section 33A of the Act. A Local Environmental Plan (LEP) is a legal document prepared by Council and approved by the State Government to regulate and guide Council's planning decisions regarding land use and development. LEPs allow Council to regulate the ways in which all land, both private and public, can be used and protected through zoning and development controls. They are used to zone and classify land for a range of uses such as for housing, commercial and industrial development, open space and rural development. They are the main planning tool to shape the future of communities and to ensure local development is done appropriately and in an environmentally sensitive manner.
30	Byron Bay Town Centre Master Plan	McGregor Coxall for BSC	2016	Report	Received	Potentially worth reviewing for specific details	Completed in 2016, the Town Centre Master Plan has been developed to provide master planning and place making guidance for the town centre of Byron Bay. It was developed considering 6 Place Vitality Criteria including Access and Movement, Public Domain, Natural Environment, Culture, Economic Development and Built Form & Aesthetics. The Master Plan is divided into 12 precincts which of direct relevance to this CMP include the precincts of Main Beach and Clarkes Beach. The values of Main Beach to the community are identified and the Master Plan provides a series of short and long term priorities, which primarily relate to upgrading and redesigning existing parks and infrastructure to make is more visually appealing. The outcomes of the Master Plan will necessarily respond to the outcomes of coastal planning work and/or protection works identified for this precinct. The ability for pedestrians to walk along the foreshore is clearly identified.

Doc Ref.	Full Title	Author /Agency	Date	Format	Doc Status	Relevance /Importance	Brief Description
							For the Clarkes Beach precinct the Master Plan identifies the need for continued dune rehabilitation and preservation of existing vegetation. The need for the maintenance of access tracks through to Clarkes Beach is also noted.
31	Belongil Estuary Seabird and Shorebird Management Plan	Byron Bird Buddies	2007	Report	Received	Potentially worth reviewing for specific details	This management plan has been developed to protect and enhance roosting and breeding opportunities for seabirds within the lower sections of Belongil Creek from the Ewingsdale Road bridge to the estuary entrance. The total area is around 19.6 Ha and includes open water, saltmarsh, mangrove and swamp oak floodplain forest in addition to areas of open sand. The management plan reports that some eighty seabirds, shorebirds, waterbirds and other wetland associated birds have been identified in the precinct. A number of these are identified with a conservation status of vulnerable or endangered. Many of the species are migratory. The area was historically impacted by human interference such as urban development, and new and continued threated were identified to include increased recreational use, increased urbanisation, rising sea-levels (and global warming generally) and reduced ability to undertake predator control in the increasingly urbanised and utilised area. The management plan presents an implementation table with a variety of actions under the headings of community education, public access, predator control, habitat management, pollutants, planning controls supporting with monitoring and response type actions.
32	Cape Byron Headland Reserve Plan of Management	Wildsite Ecological Services for Cape Byron Trust	2002	Plan	Received	Potentially worth reviewing for specific details	The Cape Byron Headland Reserve is within the study area. The Headland Reserve extends to the low water mark and as such includes parts of Clarkes Beach, The Pass, Wategos and Little Wategos beaches. While part of the National Parks and Wildlife Service (NPWS) estate; the Reserve's management is managed by a community based Trust (Cape Byron Trust) which has a membership of community and government representatives. This model of management for this Estate is generally regarded as successful. A Plan of Management was prepared in 2002 in accordance with the National Parks and Wildlife Act 1974 and addresses the criteria of why a Reserve was created and the principles to be applied in the Estate management. The Plan itself was intended to serve to 2011 and as such may soon be revisited for renewal. The Plan of Management provides management strategies under four principal strategy areas including Natural Resource Management, Cultural Resource Management and Recreation, Tourism and Visitor Use and Complementary Management of Adjoining Areas. The Plan of Management identifies that the Trust has historically been represented on Byron Council Committees associated with the development of Coastal Management Plans. The Plan of Management itself provides few particular details on coastal management matters.

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33	Cumbebin Swamp Nature Reserve Plan of Management	NPWS	2012	Plan	Received	Potentially worth reviewing for specific details	This plan talks about a special part of the Country of the Bundjalung of Byron Bay (Arakwal) people known as Cumbebin Swamp Nature Reserve situated adjacent to the township of Byron Bay. ...In 2010 a small area of 1.4 hectares at Belongil Beach, which was acquired by the State government under the Coastal Lands Protection Scheme, was added to the reserve. This section is within the proposed CMP study area. The reserve is a significant component of the Belongil-Cumbebin wetland. Extensive areas of wetlands protected under State Environmental Planning Policy No. 14 (SEPP 14) occur adjacent to or nearby the reserve.
34	The Byron Coastal Group of Nature Reserves Plan of Management	NPWS	1998	Plan	Received	Potentially worth reviewing for specific details	The Brunswick Heads, Tyagarah and Broken Head nature reserves cover about 922 hectares. These three areas lie within a regionally important landsystem which comprises both erosional and depositional landforms on the coast within the ancient valley of the Brunswick River and its related streams. The seafront areas of Brunswick Heads and Tyagarah nature reserves are within the proposed CMP study area. The Broken Head nature reserve is outside of the proposed CMP Study area. The Plan states: The NSW Government was also finalising proposals for a significant new nature reserve and an addition to Broken Head Nature Reserve in the Byron Bay area which will complement these existing conservation areas. The three existing nature reserves and the proposed new areas contain remnant communities of littoral rainforest, wet and dry heathland, eucalypt forests and woodlands as well as areas of undisturbed freshwater and estuarine wetlands. This produces a high level of habitat diversity which in turn, supports a diverse range of wildlife communities, including refuges for numerous threatened plant and animal species. The Byron Coast group of nature reserves and the proposed new areas are however pressed on all sides by urban, tourist and rural developments. An important strategy in this plan of management is to ensure their survival as remnant natural areas within the highly modified landscape of the far north coast of NSW. A second important strategy in this plan is to continue to permit low impact recreational use of the beaches within the three existing nature reserves generally based on the current pattern of roads and facilities.
35	Billinudgel Nature Reserve Plan of Management	NPWS	2000	Plan	Received	Potentially worth reviewing for specific details	Part of the seafront area of Billinudgel nature reserve is within the proposed CMP study area. The reserve forms one of several coastal nature reserves which protect important remnants of coastal habitat in an otherwise highly modified environment. This plan draws on the NPWS records and information provided by members of the community. It outlines a broad framework for the management of the Reserve. Management objectives focus on the conservation of natural and cultural heritage

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							values which are special to the Reserve. Management strategies provide for the protection of these values from threats and for appropriate recreational, educational and research use. Many of the strategies have been formulated with the assistance of members of the local community.
36	Marshalls Creek Nature Reserve Plan of Management	NPWS	2011	Plan	Received	No further review required	Marshalls Creek nature reserve is in the vicinity of the proposed CMP study area. The reserve extends to the mean low watermark and includes much of the lower estuarine section and floodplains of Marshalls Creek, which is the north arm of the Brunswick River. The tidal waters and tidal lands to the mean high water mark of Marshalls Creek, including its creeks, bays and tributaries, are within the Cape Byron Marine Park. The reserve conserves significant coastal vegetation including mangroves, saltmarsh and swamp forest communities, as well as sclerophyll forest and several patches of littoral rainforest. Eleven plant species and 24 animal species which are classified as endangered or vulnerable have been recorded in the reserve. This plan contains a number of actions to achieve the State Plan priority to "Protect our native vegetation, biodiversity, land, rivers and coastal waterways", including implementation of strategies for the recovery of threatened species, control of pest species, implementation of the fire management strategy for the reserve.
37	Generic Plan of Management for Community Land Categorised as General Community Use – Community Facilities	BSC	2005	Plan	Received	Potentially worth reviewing for specific details	Byron Council has a number of individual Plans of Management for Open Space and Recreational areas. The study area contains numerous parcels of Community Land where Community Land is land owned and operated by Council for the public benefit. The Generic Plan of Management for Community Land Categorised as General Community Use – Community Facilities applies to these areas. This generic plan has been developed to save Council from preparing multiple repetitive plans of management for individual parcels of land, however, depending on the circumstances of the land an individual plan of management may be prepared. Operational and community land parcels within the study area exist in Byron Bay, Belongil and New Brighton and includes features such as the First Sun Holiday Park, Byron Memorial Swimming Pool, carparks and other vegetated foreshore areas. Community land areas are assigned as natural area, sportsground, park, area of cultural significance and general community use. These categorisations each have core objectives specific to them and the land parcels must be managed in accordance with them. All parcels of land included in this Plan of Management have a primary category of General Community Use – Community Facilities.
38	Cape Byron Marine Park Zoning Map	DPI		Map	Received	Potentially worth reviewing for	Cape Byron Marine Park Zoning Map The Cape Byron to South Golden Beach Coastline CMP includes a 16 km stretch of coastline that is also within the Cape Byron Marine Park. This Marine Park extends 37 km along the coastline from

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						specific details	the Brunswick River northern training wall to Lennox Head. The Marine Park extends 3 nautical miles into the Tasman Sea and includes Julian Rocks. As such the CMP study area extent into the ocean is the same as the Marine Parks. Of the total Marine Park Estate which is 220 km2 approximately 94 km2 exists within the CMP study area. The CMP study area largely excludes the tidal waters of the Brunswick River and Belongil Creek which are within the Marine Estate. It is noted that beach areas around Belongil Creek entrance, The Pass and Wategos Beaches are Sanctuary zones as are most of the nearshore waters. The remainder of the beach areas, and some limited offshore waters are Habitat Protection Zones, while a general use zone exists towards the ocean boundary of the Marine Park. The management objectives of the Marine Park estate will be relevant to the Cape Byron to South Golden Beach Coastline CMP.
39	Fire Management Strategies for Reserves and National Parks	NPWS	various	Report	Received	No further review required	A series of Fire Management Strategies were prepared by the National Parks and Wildlife Service (NPWS) to assist in managing fires within the lands managed by the NPWS. The development of fire management strategies is guided by a state-wide fire management approach detailed in Living with Fire in NSW National Parks – A strategy for managing bushfires in national parks and reserves 2012-2021. The plans identify the key resources of the reserve/park and guideline for fire management of those areas. Approaches to fire management are suggested. Additionally the status of fire thresholds and associated risk to biodiversity are provided. This provides information on which parts of the reserve /park are over or under burnt and likely biodiversity resilience to further burning.
40	Belongil Estuary Study and Management Plan	Peter Parker for BSC	2001	Report	Received	No further review required	The Cape Byron to South Golden Beach Coastline CMP study area includes the Belongil Creek entrance area and as such management actions outlined in the estuary plan relating to the management of the entrance are of relevance to the CMP. However, this estuary management plan was prepared in 2001 and is largely outdated due to a number of changes in the catchment since this time which may have influenced past issues which were experienced in the estuary such as acid runoff. Additionally, a number of subsequent studies and investigations into entrance opening, drainage and flooding have updated much of the information and actions outlined within the plan.
41	Julian Rocks Nature Reserve Plan of Management	NPWS	2011	Plan	Received	No further review required	Julian Rocks Nature Reserve is located two kilometres offshore north-east of the township of Byron Bay on the far north coast of New South Wales. The reserve is 0.4 hectares in size and consists of a number of jagged rocky outcrops. It is surrounded by Cape Byron Marine Park. The reserve is within the proposed CMP study area. Julian Rocks Nature Reserve was reserved because of its importance as a nesting place for seabirds. It also provides foraging habitat for turtles. The Julian Rocks are an important part of Country to the Bundjalung of Byron Bay (Arakwal) people and to other Bundjalung people.

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							This Management Plan for the Julian Rocks nature Reserve (prepared in 2011 by the National Parks and Wildlife Association) provides for a series of actions (and associated priorities) to be implemented in the ongoing management of the reserve. Actions are divided into a variety of themes related to management, reserve naming, native plants and animals, pest plants and animals, fire, use management, education and research.
42	Byron Shire Destination Management Plan 2014 - 2020	BSC	2014	Plan	Received	Potentially worth reviewing for specific details	This plan represents the evolution of the Byron Shire Tourism Management Plan, it also supports state-wide destination management planning initiatives. The Destination Management Plan is an action plan that provides direction for a variety of initiatives to support tourism in the Byron Shire. It builds on historical knowledge of past tourism to the region and considers the likely evolution of tourism in the Shire (both international and domestic) promoting tourism related initiatives that both drive and support tourism styles that accords with what the region can provide in line with the cultural direction of the Shire (i.e. traditional and emerging markets). Strategic directions are outlined in the following several key areas, leadership, management and coordination; marketing, communication and education; visitor services; research; product development; events and destination management. The plan recognises strong links and relationships to the Byron Town Centre Master Plan as it has a major focus on the town centre and foreshore areas (i.e. beaches and walkways) which are key destinations in the Shire.
43	Tourism Management Plan	BSC	2009	Plan	Received	No further review required	The Byron Shire Tourism Management Plan (BSTMP) is a living strategy that has been developed to guide tourism in the Shire over the next ten years. It has been developed in consultation with a BSC Steering Committee, a Regional Tourism Expert Panel, a range of stakeholder organisations representing governments, business and community interests across local, regional and state levels, and a Citizen Jury that was established to gain input and feedback from representatives of communities within the Shire. This Tourism Management Plan will be utilised by Council in its support of the local tourism industry in its context as a major but not exclusive part of the economy of the Byron Shire. Council, as a major supplier of services and infrastructure to all sectors of the community, clearly recognises its duty to try and balance the impacts of commercial, social and environmental activities for the common good.
44	Commercial Activities on Coastal and Riparian Crown Reserves, Policy 5.52	BSC	2017	Policy	Received	Potentially worth reviewing for specific details	This policy applies to all beaches and adjoining parks that are coastal Crown reserves under the care control and management of Byron Shire Council, where authorised as the Reserve Trust Manager. The objectives of the policy for those coastal Crown reserves are: to retain them as reserves; to set out what activities can be carried out with and without permision from Council; to regulate the level of temporary business or commercial activity; and to provide criteria for determining applications to carry out commercial activities.

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							The following beaches covered by this Policy are within the proposed CMP study area: South Golden Beach, New Brighton Beach, Brunswick Heads Beach, South Brunswick Heads Beach, Belongil Beach, Byron Bay (Main) Beach and Clarkes Beach.
45	Byron Shire Council - Tourism scale and impact analysis	.id for BSC	2018	Report	Received	No further review required	This report presents recent analysis into the scale and impact of high visitation numbers in BSC area. The analysis provides insights on the magnitude and pressures of tourism activity in the BSC LGA, including some state and national comparisons.
46	Byron Shire Employment Lands Background Report	HillPDA Consulting for BSC	2018	Report	Received	Potentially worth reviewing for specific details	This document examines the opportunities for Byron Council to best manage its employment lands to attract investment and growth. This Background Report presents research findings and projects future demand for employment land in Byron LGA. It provides a comprehensive evidence base that has informed the development of an Employment Land Strategy for Byron LGA. The Employment Lands Strategy provides a comprehensive pathway for Council to attract and accommodate growth. The Strategy includes recommendations and actions to assist Council exercise strong leadership in planning and facilitating future growth in employment lands in the LGA. Employment land in Byron LGA includes “land that is predominantly used for commercial or industrial activities resulting in employment”. The Background Report and Employment Lands Strategy focuses on land designated for industrial, retail and commercial office uses under the Byron Local Environmental Plan 2014.
47	Byron Shire Community-Based Heritage Study	BSC	2007	Report	Received	No further review required	Between 2004 and 2006, members of the Byron Shire community participated in a comprehensive Community-Based Heritage Study that aimed to identify, assess and recommend listing of places of heritage significance within the Shire. This report provides the findings and recommendations of the Study. The Study makes recommendations for the ongoing management and protection of heritage places including the inclusion of 200 individual items, 5 conservation areas, and 8 Serial Listings on the schedule of places of local heritage significance in the Byron Shire Local Environment Plan. A series of heritage places are in the vicinity of the proposed CMP study area.
48	Business in Byron Shire 2017 2018	HJ Bell Consulting for BSC	2017	Report	Received	No further review required	Byron Shire conducted research in 2017 to gain an understanding of the current and future needs of businesses in the Shire. Over 1000 businesses participated in the online survey between November and December, 2017. This report includes the results of the research. Businesses were also asked to list their top 20 initiatives for Council to address over the next five years. Notably, 'protection of the natural environment' was listed among the priorities, which is relevant to the CMP.

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49	Byron Biodiversity Conservation Strategy	BSC	2004	Report	Received	Potentially worth reviewing for specific details	The Biodiversity Conservation Strategy is a key strategic document that outlines how Council and the broader community can improve biodiversity conservation across the Shire by developing a range of actions that address a wide range of issues impacting on biodiversity. The report is organised in 3 parts: Planning Framework & Context; Byron Biodiversity Action Plan; and Appendices and Additional Information. The strategy predates and informed the latest BSC's LEP and DCP.
50	The Effects of Beach Scraping on the Infauna of New Brighton Beach, Northern NSW	Southern Cross University for BSC	2011	Report	Received	No further review required	As part of an assessment of mitigation strategies for beach erosion, Byron Shire Council undertook trial beach scraping at New Brighton beach in August and September 2010. The objectives of the works were: i) to build sand reserves for protection of beachfront development and infrastructure from short-term coastal erosion; and ii) to augment the natural buffer provided by sand dunes. Monitoring of the environmental impacts of these works was initiated across the habitats and taxa likely to be affected. This report summarises the data from a comprehensive assessment of the impacts of scraping on beach infauna (animals living within the intertidal beach). This study confirms suggestions from similar research that beaches are highly dynamic and thus have the capacity to recover rapidly from physical disturbance. In this study, natural disturbances appear to have had more of an effect than the mechanical removal of sand from the beach face.
51	Bush Fire Risk Management Plan	Far North Coast Bush Fire Management Committee	2009	Plan	Received	No further review required	The Far North Coast BFMC area is located in the north east corner of New South Wales and includes the Local Government Areas of Ballina, Byron and Tweed. Major landholders include Department of Environment and Climate Change (NPWS), Local Government, Department of Lands and Private Landowners (including joint venture forestry plantations and Local Aboriginal Land Councils). The typical / average climate in the Far North Coast BFMC area could be described as temperate to sub-tropical. Although the area can experience high rainfall, this can be very seasonal, the driest months on average being August to October and wettest in late summer and autumn (source www.weatherzone.com.au). The bush fire season generally runs from September through November although statutorily extends to March most seasons due to hot summer temperatures and strong coastal winds. Prevailing weather conditions associated with the bush fire season in the Far North Coast BFMC area are strong north to north westerly winds, with high temperatures and low humidity. Worst seasons occur after prolonged periods of drought. The season can often start “early” in July or August if drought conditions prevail. The Far North Coast BFMC area has on average one hundred and thirty five bush fires per year, on average four of which could be considered to be major fires.

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							The main sources of ignition in the Far North Coast BFMC area are fire escape from legal or illegal fires (mainly prior to the introduction of the bush fire danger period), arson, and less frequently lightning strikes and issues related to power line infrastructure.
52	Draft Plan of Management - Tyagarah Nature Reserve	NPWS	2016	Plan	Received	Potentially worth reviewing for specific details	This plan talks about a special part of the Country of the Bundjalung of Byron Bay (Arakwal) people know as Tyagarah Nature Reserve, which is located on the far north coast between the townships of Byron Bay and Brunswick Heads. The reserve is an important part of Country to the Arakwal and to other Bundjalung because it is a place of spiritual and cultural significance. As an outcome of the second Indigenous land use agreement (ILUA 2) between the Arakwal and the NSW Government, a Management Committee has been established. The committee covers the NPWS Byron Coast Area, including Tyagarah Nature Reserve, and enables joint management of the reserve by NPWS and the Arakwal. Joint management provides a continuing role for the Arakwal in looking after Country. The plan establishes a scheme of operations (action plan) for the Tyagarah Nature Reserve.
53	Draft Coastal Management Strategy and Action Plan form New Brighton to Wooyung Far North NSW	EcoCo-ord	1998	Plan	Received	No further review required	This plan focussed on the strip of coast between New Brighton (Byron Shire) and Wooyung (Tweed Shire); an environmentally sensitive area. The strategy identifies a series of features, values, problems and issues. Coastal inundation is identified as the main hazard of concern in the area. The action plan provides timelines and responsible for the recommended strategies. Most of these actions would have been by now captured in other plans of managements.
54	Belongil Creek Floodplain Risk Managment Plan	BMT WBM for BSC	2015	Plan	Received	Potentially worth reviewing for specific details	The Belongil Creek Flood Study and the Belongil Creek Floodplain Risk Management Study were completed in 2009 (SMEC, 2009) and 2014 (BMT WBM, 2014) respectively. The NSW State Government has provided financial assistance towards the cost of the study under its Floodplain Management Program. This study represents the fourth of the five flood risk management stages for the Belongil Creek catchment. It has been prepared for Byron Shire Council to define a series of actions which, if implemented, help to reduce the impact of flooding In Byron Bay by controlling the flood risk and reducing flood damages. Need to consider effects of creek entrance on flooding, noting that Byron Bay is susceptible to flooding from both intense short duration storms over the town catchment and ocean storm tide events.
55	Byron Shire Council and Bundjalung of Byron Bay Arakwal People	BSC	2013	Received	Potentially worth reviewing for specific details		This MOU records a voluntary, co-operative agreement entered into on 8 July 2013 between BSC and Arakwal It recognises the status of the Arakwal as traditional owners and provides a clear process and timetable for delivery of core priorities and projects identified in the MOU.

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	Memorandum of Understanding						
56	Coastal Hazards Risk Management Policy – discussion paper	C Knight	2017?	Report	Received	Potentially worth reviewing for specific details	This report canvasses feasible policy and management options for mitigating coastal hazard risks at New Brighton, Byron Shire. The report is part of an over-arching project, to prepare a Coastal Hazards Risk Management policy for New Brighton, in consultation with key stakeholders and the community, to be adopted by the local planning authority, Byron Shire Council.
57	Our Byron Our Future - Our Community Strategic Plan 2028	BSC	2018	Plan	Received	Potentially worth reviewing for specific details	This plan sets out our collective vision for the next 10 years and highlights our priorities and aspirations. It is a collective document that is facilitated by Council in collaboration with the community and other partners. The Integrated Planning and Reporting Framework in NSW requires all councils to adopt a suite of strategic plans. Our Community Strategic Plan outlines the vision, community objectives and supporting strategies which will guide Council's long-term decision making. The next level of planning and reporting comes in the form of the Delivery Program. The Delivery Program has a timespan of four years and describes how the vision and community objectives outlined in the Community Strategic Plan are to be translated into actions through specific activities and programs. The Delivery Program aims to provide the community with a commitment from the Council which outlines what will be delivered during its term of office. The Operational Plan is updated annually and makes up one year of the Delivery Program. It is outlined in the plan that the community desires waterways and the coast to be managed in a sustainable manner.
58	Far North Coast Regional Strategy	DoP	2006	Report	Received	Potentially worth reviewing for specific details	This is the Far North Coast Regional Strategy. It applies to the six local government areas of Ballina, Byron, Kyogle, Lismore, Richmond Valley and Tweed, and is one of a number of regional strategies that have been prepared by the NSW Department of Planning. The Regional Strategy consolidates and builds on previous planning work, including the Northern Rivers Regional Strategy and local council settlement strategies. In developing policies and actions to address the Region's future growth, the Strategy has also recognised the potential impacts on the Region from the rapid growth of South East Queensland. The purpose of the Regional Strategy is to manage the Region's expected high growth rate in a sustainable manner. The Regional Strategy will protect the unique environmental assets, cultural values and natural resources of the Region while ensuring that future planning maintains the character of the Region and provides for economic opportunities. In addition, future growth will be managed by preventing the spread of coastal development and encouraging the development of non-coastal centres.

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59	North Coast Regional Plan	DoP	2017	Plan	Received	Potentially worth reviewing for specific details	The North Coast Regional Plan 2036 is our blueprint for the next two decades that reflects community and stakeholder aspirations and opportunities from leveraging the North Coast's position between two of the fastest growing population corridors in the nation. The plan encompasses a vision, goals and actions geared towards delivering greater prosperity in the years ahead for those who live, work and visit this important region. By focusing growth in cities and centres we have protected the sensitive coastal strip, productive farmland and land with significant environmental and cultural values. This environment will be enhanced and managed to ensure future generations enjoy the same outstanding lifestyle that we have.
60	North Coast Local Strategic Plan 2016-2021	North Coast Local Land Services	2016	Plan	Received	Potentially worth reviewing for specific details	Local Land Services represents a change in service provision to land managers in agricultural advisory services, biosecurity, emergency management and natural resource management (NRM). These services will be delivered in an integrated way which builds and improves on previous arrangements. The State Strategic Plan sets the vision and goals for Local Land Services for the next ten years and outlines the strategies through which these goals will be achieved. A series of key performance indicators provides guidance on what success will look like and how investors and stakeholders will be able to measure performance. The North Coast Local Strategic Plan outlines our approach and commitment to building the sustainability of our primary industries, natural environment and local communities in the North Coast Region. How we cope with change will be fundamental to our contribution to regional sustainability. Goals 1–3 focus on service that guides the efforts of our customers, stakeholders and investors and involves them in decision making; Goal 4 focuses on governance, business approaches, staff capability and continuous improvement.
61	Byron Shire Council Development Control Plan	BSC	2014, 2010	Plan	Received	Review in further detail	Development Control Plans (DCPs) are documents that provide planning and building design guidelines for new development or alterations to existing development. The purpose of our Development Control Plans 2010 (DCP 2010) and 2014 (DCP 2014) are to specify Council's requirements for quality development and sustainable environmental outcomes on land in our Shire. DCP 2010 applies to land to which the Byron Local Environmental Plan 1988 (LEP 1988) applies i.e. all land deferred from LEP 2014, with the exception of the West Byron urban release area (where DCP 2014 applies). DCP 2014 applies to land to which the Byron LEP 2014 applies, as well as the West Byron urban release area.

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62	Plan of Management for the Clarkes Beach Holiday Park	Integrated Site Design Pty Ltd	2000, amended 2009	Plan	Received	No further review required.	On behalf of the Reflections Holiday the PoM was prepared to provide a framework for the future management, use and development of the reserved Crown land known as the Clarkes Beach Holiday Park. The plan was intended to be a 5 year plan which establishes objectives, environmental and management strategies and actions.
63	Byron Shire Preliminary Residential Strategy	Byron Shire Council	December 2018	Report	Received	Potentially worth reviewing for specific details	This draft report was prepared to provide: - context around issues associated with housing and land supply, - understand local demographics and population projections, - respond to existing visions for housing and land supply considering local contextual matters such as town strategies, etc. - undertake analysis of potential land and housing supply via greenfield residential opportunities and residential infill with comparisons drawn against expected demand.
64	Integrated Regional Vulnerability Assessment: North Coast of New South Wales	OEH	2016	Report	Received	Potentially worth reviewing for specific details	The report is the initiative of the OEH (NSW Government) focused on regional stakeholders to understand and plan response to climate change risk. It is a qualitative assessment of the impacts of climate change on services and infrastructure under local or state jurisdiction. Examples include public health, land use planning, infrastructure and emergency services. The general approach applied has been assess and understand, develop cross-agency understanding of links and dependences through knowledge sharing and preliminary planning for an adaptation strategy. The report has two volumes, including Assessment Report and Priority Sector Workshops Summary Findings.
65	North Coast Climate change snapshot	OEH	2014	Report	Received	Potentially worth reviewing for specific details	This overview of climate change for the North Coast Region describes the climate modelling platform used (NARCliM) to develop climate change projections for the region. Along with summary text describing current, topography, population and settlements/ecosystems/climate, etc a range of projected climate graphs are provided for rainfall, fire weather, temperature, hot days and cold nights.
66	State of the Beaches Report 2009-10, 2010-11, 2011-12 and 2012-13	OEH	2010, 2011, 2012, 2014	Report	Received	No further review required.	Summary water quality data reports for the Beach Watch program for the Far North Coast Region. Overview of the water quality monitoring program, sites, methods, results and grading.
67	Byron and Tweed Shire Councils Climate Change	GHD	2009	Plan	Received	Potentially worth reviewing for	This plan was developed following prescribed methodologies using recognised risk management approaches. Simplistically, the study involved working with stakeholders to assess assets and activities that were sensitive to climate change and then assess their level of risk. Variables

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	Adaptation Action Plan					specific details	considered included sea level rise, temperature, rainfall and extreme weather. Adaptation options for each risk were considered over the present, 2020 and 2070 timeframes
68	Planning responses to online short-term holiday rental platforms	Australian Coastal Councils Association Inc.	2018	Research Paper	Received	Potentially worth reviewing for specific details	The research paper was prepared to investigate issues, opportunities and risks from short-term holiday rental properties in different coastal communities of Australia. It aimed to identify planning responses / tools and strategies and emerging international responses to the issues identified.
	Generic Plan of Management for Community Land Categorised as a Natural Area	BSC	2015		Not Received		
	Cape Byron Marine Park Operational Plan	DPI - Marine Parks Authority	2010		Not Received		The Cape Byron Marine Park Operational Plan outlines how the marine park will be managed to meet key the objectives of: - conserving marine biodiversity; - maintaining ecological processes; - providing opportunities for ecologically sustainable use; - supporting public appreciation, enjoyment and understanding of the marine park. The Operational Plan was developed in consultation with the then Cape Byron Marine Park Advisory Committee.
	North Byron Beach Resort Estuarine and Dunal Management Plan	Wetland Care Australia	2015		Not Received		

B.2 Management Issues Identified in a previous CZMP pertaining to the Byron Bay Embayment (WRL, 2016)

Coastal Processes

- Long term coastal recession threatening built assets
- Coastal/storm erosion threatening built assets

Ecology

- Complex land ownership and management arrangements
- Inappropriate use of coastal and marine resources
- Marine biosecurity
- Marine pollution
- Altered / degraded water quality
- Introduced fauna
- Disturbance of fauna
- Artificial lighting
- Vegetation clearing and modification
- Poor connectivity between vegetation communities
- Inappropriate fire frequency and intensity
- Introduced flora / coastal vegetation
- Declining or threatened species biodiversity
- Direct impacts physical coastal processes
- Indirect impacts physical coastal processes and coastal protection works
- Climate change
- Informal access through dunes
- Vehicle access on beaches
- Lack of education and awareness leading to negative behaviours.

Cultural heritage

- Cultural and heritage resources (i.e. places, material items and landscapes) may not be identified, mapped or managed appropriately
- Coastal processes such as coastal erosion and recession have impacted or may impact in the future upon cultural heritage resources and sites e.g. middens

- Development and recreational usage may impact on cultural heritage resources e.g. disturbance of The Pass midden
- The construction and implementation of development including coastal infrastructure or coastal protection works may impact on cultural heritage resources
- Coastal processes such as coastal erosion and recession have impacted or may impact upon non indigenous cultural heritage sites of significance e.g. Old Jetty Sites
- Human impacts and activities, for example sandmining and residential development have resulted in the loss of cultural heritage sites.

Recreation and amenity management issues

- Socially and environmentally undesirable behaviours in beach and dune areas e.g. illegal camping, lighting of fires, alcohol and drug consumption, leading to environmental damage, habitat disturbance, negative impacts on amenity and public safety
- Terrestrial and marine pollution / littering (e.g. cigarette butts, plastic bags, fishing tackle and bait bags) negatively affecting beach amenity and the environment.
- Unregulated commercial activities on the beaches and foreshores may impact negatively on environmental, social and amenity values.
- Shoreline alignment of Jetty Site provides for a small embayment/pocket beach under most conditions, however there is no formal access or management regime provided and it is often in a state of disrepair or closure following storm events.
- When beaches are eroded, debris and potentially dangerous materials such as car bodies may become exposed, leading to amenity and public safety impacts
- Access #17 and #18 may be restricted / undercut by Clarkes Beach stormwater drain under certain conditions.
- Clarkes Beach stormwater drain may result in water quality and amenity issues
- Potential for oil/fuel leaks and spills from vehicles and vessels
- Potential conflicts between surfers, swimmers and boats / vessels
- Stormwater drains at Wategos Beach may result in water quality and amenity issues, erosion between road and beach
- Lacking provision of infrastructure at Belongil Beach for beach users e.g. pathways, formalised parking, amenities such as toilets, fresh water and showering facilities
- Lacking provision of formalised emergency access at Belongil Beach.
- Increased shark activity and associated conflicts with water based recreation activities.
- Coastal protection works at Belongil Beach have been rated as ‘poor’ in terms of visual amenity.

Appendix C Governance Table

Table C-1 Governance Table: Organisations and Responsibilities Relevant to the Coastal Environment

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
Federal	Australian Defence Force	• The military organisation responsible for defence in Australia, and forms the Maritime Border Command in partnership with the Department of Immigration and Border Protection. • In partnership with the Department of Defence, makes up the Australian Defence Organisation.
Federal	Australian Maritime Safety Authority (AMSA)	• Established by the *Australian Maritime Safety Authority Act 1990* • Administers the *Protection of the Sea Act 1983* • Co-ordinates maritime safety, including environmental management and pollution prevention
Federal	Department of Agriculture	• Designs and implements Australian Government policy, programs and services improve the productivity, competitiveness and sustainability of the food and agriculture industry. • Administers all biosecurity threats and associated quarantine services. It is responsible for the monitoring of all vessels scheduled to enter and leave Australian waters.
Federal	Department of Immigration and Border Protection Command	• Department staff work with the Australian Defence Force to form the Maritime Border Command.
Federal	Department of Infrastructure and Regional Development	• Responsible for administration of the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*
Federal	Civil Aviation Safety Authority	Government body that regulates Australian aviation safety and the operation of Australian aircraft overseas. Licencing pilots, registering aircraft, oversee aviation safety and promote safety awareness. Roles described in *Civil Aviation Act 1988*
Federal	Department of the Environment and Energy	• Designs and implements Australian Government policy and programs to protect and conserve the environment, water and heritage, promote climate action, and provide adequate, reliable and affordable energy. • Administers the *Environmental Protection and Biodiversity Conservation Act 1999* • Projects listed Threatened species occurring in and around the study area • No Heritage items of national environmental significance within the study area
Federal	Maritime Border Command	• Australia's lead civil maritime security authority that operates primarily offshore to safeguard Australia's maritime jurisdiction. • Comprises staff from the Department of Immigration and Border Protection, and the Australian Defence Force. • Has various roles and responsibilities, including to counter civil maritime security threats such as illegal activity in protected areas, illegal exploitation of natural resources, marine pollution and compromises to bio-security.

Governance Table

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
		• Liaises with a range or partner agencies including the Australian Fisheries Management Authority and the Australian Maritime Safety Authority.
Federal	National Health and Medical Research Council	• Australian government body expert body promoting the development and maintenance of public and individual health standards. • Oversees the ongoing development of the National Water Quality Management Strategy, that consists of policy, process and guidelines (including the 'ANZECC guidelines')
State		
State	Department of Health	• Department of Health has a diverse set of responsibilities centred around improving the health and wellbeing of all Australians both now and in the future. They provide evidence-based policy advice, program management, research and regulation.
State	Department of Industry	• Supports the growth and advancement of globally competitive and sustainable NSW industries to attract investment increase trade and create new jobs.
State	Department of Planning, Industry and Environment - Crown Lands	• Agency within the Department of Planning, Industry and Environment. • Develops strategy, programs and policy for the management of the Crown land estate and Water, with key business areas aiming to deliver social and economic outcomes for the state .• Administers the *Crown Land Management Act 2016 (as at 2 July 2018),* which provides for ownership and management of NSW Crown land. • Administrator for Crown land within the catchment area out to 3 nautical mile limit. • Many Crown reserves are managed by Local Government either through appointment as trust managers or by devolvement under the *Local Government Act 1993*. • Approves jetties and other domestic waterfront structures on estuaries not covered by RMS. • Investigates and assesses Aboriginal land claims across the state under the *NSW Aboriginal Land Rights Act 1983*. The Crown estate is managed in accordance with Commonwealth Native Title legislation. • Manage NSW water resources, both groundwater and surface waters, through planning, policy and regulation including implementing the *Water Management Act, 2000*.
State	Department of Industry, Regional Development Advisory Council – Northern Rivers	• Regional Development Australia (RDA) is a joint partnership between the Australian, State, Territory and Local Government to support growth and development of Australia Region; RDA Northern Rive is one of 14 committees in NSW and covers the Northern Rivers Region of NSW • RDA Northern Rivers purpose is to build partnerships between governments, key regional organisations, local businesses, community groups and key regional stakeholders to provide strategic and targeted responses to economic, environmental and social issues affecting the region.

Governance Table

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
State	Department of Industry, Planning and Environment (DPIE)	• State government department tasked at making NSW a great place to live and work, by providing homes and services, building communities, creating jobs and protecting the environment • Is affiliated with multiple agencies that have various roles and responsibilities in managing areas, including: • Department of Planning, Industry and Environment • Office of Local Government • Urban Growth NSW • Environment Protection Agency
State	Department of Industry, Planning and Environment (DPIE)	• State government department tasked with caring /protecting NSW's environment and heritage (natural, cultural and built), and supports the community, business and government in protecting, strengthening and making the most of a healthy environment and economy in NSW. • Administers the *Biodiversity Conservation Act 2016,* which establishes a balanced approach to land management and biodiversity conservation in NSW • Administers the *Coastal Management Act 2016*, which provides framework for strategic management of the NSW coastal zone now and into the future • Provides technical advice and financial assistance to Councils with preparing and implementing Coastal Management Programs, in line with the Coastal Management Manual and CM Act
State	Department of Industry, Planning and Environment (DPIE), Office of Local Government	• Agency within the Department of Planning, Industry and Environment portfolio • Is responsible for local government across NSW and is an advisor to the NSW Government on Local Government matters. • Has a policy, legislative, investigative and program focus in matters ranging from Local Government finance, infrastructure, governance, performance, collaboration and community engagement. • Administers the *Local Government Act 1993*, which provides the legal framework for the system of local government for New South Wales.
State	Department of Primary Industries, Biosecurity and Food Safety	• Agency within the Department of Primary Industries. • Responsible for the protection of the NSW economy, environment and community from biosecurity and food safety risks. • Administers the *Biosecurity Act 2015*, which provides flexible and responsive statutory framework to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants, for the benefit of the NSW economy, environment and community.
State	Department of Primary Industries, Fisheries	• Agency within the Department of Primary Industries • Administers the *Fisheries Management Act 1994*, which provides the legislative framework for conserving, developing and sharing the fishery resources of NSW for present and future generations. • Supports economic growth and sustainable access to aquatic resources through commercial and recreational

Governance Table

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
		fisheries management, research, aquaculture development, marine protected areas management, habitat protection and rehabilitation, regulation and compliance. Also mitigates and manages risks from use of land and water. • Responsible for ensuring that fish stocks are conserved and key fish habitat is protected. • Responsible for ensuring the sustainable management of commercial, recreational and Aboriginal cultural fishing, aquaculture, aquatic habitat and biodiversity, and marine protected areas within NSW including the Cape Byron Marine Park. • Undertakes compliance of recreational fishing and assessing development applications within waterway (e.g. jetties).
State	Destination NSW	• Destination NSW is the lead government agency responsible for the major events and tourism sectors. • Their role is to devise and implement strategies to grow the State's visitor economy.
State	Independent Pricing and Regulatory Tribunal (IPART)	• IPART provides advice and independent regulatory decisions to protect and promote the interests of taxpayers, citizens and consumers of NSW. They are the independent pricing regulator for water, public transport and local government as well as the licence administrator of water, gas and electricity.
State	Infrastructure NSW	• Infrastructure NSW is an independent statutory agency tasked with identifying and prioritising the delivery of critical public infrastructure for NSW.
State	Local Government NSW	• Local Government NSW is the industry association that represents the interests of NSW general and special purpose councils.
State	Local Land Services (LLS)	• LLS are a regionally based NSW Government agency that delivers quality services to farmers, landholders and the community. LLS have 11 regions, one of which is North Coast. • The *Local Land Service Act 2013* requires the development of regional strategies to set the vision, priorities and strategy for the delivery of LLS in each region. North Coast Local Land Services consulted with landholders, customers and the community to develop their local strategic plan. The plan was adopted in 2016 for the period from 2016 to 2021. • Each LLS region is governed by a board of local community representatives. The statewide LLS Board is responsible for safeguarding the delivery of state-wide priorities under the direction of the Minister for Primary Industries.
State	Marine Estate Management Authority	• The NSW Government Marine Estate Management Authority assist in ensuring that policies and programs address priority issues, are efficient and evidence based and result in positive outcomes. Their vision is to have a healthy coast and sea managed for the greatest wellbeing of the community now and in the future. • The Marine Estate Management Act 2014 and Marine Estate Management Regulation 2017 provides for the strategic and integrated management of the whole marine estate.

Governance Table

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
State	Maritime Infrastructure Delivery Office	The Maritime Infrastructure Delivery Office (MIDO) is a joint initiative between DPIE and Transport for NSW to improve the coordination and delivery of coastal and boating infrastructure programs and projects across NSW that support recreational boating, fishing, tourism and a range of other commercial activities. The office delivers the Coastal Infrastructure Program (including management of the Brunswick River Entrance Breakwaters) and the Rescuing our Waterways Dredging Program.
State	National Parks and Wildlife Service (NPWS)	• NPWS manages more than 870 protected areas in NSW including national parks, nature reserves, flora reserves, World Heritage areas, beaches etc. This includes the management of several national parks and nature reserves that intersect the study area including the Cape Byron State Conservation Area, Cumbebin Swamp Nature Reserve, Tyagarah Nature Reserve, Brunswick Head Nature Reserve, Marshalls Creek Nature Reserve, Billinudgel Nature Reserve.
State	NSW Coastal Council	• The NSW Coastal Council provides independent expert advice to the Minister administering the *Coastal Management Act 2016* on coastal planning and management issues. • The NSW Coastal Council was appointed under the *Coastal Management Act 2016 and* replaced the NSW Coastal Panel and the Coastal Expert Panel. • The Minister can request the NSW Coastal Council to audit a local council's implementation of its coastal management program to determine if they are being effectively implemented.
State	NSW Environment Protection Authority	• The EPA is the primary environmental regulator for NSW and aims to reduce pollution and waste, protect human health and prevent degradation of the environment. • The NSW EPA is an independent statutory authority that sits in the Environment Portfolio under the Minister for the Environment as part of the Planning and Environment Cluster. • Responsible for administering the *Protection of the Environment Operations Act 1997*.
State	NSW Land Registry Services (LRS)	• The NSW LRS is maintains a secure, efficient and guaranteed system of land ownership for NSW, defines the legal ownership and boundaries of land parcels throughout the State, both private and public, and records changes as they occur. • NSW LRS collects, collates and integrates property information in NSW and makes it readily available. • The community, business and government rely on this information for a variety of purposes including land management, conveyancing, property development, investment, local planning, state economic and social development and historical research.
State	Port Authority of NSW	• Port Authority of New South Wales is a state owned corporation that manages and develops port facilities and services to cater for the existing and future commercial shipping needs of the State of NSW. Operating under the *Ports and Maritime Administration Act 1995* they manages the navigation, security and operational safety needs of commercial shipping including the role of Harbour Master in all NSW ports. There are no port facilities however, within the study area.

Governance Table

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
State	Roads and Maritime Services	• The NSW RMS is an agency within the NSW Transport Cluster responsible for delivering safe and efficient journeys throughout NSW and managing the operations and programs of waterways (and roads).Within these areas RMS regulates maritime activities and is responsible for leasing domestic, commercial and community waterfront facilities. • The RMS is responsible for administering the following Acts:- City of Sydney Act 1988, Part 4A and Schedule 2, jointly with the Minister for Transport (remainder, the Minister for Local Government)- Driving Instructors Act 1992- Heavy Vehicle (Adoption of National Law) Act 2013 and the Heavy Vehicle National Law (NSW)- Marine Pollution Act 2012- Marine Safety Act 1998- Marine Safety Legislation (Lakes Hume and Mulwala) Act 2001- Motor Vehicles Taxation Act 1988- Photo Card Act 2005- Ports and Maritime Administration Act 1995- Recreation Vehicles Act 1983, Parts 4 and 6 (remainder, the Minister for the Environment)- Road Transport Act 2013- Roads Act 1993 (except parts, jointly the Minister for Primary Industries and other Ministers, parts, the Minister for the Environment, and parts, the Minister for Local Government)- Sydney Harbour Tunnel (Private Joint Venture) Act 1987- Transport Administration Act 1988, Part 4A, Divisions 1 to 3, so far as it relates to Roads and Maritime Services, Part 6, and so much of the Act as relates to Roads and Maritime Services (remainder, the Minister for Transport)
State	Transport for NSW	• Transport for NSW is the lead agency of the NSW Transport cluster. • Tasked with leading the development of a safe, efficient, integrated transport system that connects communities and regions. • Responsible for strategy, planning, policy, regulation, funding allocation and other non-service delivery functions for all modes of transport in NSW (including ferry, cycling and walking)
State	Railcorp NSW	Ownership and management of the rail corridor within the study area. It is presently used to convey the solar train between Elements of Byron and Byron Bay.
State	Treasury	• NSW Treasury manages the State's finances and assets, monitor the performance of its commercial agencies and develop its financial and industrial relations policies. • They assist the NSW government in establishing, implementing and delivering the State Budget and provide funding to government agencies and programs.
Local		
Local	Local Aboriginal Land Councils	• LALCs established following the *Aboriginal Land Rights Act 1983 (ALRA)* • LALCs bound by key legislative requirements in the amended ALRA. • The objects of each LALC are to "*improve, protect and foster the best interests of all Aboriginal persons within the Council's area and other persons who are members of the Council*". • Functions include acquiring and managing land, and promoting/protecting culture and heritage, facilitating business enterprise, provide community benefits

Governance Table

Govt Level	Agency / Organisation	Responsibility: Agency / Organisation
		• There are three Local Aboriginal Land Councils whose boundaries overlap with the Byron Shire including Tweed Byron LALC situated in Tweed Heads, Jali LALC situated in Ballina and Ngulingah LALC situated in Lismore.
Local	Arakwal Corporation	This corporation represents the interests of the Arakwal people by engaging in activities that promote agreed objectives of Living and Working Back on Country, Maintaining Cultural Connection to Country and Business and Economic Development. The Bundjalung of Byron Bay – Arakwal People has a Memorandum of Understanding in place with Byron Shire Council where Council identifies support and cooperation with the Arakwal People in respect of previously established Indigenous Land Use Agreements and the Arakwal people's ongoing involvement in the management and protection of culturally significant places within the Byron Shire, which in the study area primarily relates to the Cape Byron Sate Conservation Area and Cape Byron Marine Park.
Local	Byron Shire Council	• Byron Shire Council is independent entity responsible for administering the local government area over which it has jurisdiction as per the *Local Government Act 1993.* • Byron Shire Council is responsible for administering various legislation and developing their own plans and policies for their LGA (i.e. LEPs, CMPs etc). • Byron Shire Council has key responsibilities in relation to Coastal Zone Management including: land use planning, development approval, water quality and pollution regulation, open space and stormwater management etc.
Local	NSW Crown Holiday Parks Land Manager t/a Reflections Holiday Parks	Appointed Non-Council Land Manager of Crown Land for the Reserve on which the Clarkes Beach Holiday Park is located.

C.1 Key Commonwealth Legislation Supporting Coastal Management

C.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is Australia's key piece of environmental legislation focusing on the protection of matters of national environmental significance (MNES). It provides the legal framework for the protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places.

The nine MNES to which the EPBC Act applies are:

- World heritage properties
- National heritage places
- Wetlands of international importance (often called 'Ramsar' wetlands)
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- A water resource, in relation to coal seam gas development and large coal mining development.

Additionally, the EPBC Act confers jurisdiction over actions that have a significant environmental impact where the actions affect or are taken on Commonwealth land or are carried out by a Commonwealth agency (even if the significant impact is not on a MNES).

The EPBC Act is administered by the Australian Government Department of the Environment and Energy.

C.2 Key NSW Legislation Supporting Coastal Management

C.2.1 Environmental Planning & Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EPA Act) is the key NSW legislation for planning and land use. The Act provides a system of environmental planning and assessment for NSW, and involves developing plans to regulate competing land uses, through 'environmental planning instruments'. The EPA Act establishes three types of environment planning instruments (EPI):

- Local Environmental Plans;
- Regional Environmental Plans; and
- State Environmental Planning Policies.

The objectives of the EPA Act are to encourage:

- Proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;
- Promotion and co-ordination of the orderly and economic use and development of land;
- Protection, provision and co-ordination of communication and utility services;
- Provision of land for public purposes;
- Provision and co-ordination of community services and facilities;
- Protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats;
- Ecologically sustainable development;
- The provision and maintenance of affordable housing;
- Promotion of the sharing of the responsibility for environmental planning between the different levels of government in the State; and
- Provision of increased opportunity for public involvement and participation in environmental planning and assessment.

Approval processes for “development” and “works” in NSW are provided for in Part 3A, Part 4, Part 5 and Part 5A of the EPA Act. Key provisions are outlined briefly below.

Part 3A – Major Infrastructure and Other Projects

Part 3A came into operation in August 2005 and applies to development that is declared to be a project to which the part applies. A project can be declared by:

- A State Environmental Planning Policy (SEPP), with SEPP No. 71 – Coastal Protection of relevance to the coastal zone, or
- By order of the Minister for Planning published in the Government Gazette.

There are two types of development that may be declared for Part 3A approval (i.e. in addition to those directed to the Minister via a SEPP):

- Major infrastructure or other development that in the opinion of the Minister is of state or regional environmental significance, or
- Old Part 5 activity approvals where the proponent is the determining authority and an EIS would have been required.

Guidelines regarding Part 3A projects have been provided by DPIE. Part 3A of the AP&A Act has now been repealed, with the provisions largely incorporated into other planning instruments, such as *SEPP Infrastructure*.

Part 4 – Development Assessment

Part 4 of the EPA Act lays out the legislative regime for the standard process for lodgement and consideration of development applications. Part 4 processes essentially apply where the local authority (Council) is the consent authority.

The controls and permissibility for development of particular sites and / or uses are found in the Local Environment Plan (LEP) and Development Control Plan (DCP) (see following sections).

Part 5 – Environmental Assessment

Part 5 outlines the requirements for determining authorities to consider the environmental impact of activities, through an environmental assessment for the proposed activity. The environmental assessment shall outline the effect of the activity on critical habitat, endangered fauna, vulnerable species, conservation agreements (under the *National Parks and Wildlife Act 1974*), plans of management, wilderness areas (under the *Wilderness Act 1987*) and joint management agreements and bio-banking agreements under the *Threatened Species Act, 1995*, and any other legislation pertaining to the proposed activity.

Part 5 of the Act applies to proposed activities that are permissible without development consent under Part 4 of the EPA Act but require approval from a Minister or Public Authority, or is proposed to be carried out by a Minister or Public Authority (and Council is classified as a Public Authority).

Part 5 obliges the "determining authority" for the proposal to consider the environmental impact of any activity. A determining authority is the public authority which is required to approve an activity and can also be the public authority proposing to carry out the activity. For example, Council is permitted to undertake certain environmental management activities under SEPP (Infrastructure) 2007 without development consent, however may need to complete and environmental assessment under Part 5 of the EPA Act.

Part 5A (Development by the Crown) essentially provides a legislative regime for consideration of Development Applications made by, or for and on behalf of, the Crown.

The remaining parts of the EPA Act relate to: Part 6 – Implementation and Enforcement; Part 7 – Finance and Part 8 – Miscellaneous.

C.2.2 Draft Environment SEPP

The NSW Government is in the process of developing a new SEPP which will ensure the protection and management of the natural environment. The new Environment SEPP combine, repeal and replace the following:

- State Environmental Planning Policy No. 19—Bushland in Urban Areas
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- State Environmental Planning Policy No. 50—Canal Estate Development
- Greater Metropolitan Regional Environmental Plan No. 2—Georges River Catchment
- Sydney Regional Environmental Plan No. 20—Hawkesbury-Nepean River (No.2-1997)
- Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

- Willandra Lakes Regional Environmental Plan No. 1—World Heritage Property.

The purpose of the proposed SEPP Environment is to promote the protection and improvement of key environmental assets for their intrinsic value and the social and economic benefits they provide.

The SEPP (Environment) will have provisions set out under four parts, being:

(1) Catchments

(2) Waterways

(3) Bushland

(4) Protected Areas.

It will incorporate revisions to current SEPPs to remove unnecessary or outdated policy, address emerging issues and locate provisions in the most appropriate level of the planning system. The proposed Environment SEPP will provide a consistent level of environmental protection to that which is currently delivered under the existing SEPPs.

C.2.3 Local Government Act 1993

The *Local Government Act 1993* (the LG Act) creates local governments and grants them the power to perform their functions, which involve management, development, protection, restoration, enhancement and conservation of the environment for the local government area. The functions of the local government are to be performed in a manner that are consistent with and promote the principles of ecologically sustainable development.

The service functions of local councils (defined in Chapter 6 of the LG Act) includes the classification, use and management of public land, including the objectives for management of the Community Land owned by Council (i.e. that is not Crown Land).

Plans of Management for Community Land need also to be prepared under Section 35 of the Act. Section 35 of the act provides that community land only be used in accordance with the plan of management applying to the parcel of community land; any law permitting the use of the land for a specified purpose or otherwise regulating the use of the land; and the provisions of Division 2 Chapter 6 of the Act.

Community land can be categorised into a range of categories under Section 36 of the Act, and each of these categories have their own core objectives specified under the Act. The categorisation of community lands is important as the Act requires Council to only grant a lease, licence or another estate (other than in respect of public utilities) for a purpose consistent with the core objectives of the category of that community land.

C.2.4 Crown Land Management Act 2016

The *Crown Land Management Act 2016* (the CLM Act) which commenced on 1 July 2018 implements reforms identified through a comprehensive review of Crown land management and follows almost six years of community engagement.

The objects of the CLM Act are to:

- *"provide for the ownership, use and management of the Crown land of New South Wales,*
- *provide clarity concerning the law applicable to Crown land,*
- *require environmental, social, cultural heritage and economic considerations to be taken into account in decision-making about Crown land,*
- *provide for the consistent, efficient, fair and transparent management of Crown land for the benefit of the people of New South Wales,*
- *facilitate the use of Crown land by the Aboriginal people of New South Wales because of the spiritual, social, cultural and economic importance of land to Aboriginal people and, where appropriate, to enable the co-management of dedicated or reserved Crown land,*
- *provide for the management of Crown land having regard to the principles of Crown land management".*

A key feature of the new CLM Act is the appointment of a Crown Land Commissioner with broad advisory and inquiry functions who will play a key role in maintaining transparency regarding Crown land management.

C.2.5 Fisheries Management Act 1994

The *Fisheries Management Act 1994* outlines legislation relating to the management of fishery resources in NSW. The aim of the *Fisheries Management Act 1994* is to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

The Act is divided into 10 parts and covers: fishery management strategies, general fisheries management, commercial share management fisheries, licensing and other commercial fisheries management, charter fishing management, co-operation with Commonwealth and other States in fisheries management, aquaculture management, protection of aquatic habitats, threatened species conservation, administration and enforcement.

The *Fisheries Management Act 1994* is administered by the Minister for Primary Industries.

C.2.6 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (the BC Act) commenced on 25 August 2017 with the intent to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The BC Act established a modern and integrated legislative framework for biodiversity conservation and repealed the previous *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001*, and the animal and plant provisions of the *National Parks and Wildlife Act 1974*. It is comprised of 14 parts including:

- Part 1: Preliminary
- Part 2: Protection of animals and plants
- Part 3: Areas of outstanding biodiversity value

- Part 4: Threatened species and threatened ecological communities
- Part 5: Investment Strategy and private land conservation agreements
- Part 6: Biodiversity offsets scheme
- Part 7: Biodiversity assessment and approvals under Planning Act
- Part 8: Biodiversity certification of land
- Part 9: Public consultation and public registers
- Part 10: Biodiversity Conservation Trust
- Part 11: Regulatory compliance mechanisms
- Part 12: Investigation powers
- Part 13: Criminal and civil proceedings
- Part 14: Miscellaneous.

C.2.7 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) is the NSW legislation in place to conserve the State's natural and cultural heritage, foster public appreciation, understanding and enjoyment of NSW's natural and cultural heritage and manage any lands reserved for those purposes.

The NPW Act is the main piece of legislation for managing and protecting Aboriginal cultural heritage with Part 6 of the Act providing protection for Aboriginal objects and places. All Aboriginal sites in NSW are protected under the NPW and it is an offence to damage or destroy them (this includes collecting artefacts) without prior permission of the Director-General of the NSW DPIE.

C.2.8 Water Management Act 2000

The *Water Management Act 2000* (WM Act) establishes the principles and legislative framework governing water management in NSW. The WM Act aims to provide for the sustainable and integrated management of NSW water sources for the benefit of both present and future generations.

It includes requirements on water management planning, sharing, allocation and the use and the granting of access licences. The WM Act also defines what constitutes an offence. Examples of offences include taking water without an access licence, taking water for which there is no water allocation or contravening the terms and conditions of an access licence.

C.2.9 Local Land Services Act 2013

The *Local Land Services Act* (LLS Act) commenced on 1 January 2014, establishing Local Land Services and paving the way for the 11 regional Local Land Services organisations to begin operating. The LLS Act repealed the *Rural Lands Protection Act 1998*, the *Rural Lands Protection Amendment Act 2008* and the *Catchment Management Authorities Act 2003*.

The LLS Act identifies Local Land Services *"programs and advisory services associated with agricultural production, biosecurity, natural resource management and emergency management, including programs and advisory services associated with the following:*

(a) agricultural production,

(b) biosecurity, including animal pest and disease and plant pest and disease prevention, management, control and eradication,

(c) preparedness, response and recovery for animal pest and disease and plant pest and disease emergencies and other emergencies impacting on primary production or animal health and safety,

(d) animal welfare,

(e) chemical residue prevention, management and control,

(f) natural resource management and planning,

(g) travelling stock reserves and stock watering places,

(h) control and movement of stock,

(i) related services and programs".

The LLS Act designates local decision making and priority setting to Local Land Services.

C.2.10 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the primary piece of legislation concerned with environmental protection in NSW and is administered by the NSW Environment Protection Authority (EPA). The POEO Act deals with the regulation and licensing of certain activities, issuing of environmental protection notices and conducting environmental audits and investigations.

Councils have the power under the act to regulate non-scheduled activities through notices and enforcement. Specifically, the Council can issue a clean-up notice if a pollution incident has occurred. This can include water pollution, littering and dumping of waste.

C.2.11 Mining Act 1992

The *Mining Act 1992* makes provisions with respect to prospecting for and mining minerals. The objects of the Mining Act 1992 are to *"encourage and facilitate the discovery and development of mineral resources in New South Wales, having regard to the need to encourage ecologically sustainable development, and in particular*:

- *to recognise and foster the significant social and economic benefits to New South Wales that result from the efficient development of mineral resources, and*
- *to provide an integrated framework for the effective regulation of authorisations for prospecting and mining operations, and*
- *to provide a framework for compensation to landholders for loss or damage resulting from such operations, and*
- *to ensure an appropriate return to the State from mineral resources, and*

- *to require the payment of security to provide for the rehabilitation of mine sites, and*
- *to ensure effective rehabilitation of disturbed land and water, and*
- *to ensure mineral resources are identified and developed in ways that minimise impacts on the environment."*

C.3 Tabled Review of Relevant Legislation and Policy

Table C-2 Cape Byron to South Golden Beach Governance: Relevant Legislation and Policy

Govt Level	Type	Legislation / Policy
Federal	Legislation	Australian Maritime Safety Authority Act 1990
Federal	Legislation	Environment Protection and Biodiversity Conservation Act 1999
Federal	Legislation	Protection of the Sea (Prevention of Pollution from Ships) Act 1983
Federal	Legislation	Water Act 2007
Federal	Legislation	Maritime Transport and Offshore Facilities Security Act 2003 Maritime Transport and Offshore Facilities Security Regulations 2003
Federal	Legislation	Biosecurity Act 2015
State	Legislation	Biodiversity Conservation Act 2016
State	Legislation	Catchment Management Authorities Act 2003
State	Legislation	Contaminated Land Management Act 1997
State	Legislation	Coastal Management Act 2016
State	Legislation	Crown Land Management Act 2016
State	Legislation	Environmental Planning and Assessment Act 1979
State	Legislation	Fisheries Management Act 1994
State	Legislation	Heritage Act 1977
State	Legislation	Independent Pricing and Regulatory Tribunal Act 1992
State	Legislation	Local Government Act 1993
State	Legislation	Local Land Services Act 2013
State	Legislation	Marine Pollution Act 2012
State	Legislation	Maritime Services Act 1935
State	Legislation	National Parks and Wildlife Act 1974
State	Legislation	Natural Resources Commission Act 2003
State	Legislation	Ports and Maritime Administration Act 1995
State	Legislation	Protection of the Environment Administration Act 1991
State	Legislation	Protection of the Environment Operations Act 1997
State	Legislation	Public Health Act 2010

Govt Level	Type	Legislation / Policy
State	Legislation	Transport Administration Act 1988
State	Legislation	Water Act 1912
State	Legislation	Water Industry Competition Act 2006
State	Legislation	Water Management Act 2000
State	Planning Instrument	Coastal Management SEPP (derived)
State	Planning Instrument	Advertising and Signage SEPP (derived)
State	Planning Instrument	Housing for Seniors or People with a Disability SEPP (derived)
State	Planning Instrument	Caravan Parks SEPP (derived)
State	Planning Instrument	Intensive Agriculture SEPP (derived)
State	Planning Instrument	Exempt and Complying Development Codes SEPP (derived)
State	Planning Instrument	Canal Estate Development SEPP (derived)
State	Planning Instrument	Development Standards SEPP (derived)
State	Planning Instrument	Rural Lands SEPP (derived)
State	Planning Instrument	Koala Habitat Protection SEPP (derived)
State	Planning Instrument	Vegetation in Non-Rural Area SEPP (derived)
State	Planning Instrument	SEPPs for Building Sustainability Index, Affordable Rental Housing, Mining, Petroleum Production and Extractive Industries, Sustainable Aquaculture, Hazardous and Offensive Development, Manufactured Home Estates, Miscellaneous Consent Provisions, Remediation of Land, Infrastructure, Design Quality of Residential Apartment Development (Statewide Provisions)
Regional	Planning strategy	North Coast Regional Plan 2036
Regional	Planning strategy	Local Strategic Plan 2016 – 2021
Local	Planning Instrument	Byron Local Environment Plan 2014, 2010
Local	Planning Instrument	Byron Development Control Plan 2014

Appendix D Overarching NSW Coastal Management Framework

D.1 The New NSW Coastal Management Framework

Since 2012, the State Government has embarked upon a re-invigoration of the NSW Coastal Management (CM) Framework, including the open coast, estuaries, and the marine estate.

The Cooks River Catchment CMP Stage 1 Scoping Study is the first step for the CRA and Councils along this new coastal management framework. Therefore, it is worth describing recent changes to the framework.

The most important changes to the NSW coastal management process have been the:

- *Coastal Management Act 2016;*
- *State Environmental Planning Policy (Coastal Management) 2018;*
- *NSW Coastal Management Manual* (OEH, 2018), and
- *Marine Estate Management Act 2014*.

These are further outlined below.

D.1.1 Coastal Management Act 2016

The *Coastal Management Act 2016* was passed in the NSW Parliament in April 2016, and came into force in April 2018 once the CM SEPP was passed. The CM Act replaced the *Coastal Protection Act, 1979*. Under the CM Act, the coastal zone is now defined as comprising four coastal management areas, each with its own objectives under the Act:

- Coastal wetlands and littoral rainforests area;
- Coastal vulnerability area;
- Coastal environment area; and
- Coastal use area.

Mapping of all coastal management areas is gazetted under the CM SEPP, although no maps are currently available for the *coastal vulnerability area*. The SEPP mapping can be updated or in the case of the CVA, included via a Planning Proposal under the EPA Act. Further definition of the coastal management areas is provided below.

Under the CM Act, a coastal zone management plan will now take the form of a Coastal Management Program (CMP). The CM Act sets the minimum requirements for preparing and certifying CMPs.

Councils may seek to amend the mapping of any of these four coastal management areas via a Planning Proposal where they hold better or more up to date mapping, as part of preparing a CMP (and indeed this should be flagged at the Scoping Study stage). That is, it is not only the *coastal vulnerability area* for which amendments can be made by councils for their coastal zone.

D.1.1.1 Coastal Wetlands and Littoral Rainforest Area

Coastal wetlands and littoral rainforest support high value biodiversity that are particularly sensitive to development. This management area is defined in the CM Act as land which displays 'the hydrological and floristic characteristics of coastal wetlands or littoral rainforests and land adjoining those features' (DPE, 2016). This area focusses on protecting well established and more extensive vegetation communities (as opposed to single trees or isolated stands). The maps include a 100-metre proximity area, applying to all land use zones, around coastal wetlands and littoral rainforests.

The objectives of the coastal wetland and littoral rainforest management area within the CM Act are to:

- protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity,
- promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests,
- improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration,
- support the social and cultural values of coastal wetland and littoral rainforest communities,
- promote the objectives of State policies and programs for wetlands or littoral rainforest management.

D.1.1.2 Coastal Vulnerability Area

The CM Act recognises seven coastal hazards within the NSW coastal zone. The coastal vulnerability area focusses on identifying land subject to current and future coastal hazards, and ensure land use management undertaken in these areas recognise coastal risk.

The summarised objectives of the coastal vulnerability management area within the CM Act are to:

- ensure public safety and prevent risks to human life;
- mitigate current and future coastal hazards;
- maintain the presence of beaches, dunes and other natural features;
- maintain public access, amenity and use of the coast;
- encourage land use that reduces exposure to hazards, including through siting, design, construction and operational decisions;
- adopt coastal management strategies that reduce exposure to hazards, in the first instance by restoring or enhancing natural defences such as dunes, and thereafter by taking other action and
- if taking other action, to
  - avoid significant degradation or disruption of biological diversity, ecosystem integrity, coastal processes (ecological, biophysical, geological, geomorphological), beach and foreshore amenity, and social and cultural values,
  - avoid adverse offsite impacts, or otherwise restore the land if any impacts are caused by the action to reduce exposure to hazards,
- maintain essential infrastructure; and
- improve community resilience and reduce reliance on emergency responses.

D.1.1.3 Coastal Environment Area

The NSW coastal environment is diverse and encompasses a range of different landforms, processes and environments. The coastal environment management area is land containing features such as the coastal waters of the State, estuaries, coastal lakes and lagoons, and land adjoining those features such as headlands and rock platforms.

The objectives of the coastal environment areas within the CM Act are to:

- protect and enhance coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes, coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity;
- reduce threats to and improve resilience of these coastal environments, including in response to climate change;
- maintain and improve water quality and estuary health;
- support social and cultural values of the coastal environments;
- maintain the presence of beaches, dunes and natural features of the foreshore; and
- maintain and improve public access, amenity and use of the coast.

D.1.1.4 Coastal Use Area

The coastal zone comprises land that is extremely valuable to the economy and society. Indeed, the coast supports a range of human uses and development types that enable the wider coastal community to live, work and play on the coast. The coastal use management area encompasses land adjacent to coastal waterways (ocean, estuaries, lakes etc.) where impacts of development on the use and enjoyment of the beaches, dunes, estuaries and lakes need to be considered.

The objectives of the coastal use area within the CM Act are to:

- protect and enhance the scenic, social and cultural values of the coast by ensuring that:
  - the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast,
  - adverse impacts of development on cultural and built environmental heritage are avoided or mitigated,
  - urban design, including water sensitive urban design, is supported and incorporated into development activities,
  - adequate public open space is provided, including for recreational activities and associated infrastructure, and
  - the use of the surf zone is considered;
- accommodate both urbanised and natural stretches of coastline.

D.1.2 State Environmental Planning Policy (Coastal Management) 2018

The *State Environmental Planning Policy (Coastal Management) 2018* (the 'CM SEPP') passed in Parliament in April 2018, which brought the CM Act into force. The CM SEPP amalgamated and repealed SEPP No. 71 – Coastal Protection, SEPP No. 14 – Coastal Wetlands and SEPP No. 26 – Littoral Rainforest. The CM SEPP also allowed for the repeal of compulsory LEP Clause 5.5 Development in the Coastal Zone.

The CM SEPP defines the strategic planning objectives and development controls applicable to the four coastal management areas comprising the coastal zone as defined in the CM Act (i.e. coastal wetlands and littoral rainforests area, coastal vulnerability area, coastal environment area, and coastal use area).

The CM SEPP is supported by maps of the coastal management areas, except the coastal vulnerability area. Under the new process for the preparation of CMPs, Council may submit a Planning Proposal (in accordance with the EPA Act) to update any of the coastal management area maps. It is anticipated that Councils will submit planning proposals to have existing or new coastal hazard mapping adopted as the coastal vulnerability area. Updating the coastal wetland and littoral rainforest management area maps is also likely to be common.

D.1.3 NSW Coastal Management Manual (2018)

The NSW Coastal Management Manual ('the Manual') was released by the NSW Office of Environment and Heritage (OEH) in 2018 to guide the preparation of Coastal Management

Programs (CMPs) in accordance with the CM Act. A CMP sets out the long-term strategy for co-ordinated management of land within the coastal zone, that addresses local circumstances while also meeting the state objectives. The Manual comprises three parts:

- Part A: outlines the mandatory requirements in the CM Act, and the essential elements councils are required to follow in preparing a CMP.
- Part B: describes in detail the process for preparing a CMP.
- Part C: provides a technical toolkit with advice on a range of topics.

Part B of the draft Manual outlines five stages of a CMP, as illustrated in Figure D-1. The present study relates to Stage 1 (Scoping Study) of preparing a CMP.

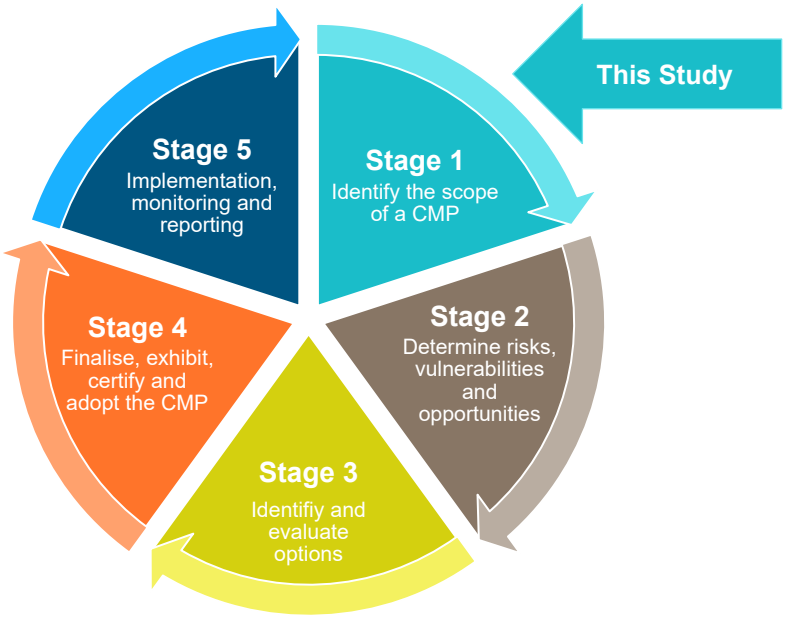

Figure D-1 Stage Process for Developing a Coastal Management Program (Coastal Management Manual; NSW Govt, 2018)

D.1.4 Marine Estate Management Act 2014

The *Marine Estate Management Act 2014* (MEM Act) repealed the *Marine Parks Act 1997* to establish a new approach to managing the whole marine estate to reduce social conflict and improve effective management of coastal and marine resources beyond existing marine parks.

The marine estate is defined in the *Marine Estate Management Act 2014* (s6), as:

"(a) the coastal waters of the State within the meaning of Part 10 of the Interpretation Act 1987,

(b) estuaries (being any part of a river whose level is periodically or intermittently affected by coastal tides) up to the highest astronomical tide,

(c) lakes, lagoons and other partially enclosed bodies of water that are permanently, periodically or intermittently open to the sea,

(d) coastal wetlands (including saltmarsh, mangroves and seagrass),

(e) lands immediately adjacent to, or in the immediate proximity of, the coastal waters of the State that are subject to oceanic processes (including beaches, dunes, headlands and rock platforms),

(f) any other place or thing declared by the regulations to be the marine estate,

but does not include any place or thing declared by the regulations not to be the marine estate".

It is an object of the CM Act (s3) "to support the objectives of the *Marine Estate Management Act 2014*". In this case, and as reciprocated in the *Coastal Management Act 2016*, CMPs need to align with the *Marine Estate Management Act 2014*.

The Marine Estate Management Authority (MEMA) was established as an advisory body by the NSW Government. MEMA is preparing the Marine Estate Management Strategy (2018), which will provide the overarching framework for marine estate management over the next decade, and outline management initiatives to address the priority threats to the NSW marine estate and to maximise community benefits. The priority threats have been identified through the State-wide Threat and Risk Assessment (TARA), which is available for use in preparing CMPs. Consistency between the Marine Estate Management Strategy and CMPs is an essential element listed in the Manual.

Key initiatives promoted by the Marine Estate Management Strategy (2018) include "*Improving water quality and reducing litter*", which can be associated to management of threats in estuaries and coastal areas, and hence may relate back to CMPs.

Marine protected areas are part of the NSW marine estate managed to conserve marine biodiversity and support marine science, recreation and education. The NSW marine protected area system includes: six marine parks; 12 aquatic reserves; and marine and estuarine habitats within national parks and nature reserves.

Appendix E Consultation Activities

Consultation Outcomes

Byron Shire Council Coastal Management Plan – Scoping Study

Client: Byron Shire Council
Date: 01 February 2019

A Veris Company

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Prepared by	Martin Klopper
Reviewed by	Lauren Milne
Date	1 February 2019
Version	2

Contents

FIGURES

TABLES

APPENDICES

No table of contents entries found.

1 Introduction

1.1 Project Background

Byron Shire Council is preparing a Coastal Management Program (CMP) for the Byron coastline, from Cape Byron to South Golden Beach.

The Coastal Management Act 2016 (CM Act) includes a requirement for Council's to consult with the community and stakeholders before adopting a CMP. Part A of the coastal management manual (the manual) prescribes statutory provisions and mandatory requirements relating to the design and delivery of community and stakeholder engagement. These mandatory requirements relate solely to the minimum period of 28 calendar days the CMP must be exhibited for. This mandatory requirement does not preclude or prevent additional community engagement, which is encouraged in the Guidelines.

A consultation strategy has been prepared in accordance with the Guidelines. This includes a strategy for Stage 1: Scoping. This outcomes report relates to the consultation for the Scoping Stage.

1.2 Consultation Aims and Objectives

The aims and objectives of this stage of consultation included:

Awareness / Information Sharing

» Increase community awareness for the project, why it is required (the need, and the legislation)

» Explain why the process is being repeated for the Byron Coastline due to the introduction of the new legislation.

» Clearly outline coastline management roles, and the responsibility of Byron Shire Council.

» Increase community and stakeholder understanding of the dynamic nature of coastal processes (sea level rise, etc), risks and opportunities.

» Relationship building

» Develop good working relationships with key stakeholders.

» Establish a transparent dialogue with the community, including key community organisations such as Dunecare.

Information Gathering

» Understand community goals and aspirations for the coastal area within the study area, from Cape Byron to South Golden Beach.

» Distinguish the differences and identify shared community aspirations, goals and priorities across the various areas, including Byron Bay, Brunswick Heads, New Brighton/Ocean Shores and South Golden Beach.

Scope Consultation

» Understand how the community prefers to engage, which tools work, timing, and location.

» Determine consultation activities for future stages of engagement (this report, Sections 2 through 5).

1.3 Scope of Consultation

Consultation was undertaken through:

Pop-up sessions held:

- At Byron Community Cabin on Carlyle Street, on Thursday 15 November 2018, between 4pm and 7pm, with a reach of 4 people.
- At Ocean Shores Community Centre, On Monday 19 November 2018 between 4pm and 7pm, with a reach of 13 people.
- At New Brighton Farmers Market, on Tuesday 11 December 2018 between 7am and 11am, with a reach of 25 people.

An **online survey**:

- Open to completion between 1 November 2018 and 13 December 2018.
- A total of 23 surveys completed.

A **physical inspection** of the New Brighton beach foreshore, with a representative of Dune Care.

2 Consultation Outcomes

2.1 Face-to-Face Community Engagement

Face-to-face engagement reporting has been separated into two distinct areas within the broader study area. This reflects the extent of past studies, information and consultation undertaken in the Cape Byron and Belongil areas.

2.1.1 Cape Byron to Brunswick Heads (South)

While the face-to-face engagement of this portion of the study area was the least attended (4 participants), it is noted that the majority of survey respondents (discussed under section 2.2) related to users that frequent beaches in this component of the study area.

Key consultation outcomes are outlined in the below table.

Table 1 Values, Opportunities and Threats – Cape Byron to Brunswick Heads (South)

Values	Opportunities	Threats
» Beauty » Scenery » Natural environment » Views » Surfing » Dog walking » Lighthouse walk.	» Growing dunes through active management, including planting and fencing. » Safe and equitable access to the beach. » Maintaining public access, including beach parking. » Protection of fauna and flora (including reintroduction)	» Erosion and loss of beach sand. » Manmade structures altering coastal processes. » Loss of fixed assets such as roads due to erosion. » Impact of dogs on the beach, natural and amenity. » Traffic and parking – changes to locals' ability to use the beach the way they have historically due to how busy Byron town has become.

Figure 1 Engagement at Byron Community Cabin

2.1.2 Brunswick Heads (North), New Brighton and South Golden Beach

The level of interest and community participation in face-to-face events was higher than the southern region, due to:

» Local community groups actively encouraging members to attend.

» Additional opportunities provided through a pop-up at local markets.

» Increased interest as this area has not been part of a study previously.

Attendees provided valuable local knowledge, and historic evidence in the form of photos and verbal record. Specific expertise in the form of academics and professionals, provided perspectives on technical coastal processes.

Historic records and technical experts should be drawn on in later stages of consultation.

Table 2 Values, Opportunities and Threats – New Brighton and South Golden (North)

Values	Opportunities	Threats
» Walking » Swimming » Sunrise over the beach » Views » Peace and tranquillity » Using the beach for fishing » Using the beach for yoga and meditation » Walking with dogs » Surfing » Fauna and Flora.	» Improved management of dunes. » Dune planting » Well managed beaches » Equitable access » Improved parking and parking management. » Coastal management arrangements. » Reintroduction / protection of birds and turtle population.	» **Dogs** > People not following the rules for on and off leash areas. > Not picking up after dogs > Not controlling dogs in off-leash areas. > Dogs damaging dunes. » **Dunes** > Council management vs Dunecare work. > Illegal access ways > Dumping > Vegetation management » **Erosion** > Impact of major storm events. > Loss of fixed infrastructure including dwellings. > Loss of beach sand. » **Other Impacts** > Noted change to estuarine systems – has this impacted beaches, or as a result of coastal management? > Fixed infrastructure (stone walls) in Byron and

Values	Opportunities	Threats
		Brunswick Heads – what impact is this having on northern beaches? > Aerial invasion (drones, light aircraft) > Illegal camping – needs enforcement > Loss of turtle breeding.

Figure 2 Engagement at Ocean Shores Community Centre & New Brighton Farmers Market

Figure 3 Site visit walk with Dunecare – illegal dumping and success of fencing and planting

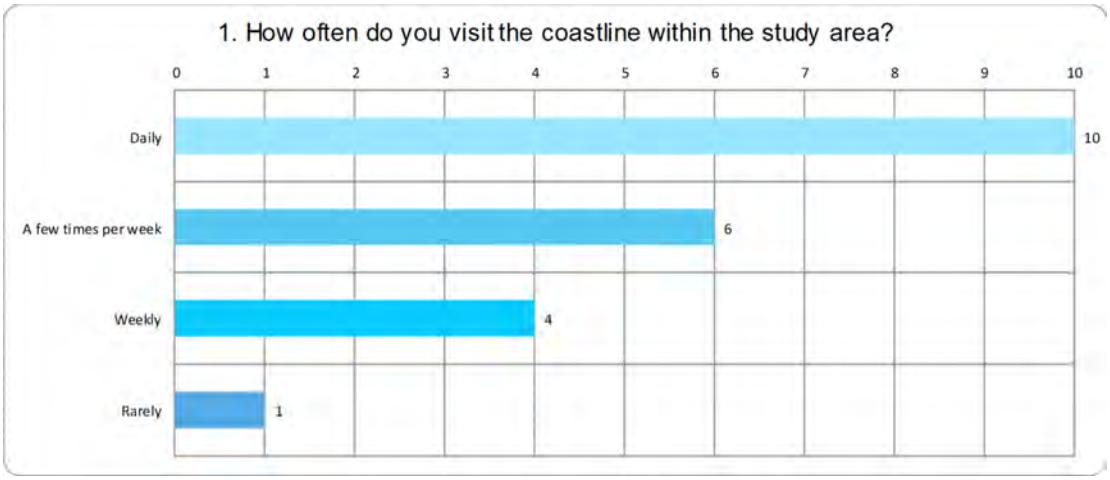
2.2 Online Engagement – Survey Outcomes

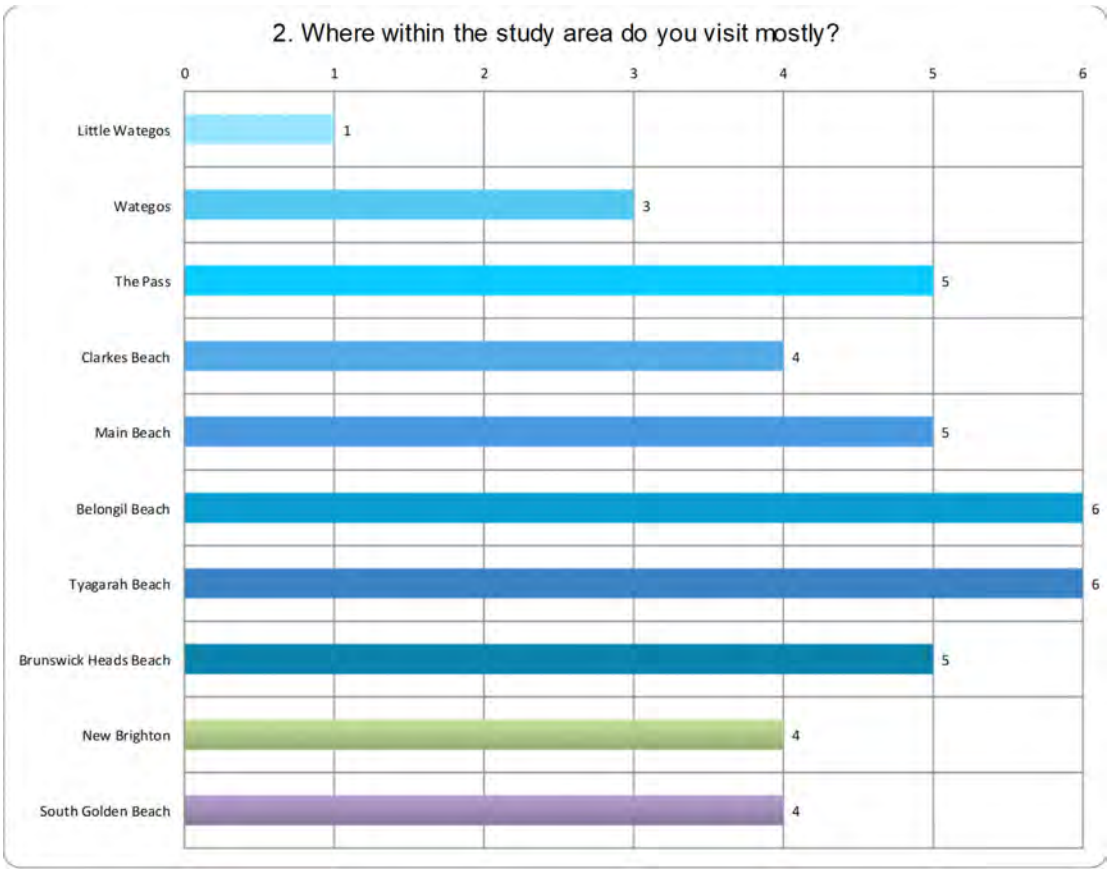
An online survey was run by Byron Shire Council through the Have your Say website.

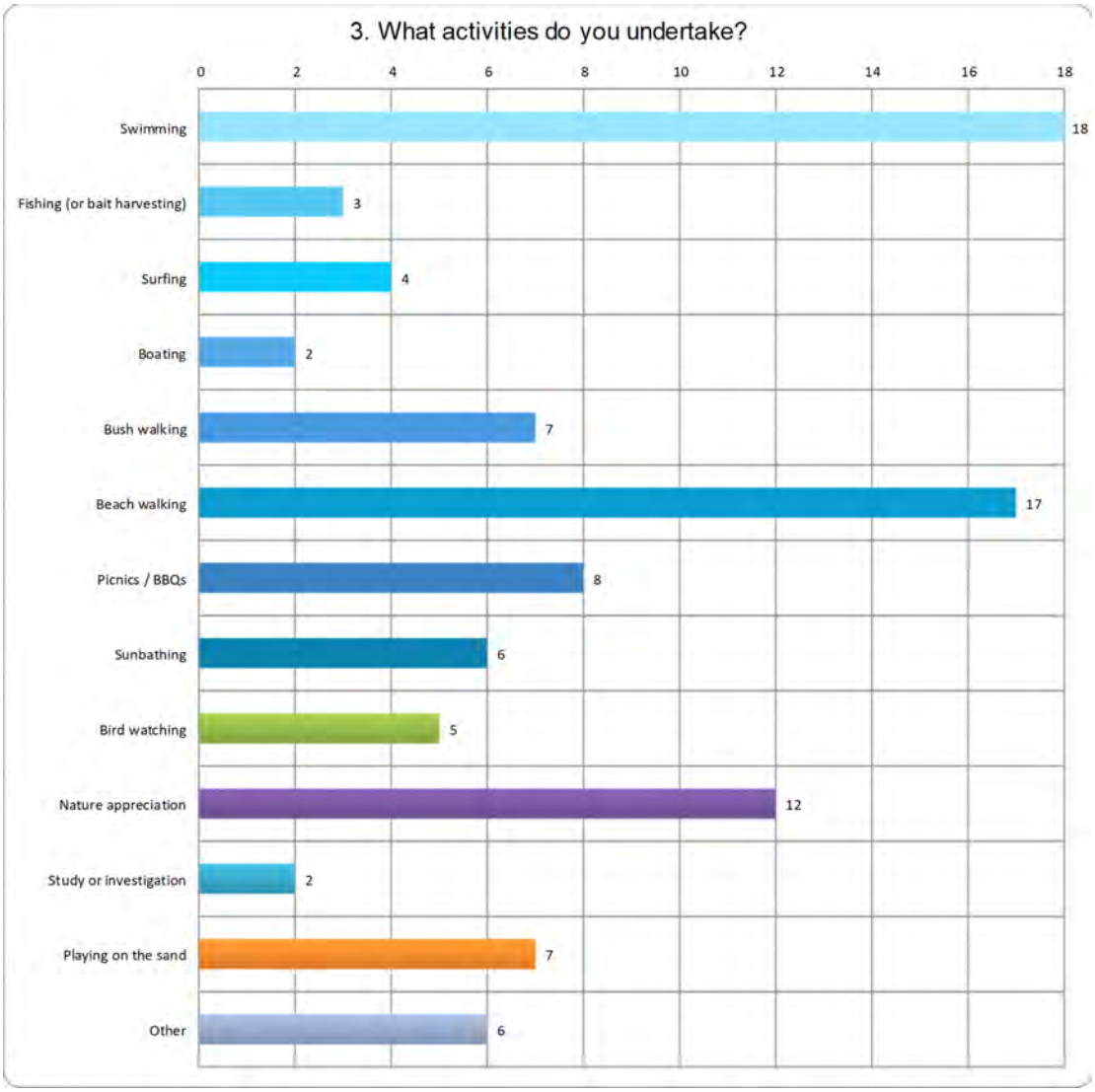
The survey had 177 visitors, and 23 contributors

Provided below are a series of graphs which represent results to the various questions posed.

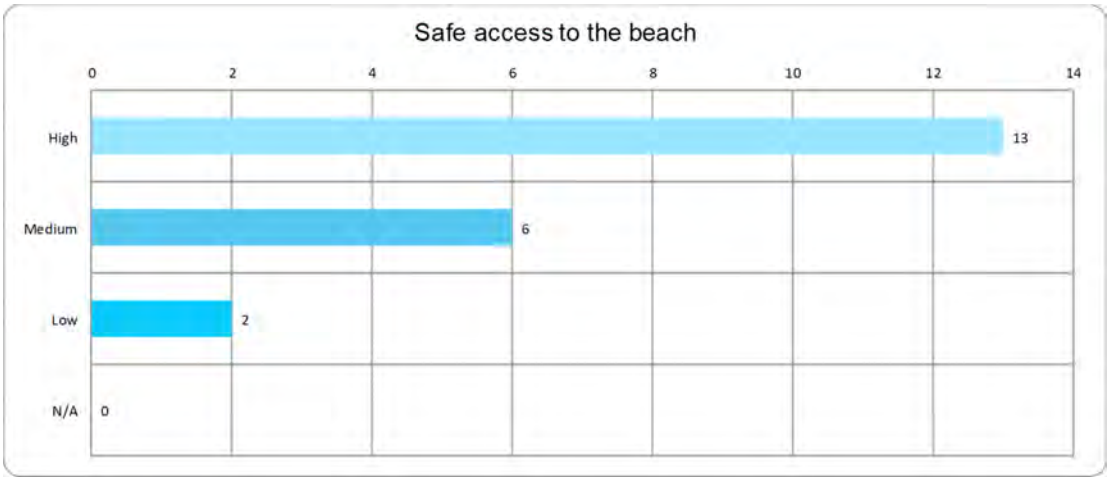
2.2.1 General

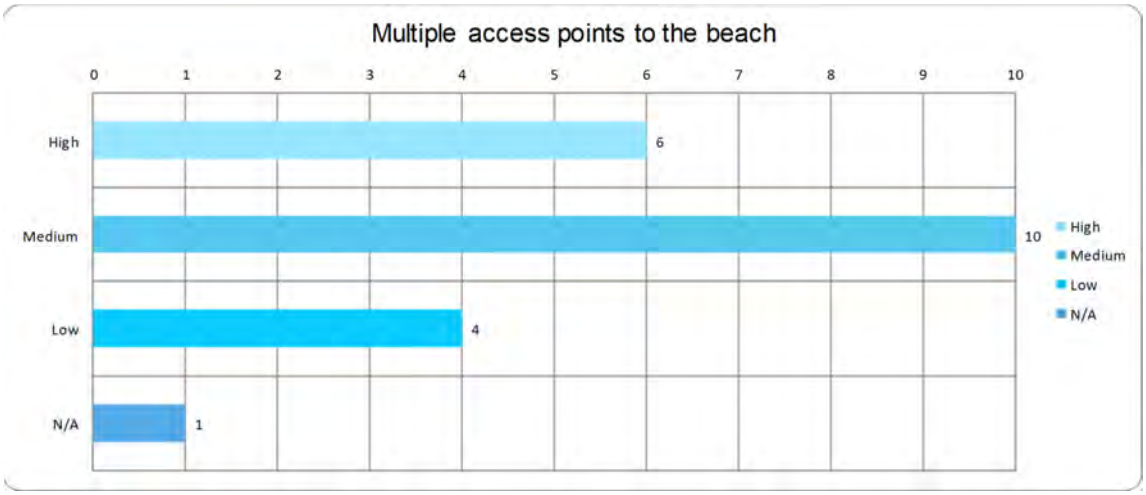





3. What activities do you undertake?
0
2
4
6
8
10
12
14
16
18
Swimming
18
Fishing (or bait harvesting)
3
Surfing
4
Boating
2
Bush walking
7
Beach walking
17
Picnics / BBQs
8
Sunbathing
6
Bird watching
5
Nature appreciation
12
Study or investigation
2
Playing on the sand
7
Other
6

2.2.2 **Values**


Safe access to the beach
0
2
4
6
8
10
12
14
High
13
Medium
6
Low
2
N/A
0


Multiple access points to the beach
0
1
2
3
4
5
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7
8
9
10
High
Medium
Low
N/A
6
10
4
1
High
Medium
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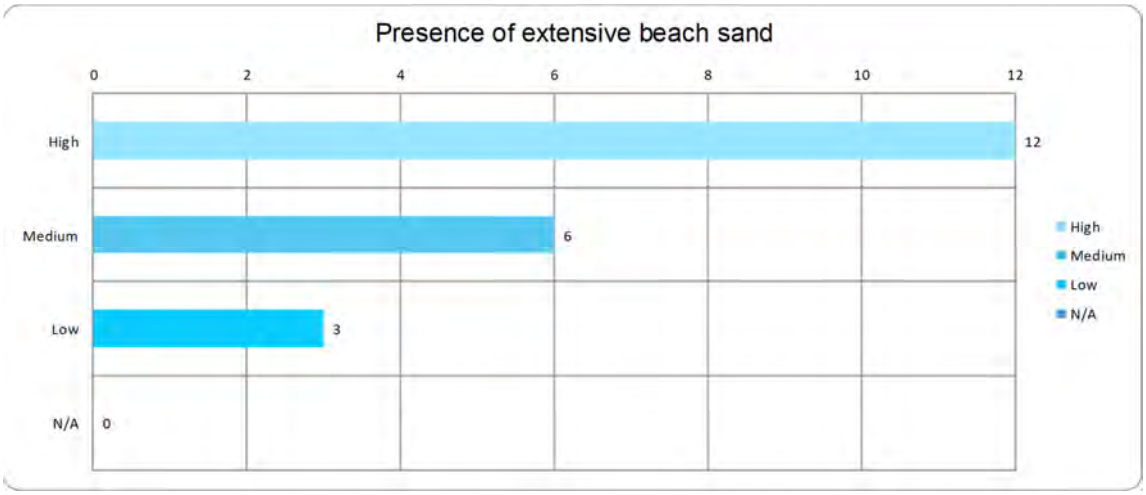
Presence of extensive beach sand
0
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8
10
12
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Medium
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N/A
12
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High
Medium
Low
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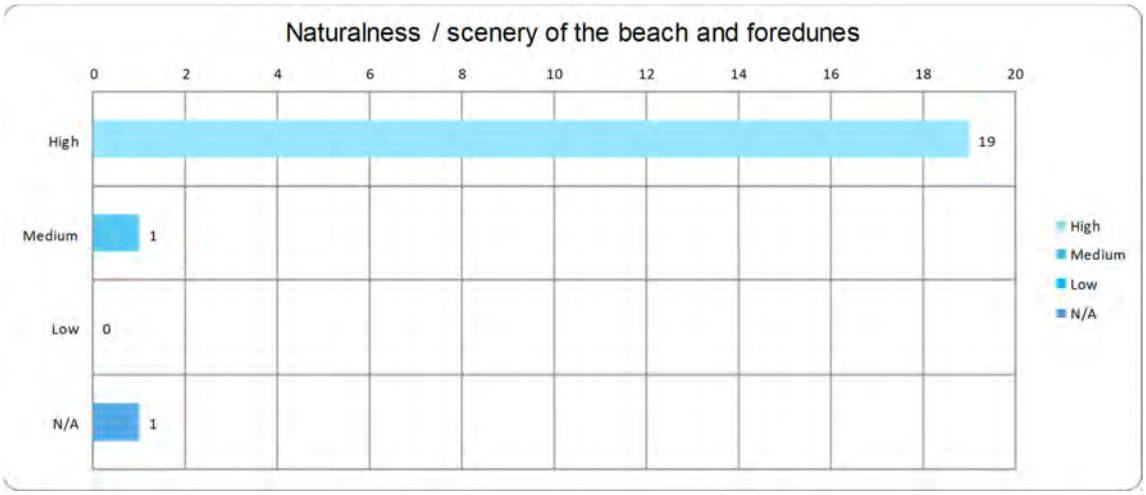
Naturalness / scenery of the beach and foredunes
0
2
4
6
8
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12
14
16
18
20
High
Medium
Low
N/A
19
1
0
1
High
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Low
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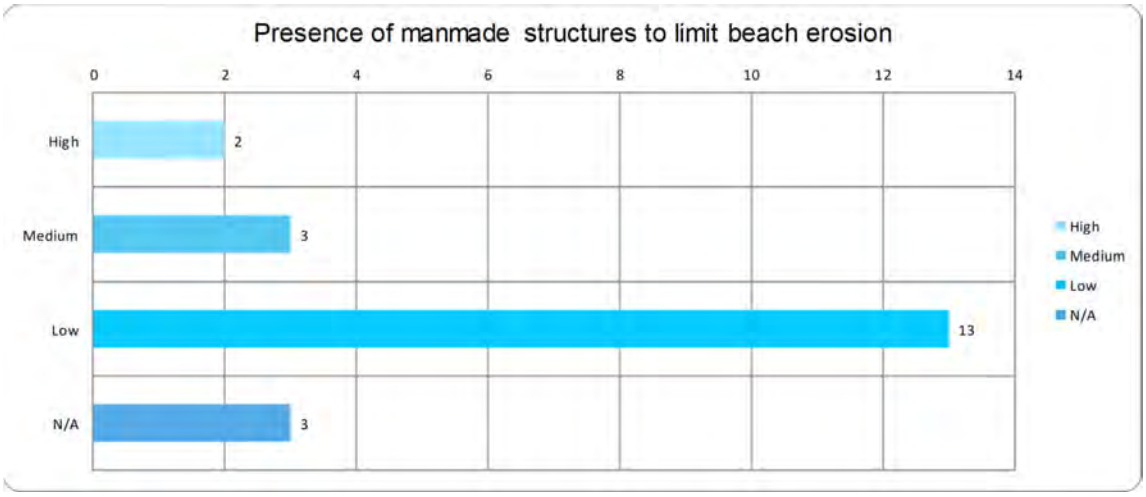
Presence of manmade structures to limit beach erosion
0
2
4
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10
12
14
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Medium
Low
N/A
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3
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3
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Medium
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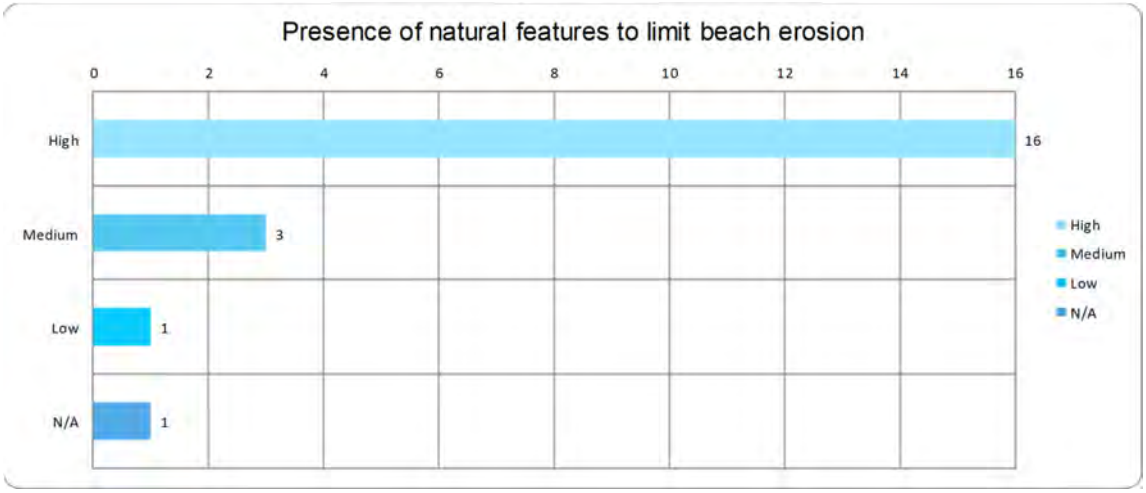
Presence of natural features to limit beach erosion
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Low
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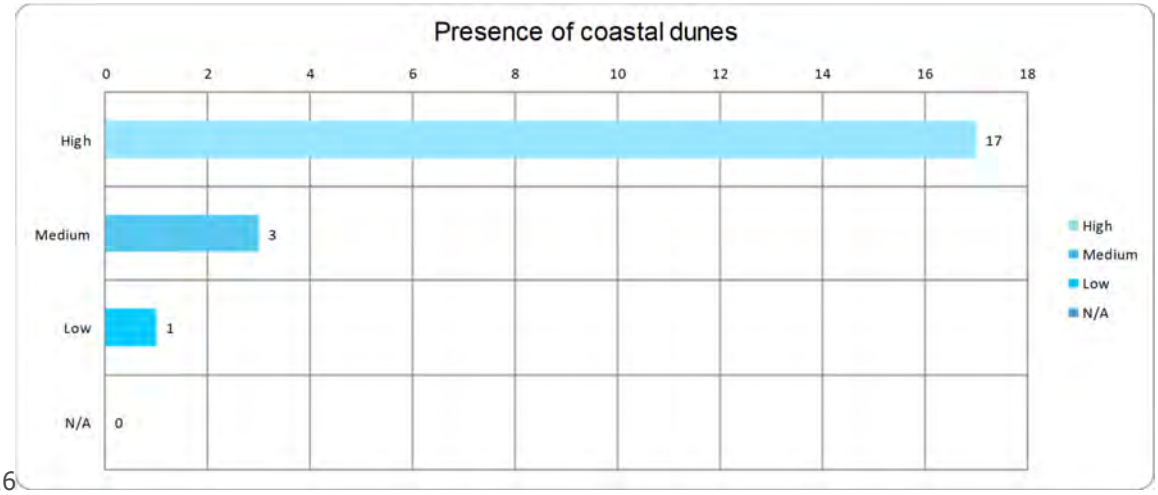
Presence of coastal dunes
0
2
4
6
8
10
12
14
16
18
High
Medium
Low
N/A
17
3
1
0
High
Medium
Low
N/A

16


Security of existing fixed assets such as roads to coastal erosion
0
1
2
3
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5
6
7
8
High
Medium
Low
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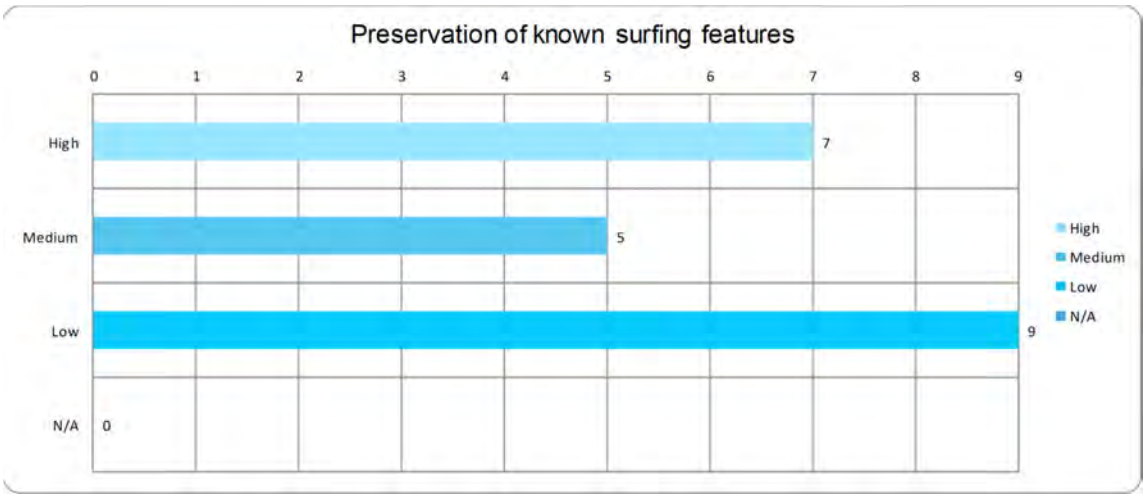
Preservation of known surfing features
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Low
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High
Medium
Low
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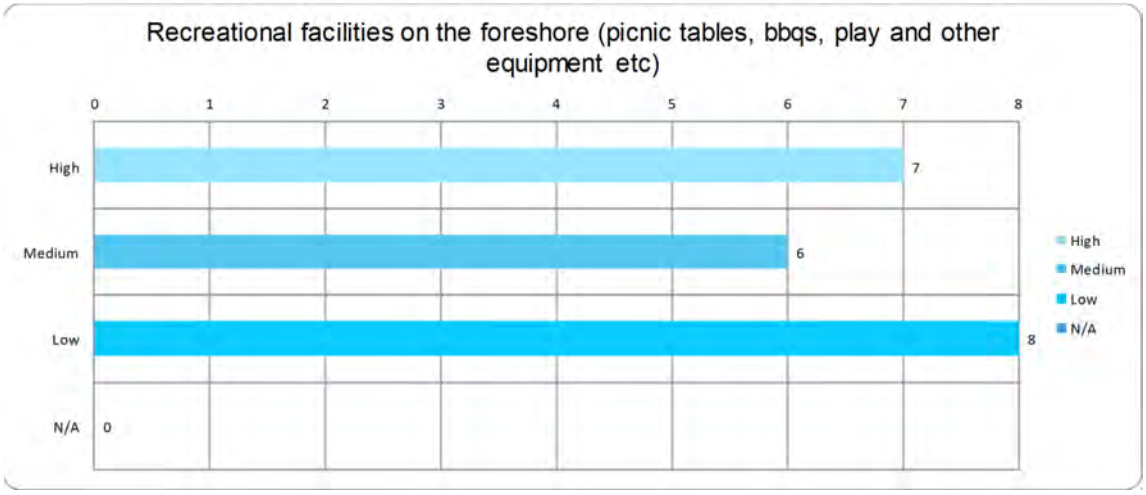
Recreational facilities on the foreshore (picnic tables, bbqs, play and other equipment etc)
0
1
2
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6
7
8
High
Medium
Low
N/A
7
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Medium
Low
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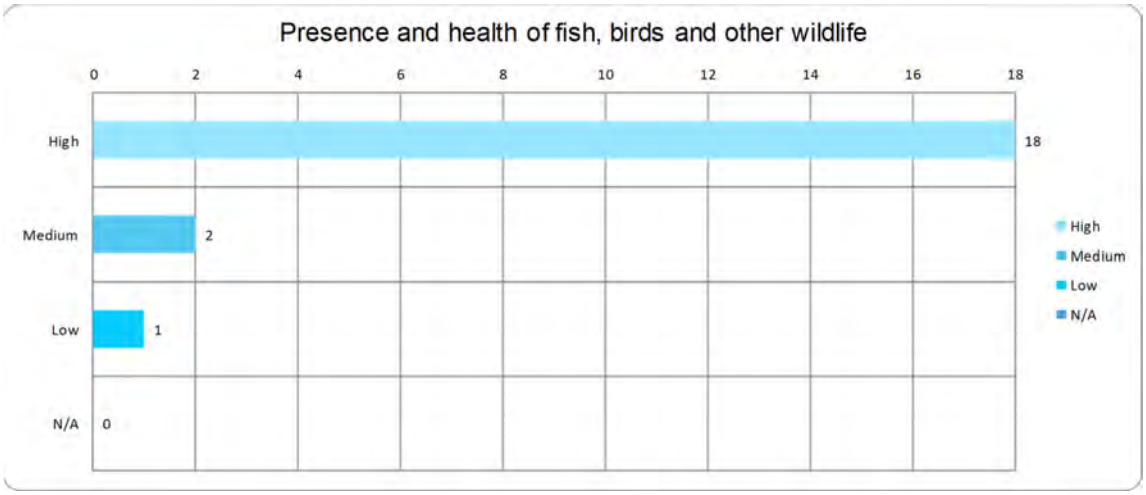
Presence and health of fish, birds and other wildlife
0
2
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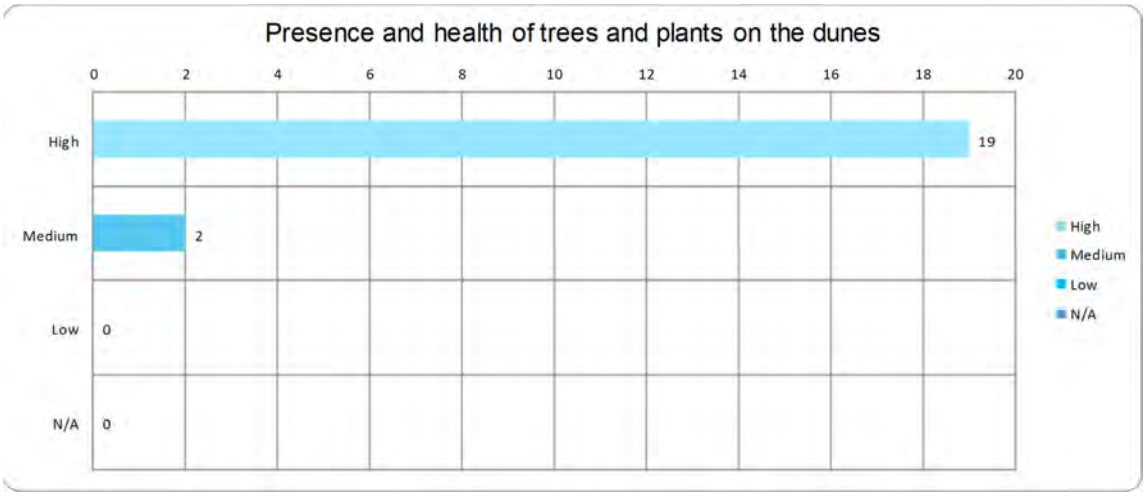
Presence and health of trees and plants on the dunes
0
2
4
6
8
10
12
14
16
18
20
High
Medium
Low
N/A
19
2
0
0
High
Medium
Low
N/A


Safe swimming locations
0
2
4
6
8
10
12
14
16
High
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15
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2
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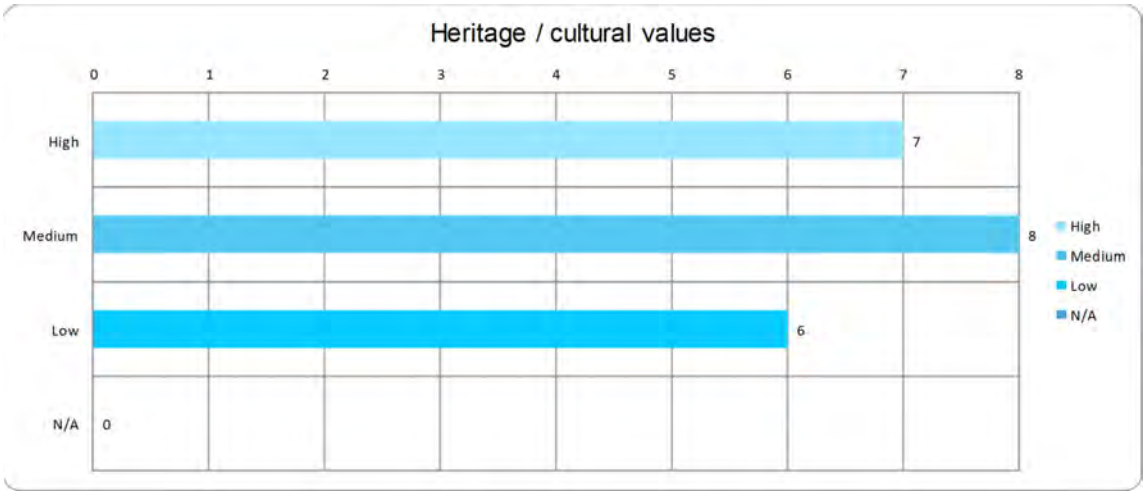
High
Medium
Low
N/A


Heritage / cultural values
0
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8
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N/A
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6
0
High
Medium
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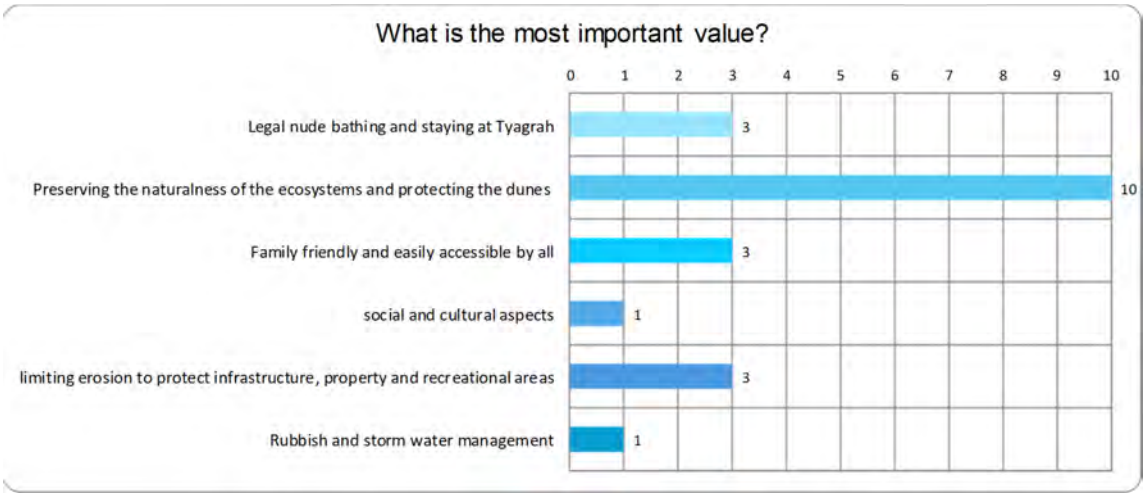
What is the most important value?
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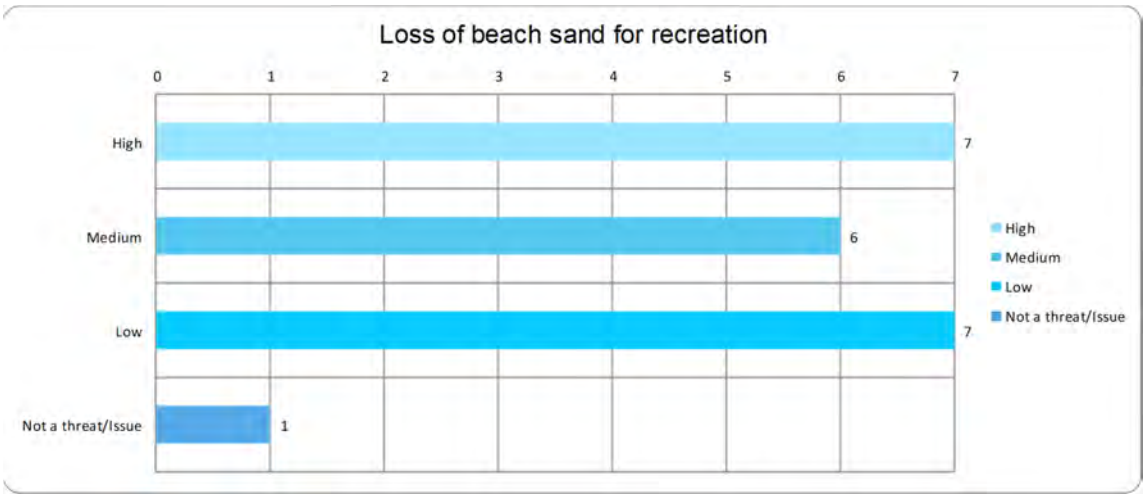
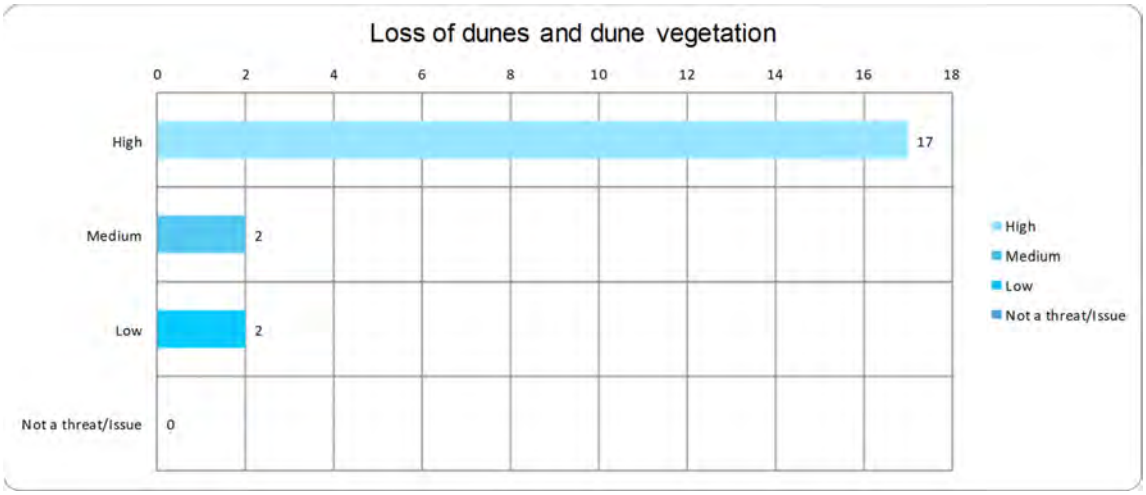
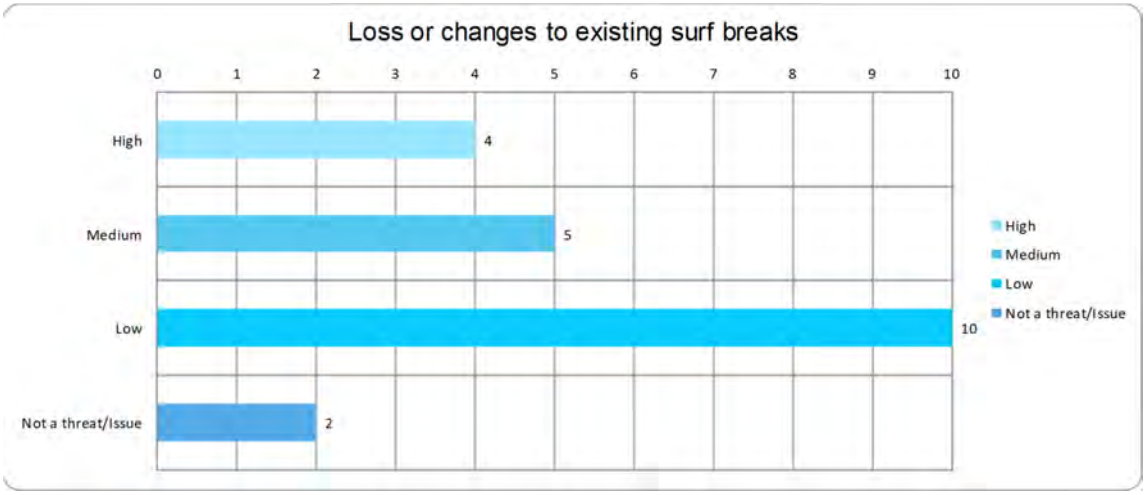
6
7
8
9
10
Legal nude bathing and staying at Tyagrah
Preserving the naturalness of the ecosystems and protecting the dunes
Family friendly and easily accessible by all
social and cultural aspects
limiting erosion to protect infrastructure, property and recreational areas
Rubbish and storm water management
3
10
3
1
3
1

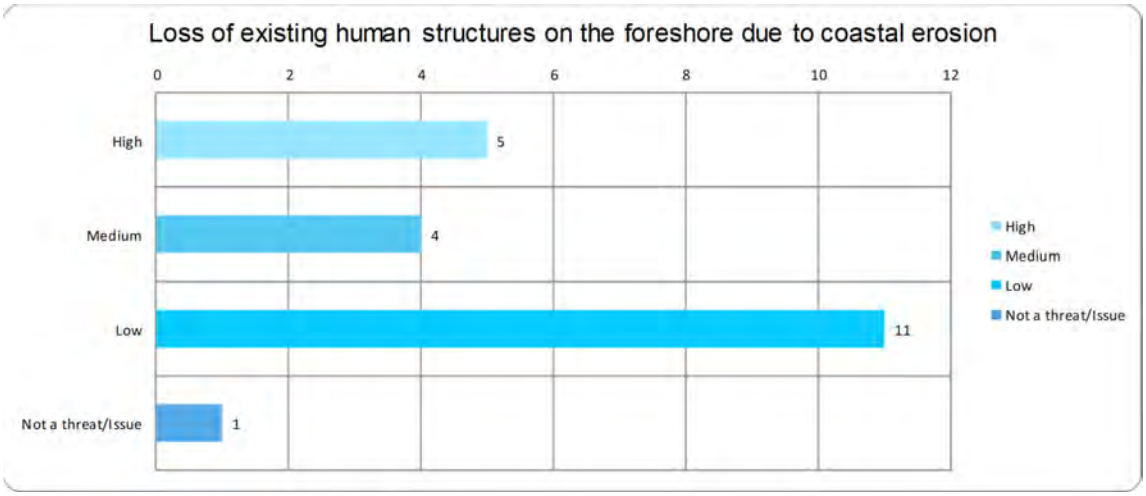
2.2.3 **Issues**

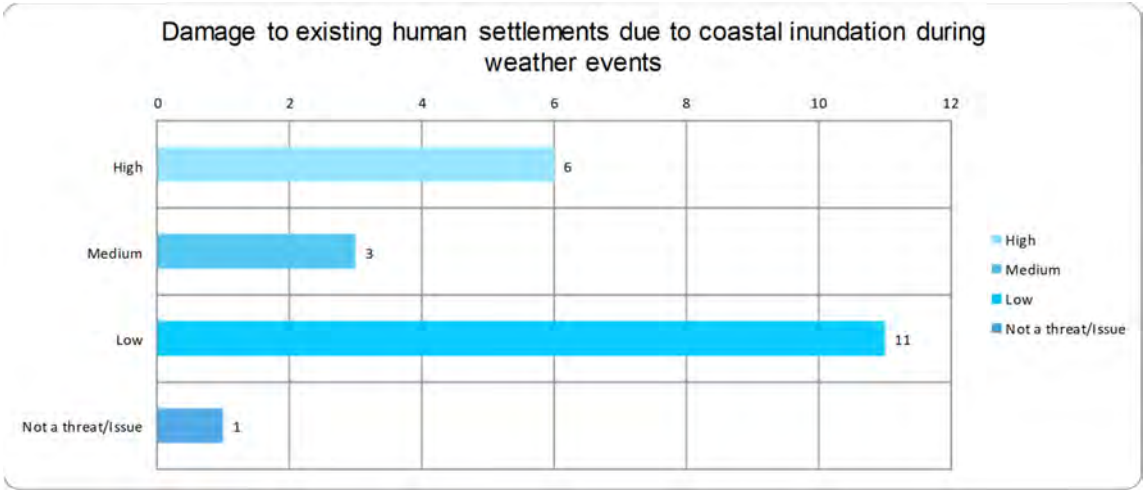

Loss of beach sand for recreation
0
1
2
3
4
5
6
7
High
Medium
Low
Not a threat/Issue
7
6
7
1
High
Medium
Low
Not a threat/Issue

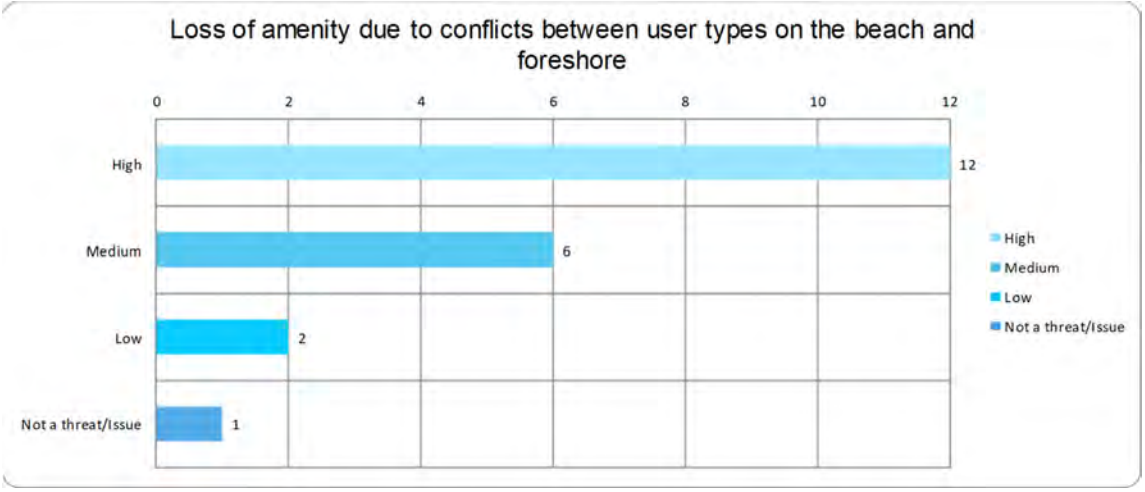

Loss of dunes and dune vegetation
0
2
4
6
8
10
12
14
16
18
High
17
Medium
2
Low
2
Not a threat/Issue
0
High
Medium
Low
Not a threat/Issue

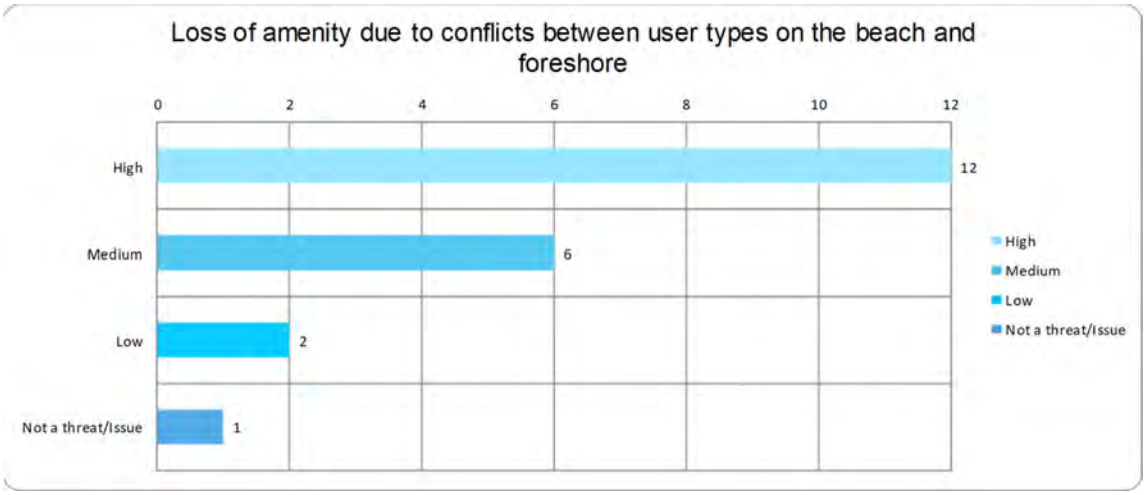

Loss or changes to existing surf breaks
0
1
2
3
4
5
6
7
8
9
10
High
4
Medium
5
Low
10
Not a threat/Issue
2
High
Medium
Low
Not a threat/Issue

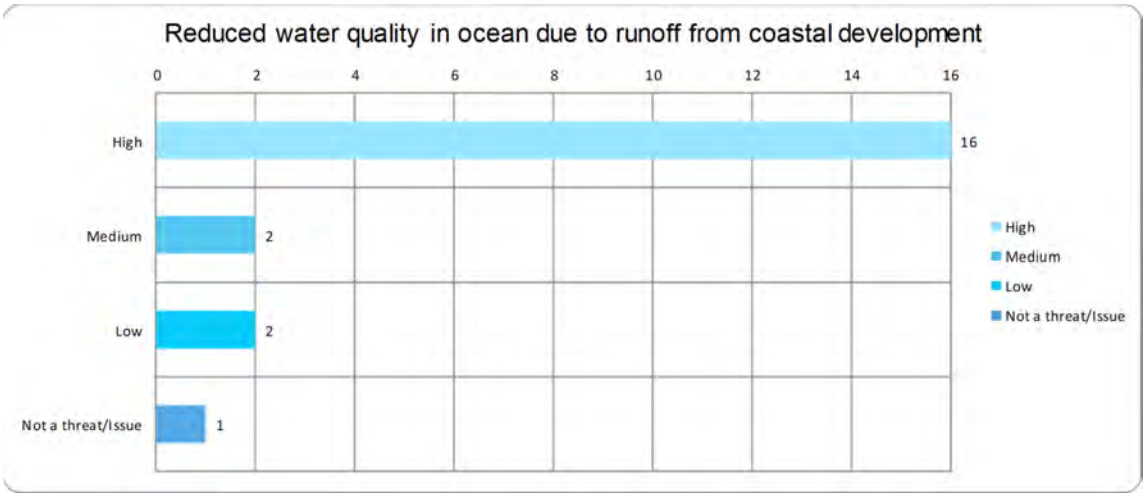

Insufficient or unsafe access to beach
0
1
2
3
4
5
6
7
8
High
7
Medium
8
Low
5
Not a threat/Issue
1
High
Medium
Low
Not a threat/Issue

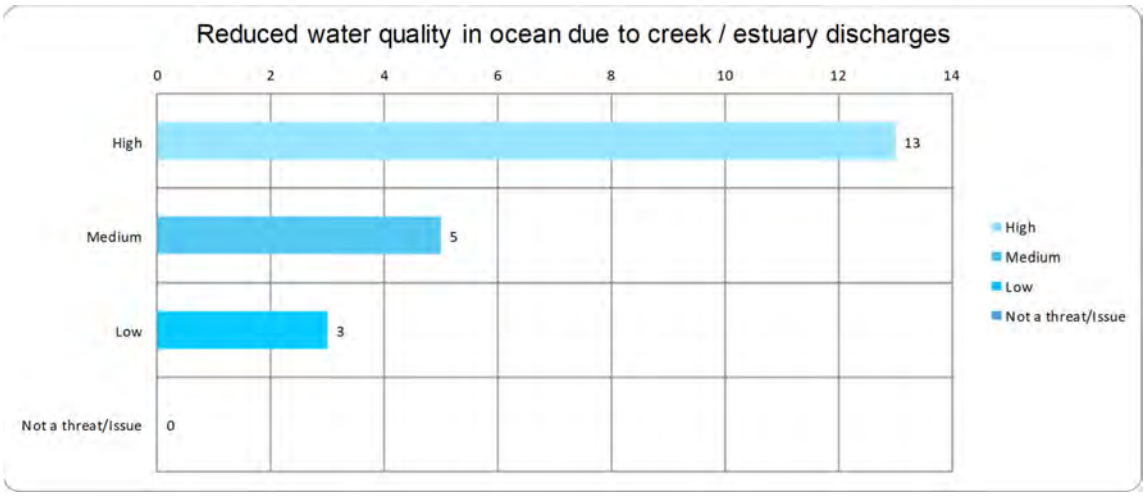

Loss of existing human structures on the foreshore due to coastal erosion
0
2
4
6
8
10
12
High
Medium
Low
Not a threat/Issue
5
4
11
1
High
Medium
Low
Not a threat/Issue

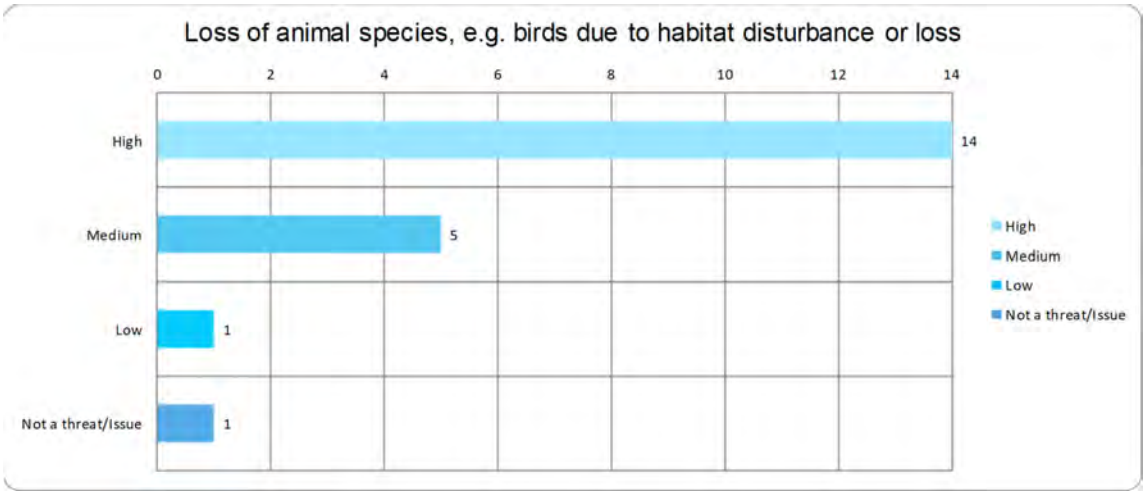

Damage to existing human settlements due to coastal inundation during weather events
0
2
4
6
8
10
12
High
Medium
Low
Not a threat/Issue
6
3
11
1
High
Medium
Low
Not a threat/Issue

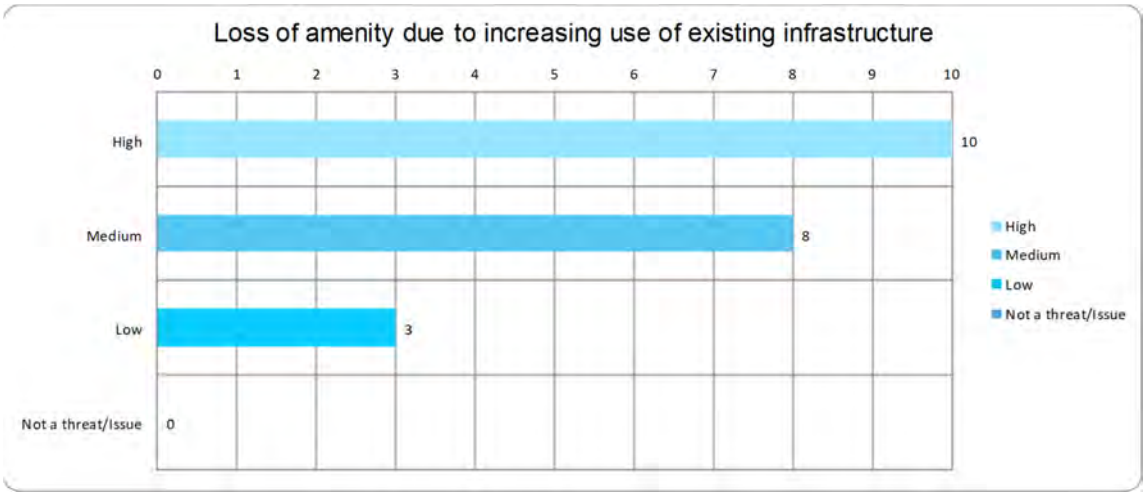

Loss of amenity due to conflicts between user types on the beach and foreshore
0
2
4
6
8
10
12
High
Medium
Low
Not a threat/Issue
12
6
2
1
High
Medium
Low
Not a threat/Issue

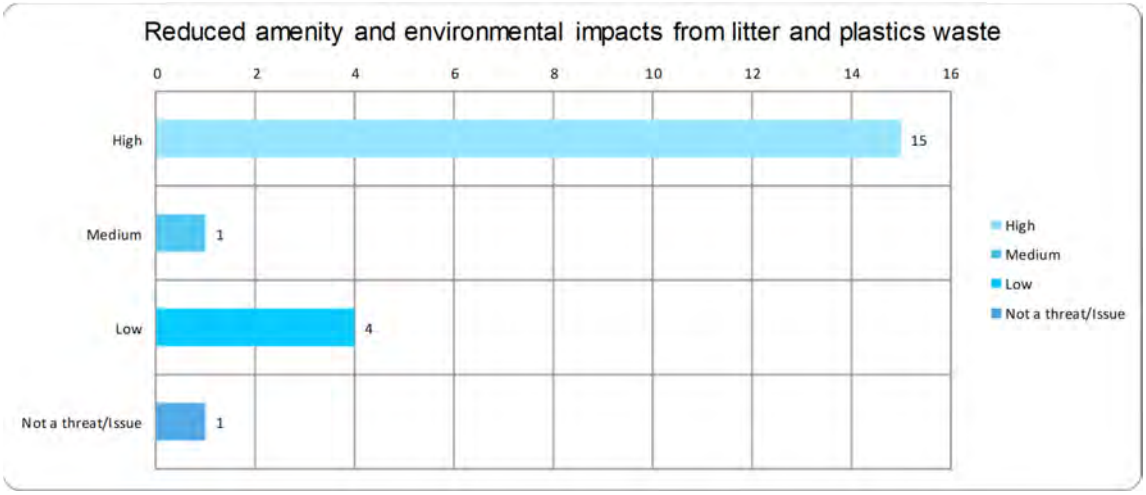

Loss of amenity due to conflicts between user types on the beach and foreshore
0
2
4
6
8
10
12
High
Medium
Low
Not a threat/Issue
12
6
2
1
High
Medium
Low
Not a threat/Issue

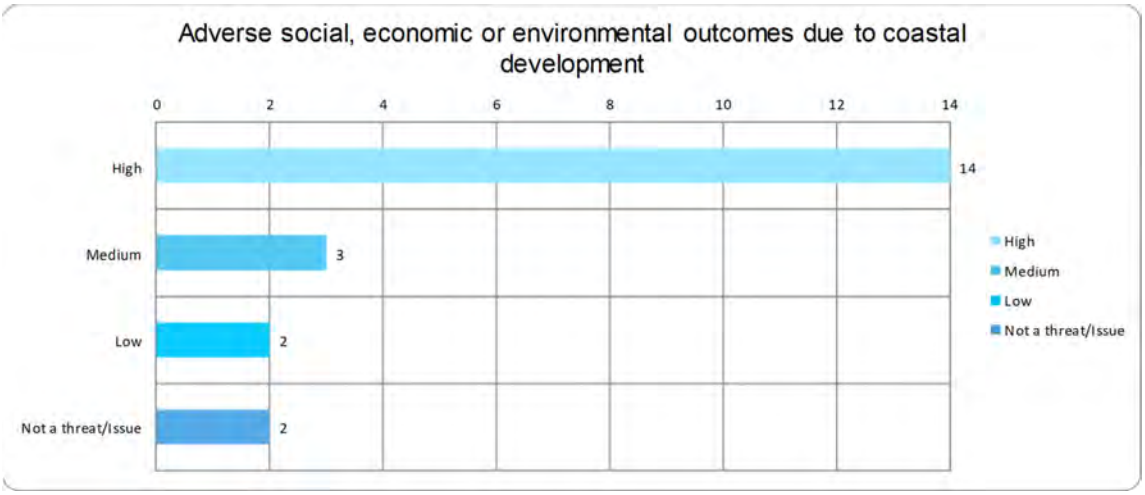

Reduced water quality in ocean due to runoff from coastal development
0
2
4
6
8
10
12
14
16
High
Medium
Low
Not a threat/Issue
16
2
2
1
High
Medium
Low
Not a threat/Issue

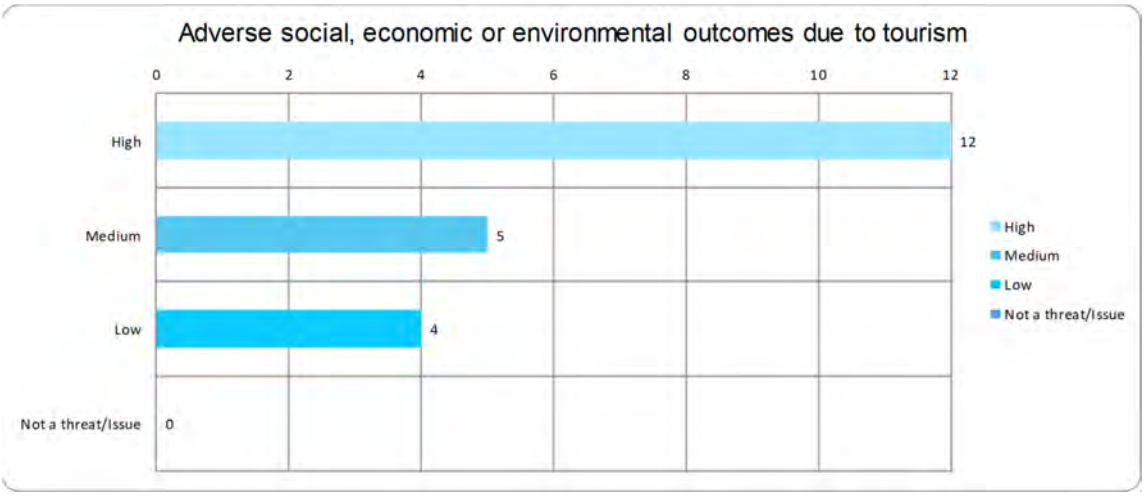

Reduced water quality in ocean due to creek / estuary discharges
0
2
4
6
8
10
12
14
High
Medium
Low
Not a threat/Issue
13
5
3
0
High
Medium
Low
Not a threat/Issue

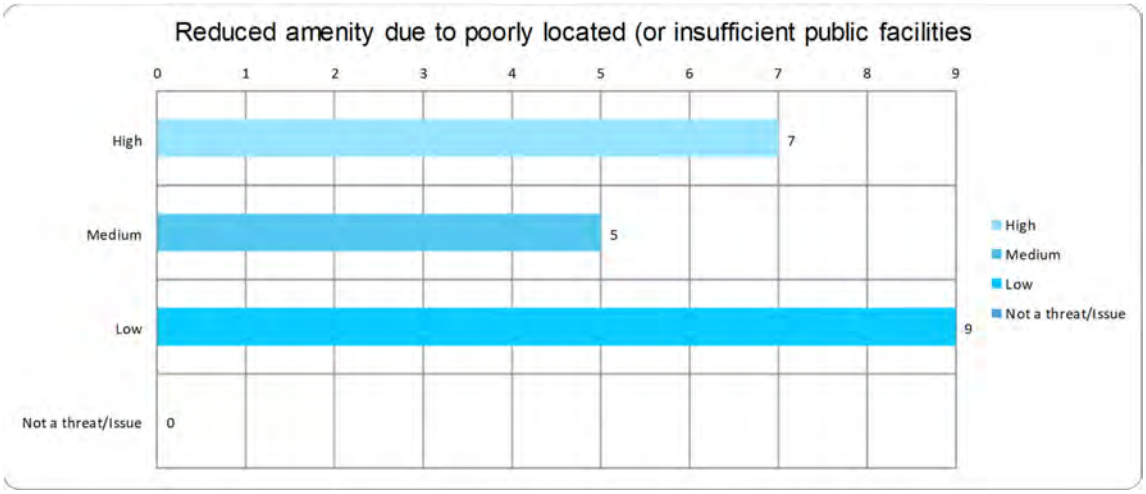

Loss of animal species, e.g. birds due to habitat disturbance or loss
0
2
4
6
8
10
12
14
High
Medium
Low
Not a threat/Issue
14
5
1
1
High
Medium
Low
Not a threat/Issue

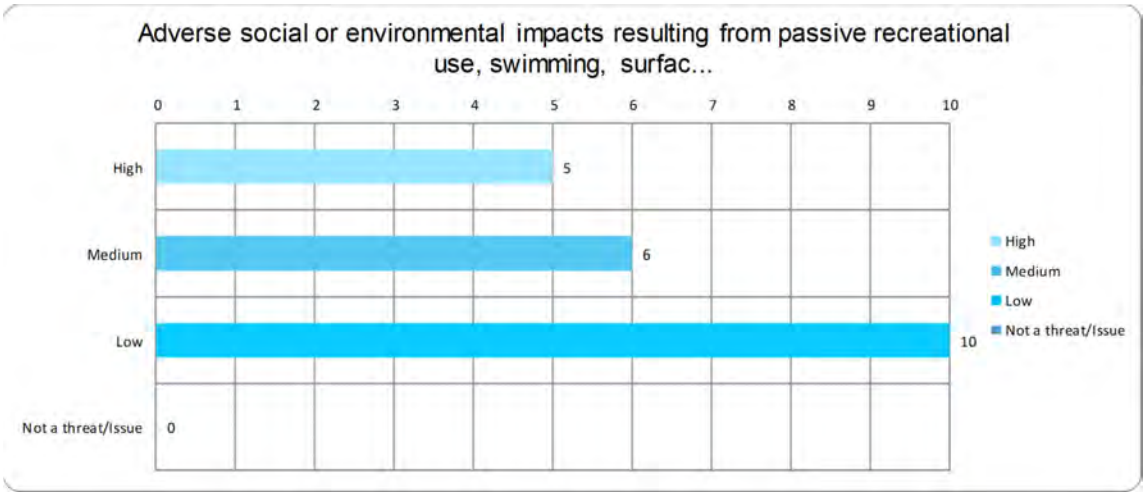

Loss of amenity due to increasing use of existing infrastructure
0
1
2
3
4
5
6
7
8
9
10
High
Medium
Low
Not a threat/Issue
10
8
3
0
High
Medium
Low
Not a threat/Issue

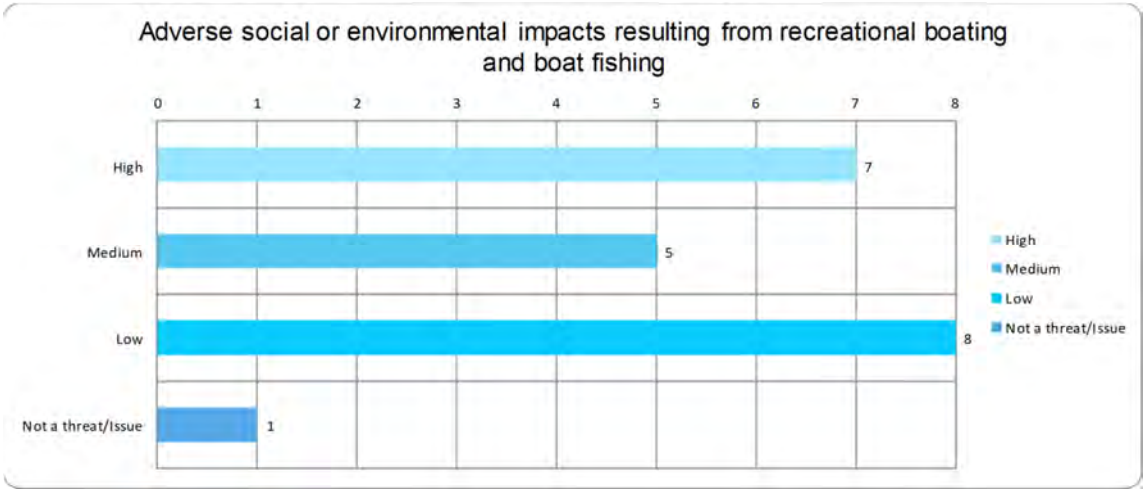

Reduced amenity and environmental impacts from litter and plastics waste
0
2
4
6
8
10
12
14
16
High
Medium
Low
Not a threat/Issue
15
1
4
1
High
Medium
Low
Not a threat/Issue

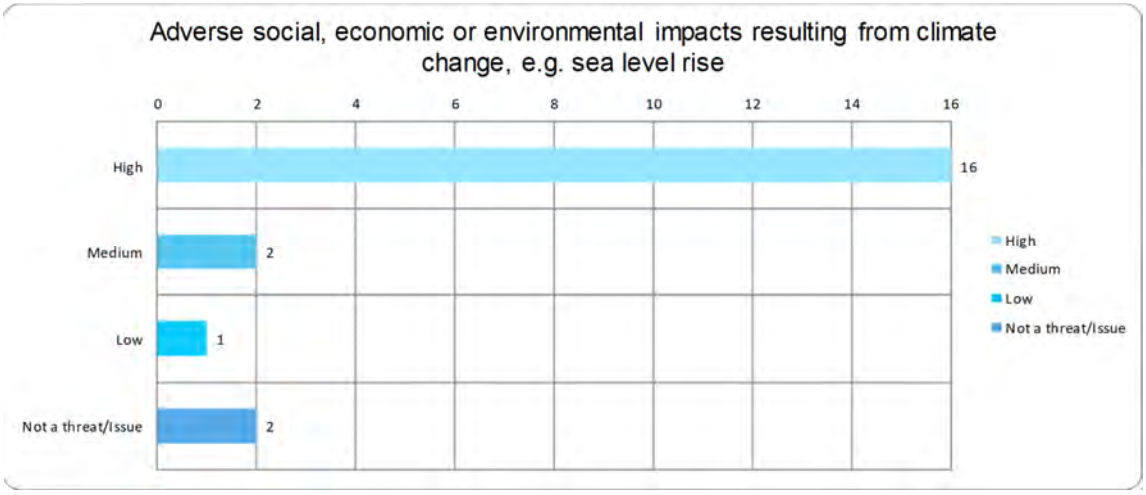

Adverse social, economic or environmental outcomes due to coastal development
0
2
4
6
8
10
12
14
High
Medium
Low
Not a threat/Issue
14
3
2
2
High
Medium
Low
Not a threat/Issue


Adverse social, economic or environmental outcomes due to tourism
0
2
4
6
8
10
12
High
Medium
Low
Not a threat/Issue
12
5
4
0
High
Medium
Low
Not a threat/Issue

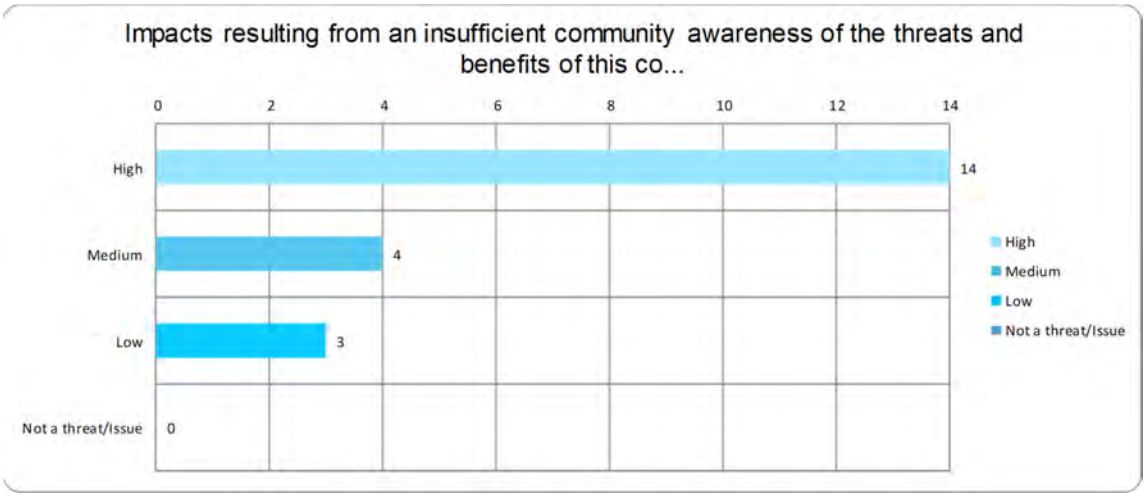

Reduced amenity due to poorly located (or insufficient public facilities
0
1
2
3
4
5
6
7
8
9
High
Medium
Low
Not a threat/Issue
7
5
9
0
High
Medium
Low
Not a threat/Issue

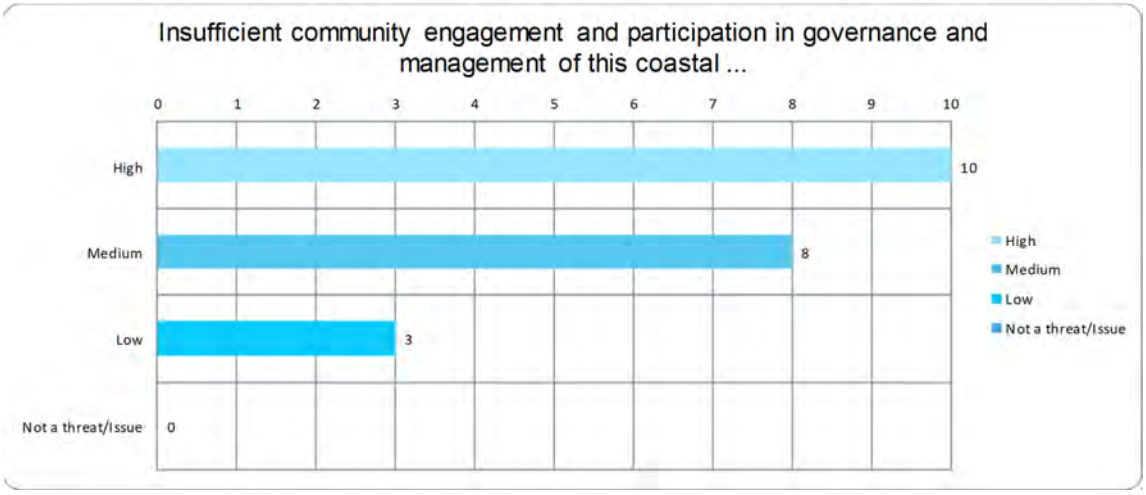

Adverse social or environmental impacts resulting from passive recreational use, swimming, surfac...
0
1
2
3
4
5
6
7
8
9
10
High
Medium
Low
Not a threat/Issue
5
6
10
0
High
Medium
Low
Not a threat/Issue

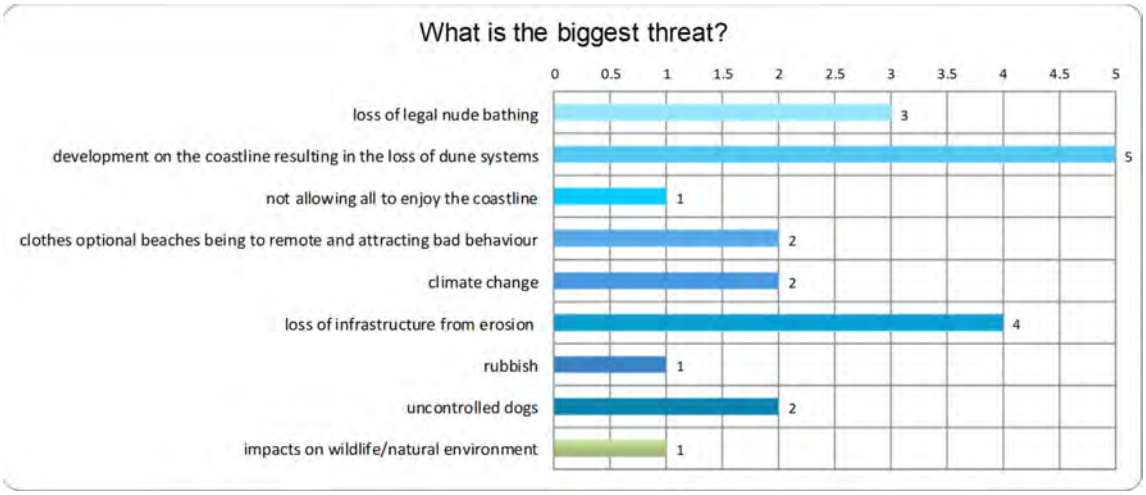

Adverse social or environmental impacts resulting from recreational boating and boat fishing
0
1
2
3
4
5
6
7
8
High
Medium
Low
Not a threat/Issue
7
5
8
1
High
Medium
Low
Not a threat/Issue


Adverse social, economic or environmental impacts resulting from climate change, e.g. sea level rise
0
2
4
6
8
10
12
14
16
High
Medium
Low
Not a threat/Issue
16
2
1
2
High
Medium
Low
Not a threat/Issue

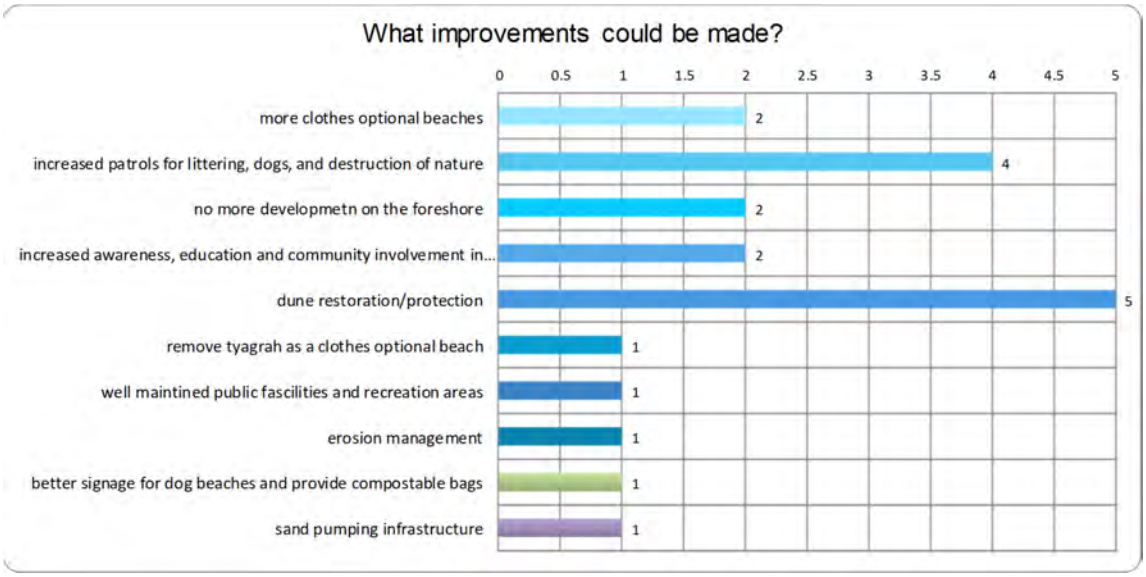

Impacts resulting from a lack of compliance with regulations or lack of compliance effort by Council
0
2
4
6
8
10
12
14
High
Medium
Low
Not a threat/Issue
14
4
2
1
High
Medium
Low
Not a threat/Issue

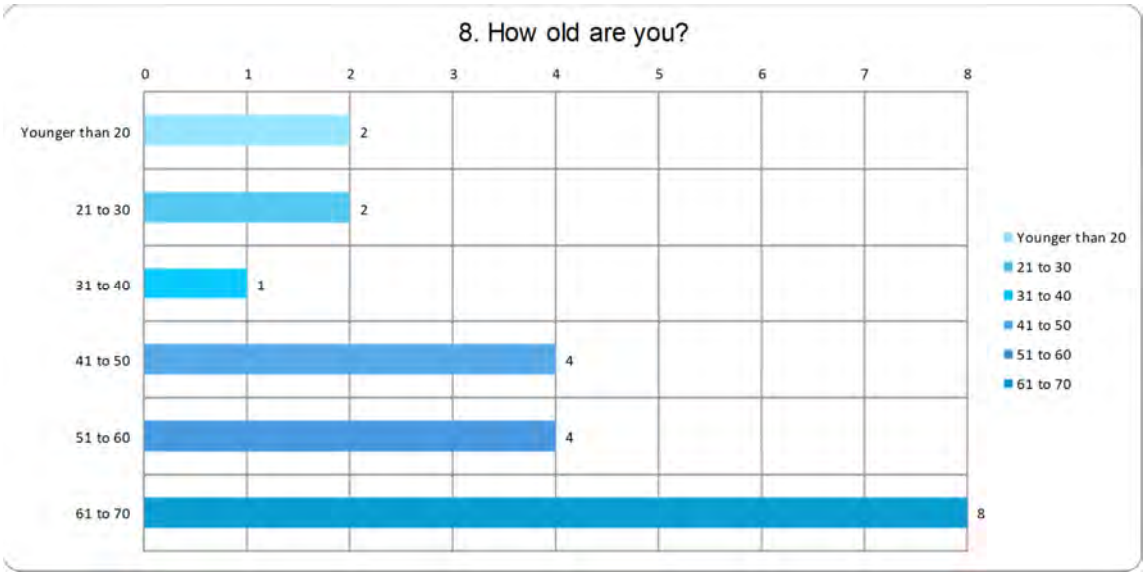

Impacts resulting from an insufficient community awareness of the threats and benefits of this co...
0
2
4
6
8
10
12
14
High
Medium
Low
Not a threat/Issue
14
4
3
0
High
Medium
Low
Not a threat/Issue

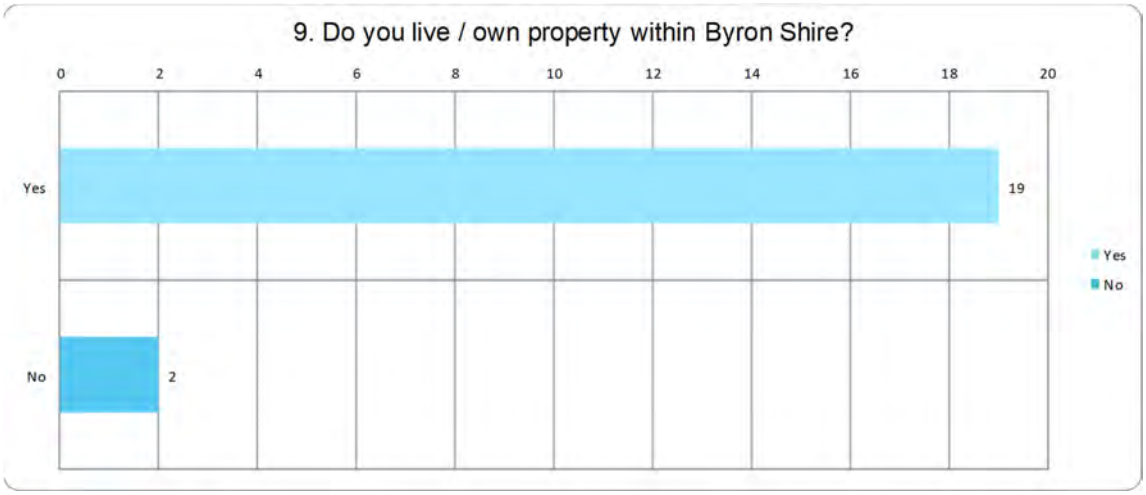

Insufficient community engagement and participation in governance and management of this coastal ...
0
1
2
3
4
5
6
7
8
9
10
High
Medium
Low
Not a threat/Issue
10
8
3
0
High
Medium
Low
Not a threat/Issue

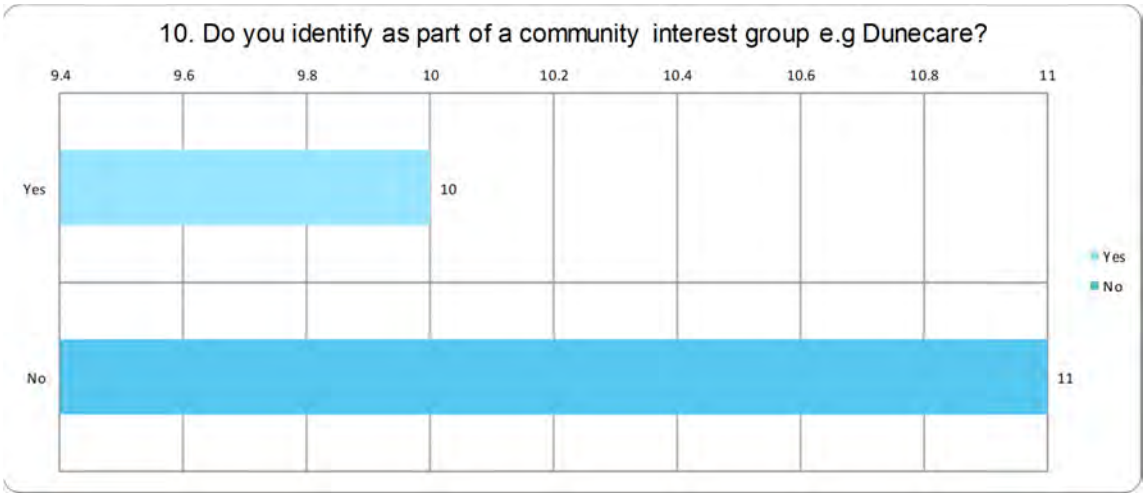

What is the biggest threat?
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
loss of legal nude bathing
3
development on the coastline resulting in the loss of dune systems
5
not allowing all to enjoy the coastline
1
clothes optional beaches being to remote and attracting bad behaviour
2
climate change
2
loss of infrastructure from erosion
4
rubbish
1
uncontrolled dogs
2
impacts on wildlife/natural environment
1

2.2.4 **Other**


What improvements could be made?
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
more clothes optional beaches
2
increased patrols for littering, dogs, and destruction of nature
4
no more developmetn on the foreshore
2
increased awareness, education and community involvement in...
2
dune restoration/protection
5
remove tyagrah as a clothes optional beach
1
well maintined public fascilities and recreation areas
1
erosion management
1
better signage for dog beaches and provide compostable bags
1
sand pumping infrastructure
1


8. How old are you?
0
1
2
3
4
5
6
7
8
Younger than 20
21 to 30
31 to 40
41 to 50
51 to 60
61 to 70
2
2
1
4
4
8
Younger than 20
21 to 30
31 to 40
41 to 50
51 to 60
61 to 70


9. Do you live / own property within Byron Shire?
0
2
4
6
8
10
12
14
16
18
20
Yes
No
19
2
Yes
No


10. Do you identify as part of a community interest group e.g Dunecare?
9.4
9.6
9.8
10
10.2
10.4
10.6
10.8
11
Yes
No
10
11
Yes
No

2.3 Stakeholder Engagement

2.3.1 Risk Workshop

A risk assessment workshop was held on 5 March 2019. The workshop was attended by 24 invited representatives including Landcare / Dunecare, Traditional Owners, Government agencies (DPI, OEH, NPWS, Crown Lands and Water) Reflections Holiday, along with Council Staff and Coastal Estuary Catchment Panel members.

The workshop was designed to involve participants in active participation, including:

» Initial values assessment.

» Refining the objectives, values, future character and unique and local features of the study area.

» Undertaking a first pass risk assessment.

While detailed workshop outcomes are documented separately in the CMP Scoping Study Report, specifically in relation to the first pass risk assessment, the following key outcomes are summarised.

Personal Values

Attendees were asked to provide one word to describe the study area, from their lived experience, words received included:

Surf	**Magnificent**	**Bountiful**	**Peaceful**
Under-water	**Natural**	**Beautiful**	**Conservable**
Iconic	**Contested**	**Harsh**	**Irresponsible people**
Unspoiled	**Loved**	**Diverse**	**Dynamic**
Vulnerable	**Home**	**Walkable**	**Complex**

Figure 4 Deliberating Values, Objectives and Character

Objectives, Values, Future Character and Unique and Local Features of the Study Area

Working in groups, participants deliberated the unique features underpinning the study area. Words in bold were highlighted as the most important.

Objectives

Peace	Inclusivity	Long Term	**Ecologically sustainable coastal development**
Preparedness for cyclical drivers	Maintain values in a contested and changeable environment	Affordable	**Supported and accepted by community**
Valued into the future	Wider acceptance amongst residents and users	Natural systems valued as much as beach erosion in key locations.	Historical and natural processes to be interpreted
Ecologically conscious tourism	Nature based tourism.		

Values

Access without oversight	Peaceful shared access	Quiet places	View-scapes
Natural	**Quiet**	**Safe**	**Biodiverse**
Natural environment	Visually stimulating	Passionate community	Biodiversity protection
Unspoilt beauty	Freedom	Marine life	Highly loved
Long, wide sandy beaches	Naturally vegetated dunes	Enjoy natural environment without intrusion of development	**Minimum infrastructure**

Future Character

Useable Beach	Walkable Coastline	Diminish privatisation	Protection from overdevelopment.
Publicly accessible coastline	Protect natural environment	Protect major transport corridors (New Brighton)	Little change
Natural features to dominate	Project and enhance natural character	Ecologically sustainable development	**Adaptive**
Well-funded	Proactive investment in and management of coastline	Resilience	**Sustainable**

Unique and Local Features

Mostly natural values	Multiplicity	Rocky, sandy, estuarine	**Natural and unspoilt features**
Marine animals	Nesting birds	Environmental and social diversity	**Access to natural environment**
Views and vistas	**Globally iconic destination**	Confluence of currents	**Endangered species**
Tourism icon	One road in and out		

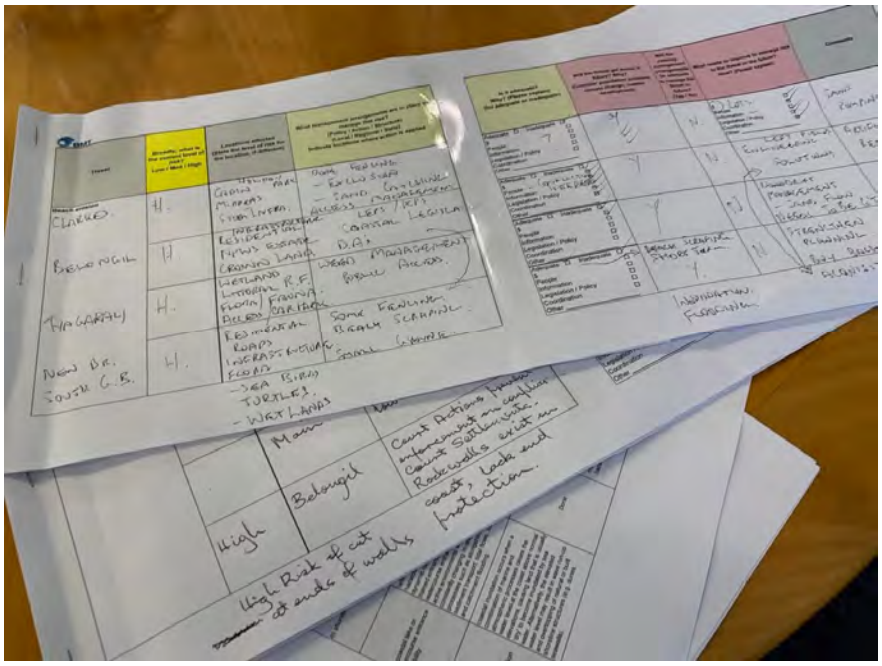
First Pass Risk Assessment

A first pass risk assessment was undertaken in groups, working through worksheets.

Figure 5 Deliberating Risk

The detailed outcomes of these assessments are incorporated into the CMP Scoping Study Report.

Figure 6 Completion of First Pass Risk Assessment Worksheets



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Appendix F First Pass Risk Assessment

F.1 First Pass Risk Assessment Workshop Worksheets

Group	Threat	Broadly, what is the current level of risk? Low / Med / High	Locations affected (State the level of risk for the location, if different)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State) Indicate locations where action is applied	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? Why? (Consider population pressure, climate change, coastal development)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Comments
1	Beach erosion	Medium	Wategos / Little Wategos	NPWS + Council-Adhoc Hazard lines POM - SCA MP Zoning Plan	Inadequate Other: Need certified CMP to guide actions	Yes SLR	No Need a CMP	$ People Legislation / Coordination Other: Geotech	
		High	Pass, Clarkes, Main, JSPW	DCP, NPWS POM, Nat Parks Plan, Master Plan under development, Reflections POM, JSPW Modification Project	Inadequate People Coordination	Yes Increased development pressure SLR Stormwater	No Need a CMP	Strategic plan = CMP	
		High	Belongil + Elements Resort	LEP + DCP MP Zoning Plan ICOLL Opening Strategy NPWS POM Ad-hoc rock wall management	Inadequate Legislation / Policy Coordination	Climate change Development pressure Underlying LTR	No	CMP	
		Low	Tyagarah to Brunswick +Torakina and Christmas Beach	MP Zoning plan NPWS POM DPIE - Crown Lands/ Council	Inadequate People Legislation / Policy Coordination	Yes Climate Change	Mostly need better access and dog/horse/nudist management	CMP	
		Low	South Golden	DPIE - Crown Lands training walls		Yes Climate Change		CMP	
		High	New Brighton						
2	NB - Group 2 did beach erosion and shoreline recession as one risk, so refer back to comments here for Shoreline recession.	High	Clarkes Holiday Park Cabin Middens Storm infrastructure	Dune fencing - exclusion - sand catching Access management	Inadequate	Yes	No	$ Lots People Information Legislation / Policy Coordination Other: Geotech	Sand pumping
2		High	Belongil Residential infrastructure NPWS Estate Crown Land	LEPS/DCPS Coastal legislation	Inadequate People (conflicting interests) Information Legislation / Policy Coordination	Yes	No	Left field engineering solutions Acquisition	Artificial reefs
2		High	Tyagarah Wetland Littoral Rainforest Flora/fauna Access/carpark	Weed management Public Access	Inadequate $	Yes	No	Downdrift management - sand flow needs to be guaranteed	
2		High	New BR South G.B Residential roads infrastructure Flora - sea birds - turtles	Some fencing beach scraping Small groyne DAs	Adequate Inadequate	Yes Beach scraping is short term (adequate in the short term)	No	Strengthen planning Buy back	

Group	Threat	Broadly, what is the current level of risk? Low / Med / High	Locations affected (State the level of risk for the location, if different)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State) Indicate locations where action is applied	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? Why? (Consider population pressure, climate change, coastal development)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Comments
			- wetlands						
3		Low	Little Wategos / Wategos	marine parade, path works		Yes, sea level rise comparatively not a huge issue	No		
3		Medium	Pass/Clarkes	dune revegetation, sand fencing, etc.	Inadequate	Reflections - don't believe adequate - soft / hard? Yes, getting worse	No	Short term - consider beach scraping	Public safety Icon
3			Main	hard works: JSCP low dunes issue	Inadequate	Big question on whether CP stays		CMP	Public safety Icon
3		High (high risk of cut at ends of walls)	Belongil	Court actions prevent enforcement on court settlements Rockwalls exist on coast, lack end protection.					
1	Shoreline recession	High	The Pass to Elements	As previous page	Inadequate	Yes - as per previous page	No	CMP	
1		Low	Tyagarah to Brunswick		Inadequate		partly as previous	CMP	
1		High	New Brighton		Inadequate		No	CMP	
1		Medium	SGB Wategos		Inadequate		No	CMP	
1	Coastal inundation: wave runup and overtopping	Medium	Wategos Tyagarah Brunswick	Monitor and respond under existing structure	Adequate *EASP*	Climate change and development pressure			
1		High	JSPW	Monitor and respond under existing structure	Adequate *EASP*	Climate change and development pressure		CMP Coordination	
1		Medium	Clarkes + Main	Monitor and respond under existing structure		Climate change and development pressure		CMP Coordination	
1		High	Belongil Beach NB			Climate change and development pressure		CMP Coordination	
2	Coastal inundation: wave runup and overtopping	High L-->M M-->L	Clarkes Carpark (H - Cabins, L-M - Lawson St)	? Rock wall Disaster Plan	Adequate	Yes	No	Information Other _*Raise carpark wall*	
2		High	Belongil (Estuary, Residents, NP Estate)	Rock walls / sand bags Planned retreat Flood heights		Yes	No		
2		Medium	Tyagarah NP (Southern Location at Risk. Car Park)	Impact	Inadequate Information	Yes	No	Putting a value on natural areas - wetlands, littoral rainforests etc.	
2		High	New Brighton South Golden (All of it)	Planned retreat Flood levels Beach scraping Dune care	Inadequate	Yes	No	Acknowledging sea level rise	
1	Coastal entrance instability	High	Belongil Creek	Entrance opening strategy Drainage Management Plan		Yes Climate change Development pressure	Adaptable strategy should deal with future risks	Coordination	

First Pass Risk Assessment

Group	Threat	Broadly, what is the current level of risk? Low / Med / High	Locations affected (State the level of risk for the location, if different)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State) Indicate locations where action is applied	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? Why? (Consider population pressure, climate change, coastal development)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Comments
1		Low	Brunswick Heads (breakwaters)	Training walls		Yes Climate change	Development pressure		
1	Dune slope instability	High - Belongil + NB (Places with housing on dunes) Medium - Pass, Clarkes, Main Low - Tyagarah	<--	POM LEPS/DCPS	Inadequate	Yes Climate Change	No	*CMP*	
2		High	Clarkes Holiday Park - Midden	Exclusion fencing Maintaining tracks access	Inadequate $ People Information	Yes	No		
1	Cliff instability		Little Wategos Wategos The Pass Clarkes	Stormwater issues at Clarkes					

Issue (Theme)	Group	Threat	Broadly, what is the level of risk? (Considering management arrangements currently in place) Low / Med / High	What locations are affected? (geographical area/sector/assets/ ecosystems)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State)	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? How? (Population pressure, climate change, trade gateway, etc)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Is existing information about the risk Adequate / Moderate / Inadequate?	What are key gaps in information/data/knowledge? (Please explain)	Comments
Overcrowding and Congestion	5	Loss of amenity due to conflicts between user types on the beach and foreshore	Medium	Tyagarah and Belongil (nudist and horses) Main Beach (people, dog exercise areas, illegal camping)	Compliance and policy (NSW)	Inadequate Legislation / Policy	Yes Population pressure increase					
	5	Loss of amenity due to increasing use of existing infrastructure	High	Clarkes Main Beach	Maintenance and asset / infrastructure investment	Inadequate	Yes Increase	No	$			Need more money
	5	Loss of amenity due to overuse of the beach and facilities	High	Carparks, toilets, showers, picnic tables	Brunswick Heads Torakina Clarkes, Main	Inadequate $ Legislation / Policy Coordination	Yes Population and tourism			We don't know - not enough information		Need other strategies, education, signage.
	5	Adverse social, economic or environmental outcomes due to tourism	High	Belongil to The Pass Wategos	Compliance (not after hours) Signs	Inadequate	Yes Tourism increase		$ Legislation / Policy			
	5	Informal beach access		Informal tracks to the beach from private property								
Overcrowding and Congestion	6	Loss of amenity due to conflicts between user types on the beach and foreshore	High	The Pass Main beach Wategos The Wrecks	Code of conduct - boat launching at Pass Licences for commercial tourist operators	Adequate	Yes Population growth	Yes	Information	Moderate	?	
	6	Loss of amenity due to increasing use of existing infrastructure	High	Brunswick boat ramps Parking (Wategos, Brunswick) Amenities (Main)	Currently being redeveloped (planned)	Inadequate Legislation / Policy	Yes Population growth / transport	No	$		National problem (parking) transport	
	6	Loss of amenity due to overuse of the beach and facilities	Low	Main Beach Brunswick								
	6	Adverse social, economic or environmental outcomes due to tourism	Medium (dune damage and disruption to shorebirds)	Belongil Clarkes South Brunswick surf club South Golden New Brighton	Dune care Byron bird buddies (fencing)	Inadequate	Yes	No	$ Legislation / Policy			
Recreational Use and Amenity		Unsafe access to beach										
	5	Reduced amenity due to poorly located or insufficient public facilities and	Medium	The Old Jetty - crown reserve	None - no facilities, no plan of management	Inadequate	Erosion of dune area by climate change	No				Need to plan for public recreation of this area

Issue (Theme)	Group	Threat	Broadly, what is the level of risk? (Considering management arrangements currently in place) Low / Med / High	What locations are affected? (geographical area/sector/assets/ ecosystems)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State)	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? How? (Population pressure, climate change, trade gateway, etc)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Is existing information about the risk Adequate / Moderate / Inadequate?	What are key gaps in information/data/knowledge? (Please explain)	Comments
		beach access points										
	5	Antisocial behaviour and unsafe practices (e.g partying, fires on the beach)	Low	Belongil Main Beach Clarkes	Police action					UnknownCouncil may not know about after hours / at night behaviour (Police)	Get information from police	
	5	Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking	High	New Brighton Belongil (disrespects the rules and overuse) Brunswick Heads	Signs Compliance Dog bags Dedicated dog beaches							Nesting sea birds at Belongil (people walking through bird area - disturbing) Tyagarah NR - dogs chasing wildlife
Recreational Use and Amenity	6	Unsafe access to beach	Low	Main Beach ramps	Council (SPWS) fixes problems routinely	Adequate						
	6	Reduced amenity due to poorly located or insufficient public facilities and beach access points	Low			Inadequate						
	6	Antisocial behaviour and unsafe practices (e.g partying, fires on the beach)	High	South Golden Tallow Creek Cosy Common Belongil Main Beach (schoolies)	Broken glass Hot coals Tyagarah issue Partying	Inadequate People þ Information						
	6	Adverse social or environmental impacts resulting from passive recreational use, swimming, surfing and dog walking	Low	Belongil Tallow creek dogs on beaches	surf etiquite dog walking zones protect shorebirds / turtles?	Adequate						
	4	Adverse social or environmental impacts resulting from recreational boating and boat fishing	Low to Medium High at holiday time	Marshalls Creek, Brunswich River, Simpsons Creek (speed boats, excessive speed) Illegal camping (holiday time)	Rangers Signage (Main beach) Belongil, Brunswick.	Inadequate $ People Information Legislation / Policy Coordination	Yes Population increase Illegal camping increasing	No	$ People Information Other Education	Inadequate	understanding disturbance to wildlife	
Water quality	4	Reduced water quality in ocean due to runoff from coastal development	High	Brunswick River Marshalls Creek	?	Inadequate $ Information Other: Education	Yes	No	$ Other Education	Inadequate	watering for livestock Assist property owners understanding importance of	

Issue (Theme)	Group	Threat	Broadly, what is the level of risk? (Considering management arrangements currently in place) Low / Med / High	What locations are affected? (geographical area/sector/assets/ ecosystems)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State)	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? How? (Population pressure, climate change, trade gateway, etc)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Is existing information about the risk Adequate / Moderate / Inadequate?	What are key gaps in information/data/knowledge? (Please explain)	Comments
											revegetation on river banks	
	5	Reduced water quality in ocean due to runoff from coastal development	High Risk (?) (Lagoons attractive to small children) Low risk (Showers at /Clarkes (soap etc))	Clarkes Beach Stormwater outlets Lagoons not always there	Barricading and signs Opening lagoon when the bacteria levels increase (action)	Inadequate $					EPA has asked BSC to implement Beachwatch again - looking for citizen science	Beachwatch WQ monitoring program (100 samples/data, testing of E. coli) doesn't sample for other indicators or other toxic algae (Cyanobacteria or Blue green algae) BSC investigation - cross connection of sewage to stormwater
	5	Reduced amenity and environmental impacts from litter and plastics waste	Low - beaches High - dunes	Beaches - natural debris and litter All beaches and estuary - litter and plastics	Active community initiatives, council policies Plastic free, cigarette free beaches. No smoking Dunes - illegal camping and litter							
Habitat Disturbance	5	Loss of plant and animal species due to habitat disturbance or loss, e.g. birds	High	Belongil - Entrance - shorebirds Belongil - no dune habitat New Brighton	SEPP - wetland and littoral rainforest protectionEducation and signage	Inadequate	Population increase					
Coastal Development	4	Adverse social, economic or environmental outcomes due to coastal development	Low Intensity of existing development an issue (Medium to high)	Existing residential zonings	Some development controls DCP / LEP		Yes More development pressure and state government	No / Unsure	Information Legislation / Policy	Adequate via hazard mapping	Awareness and information in planning documents Climate change information and modelling	
	6	Adverse social, economic or environmental outcomes due to coastal development	High	Belongil Intensifying of developing within coastal hazard zone	DCP, LEP Loss of life Loss of wealth Loss of coastal processes	Inadequate	Yes		Information Legislation / Policy		Need legislation and policy	
Engagement, Governance and Compliance	4	Impacts resulting from a lack of compliance with regulations or lack of compliance effort by Council	Medium High	Belongil sea wall for example Dune care destroying vegetation	Finance allocation to fight compliance officers Rangers	Inadequate $ People Information Legislation / Policy	Probably Lack of money and resources Councils priorities		$ People Information Legislation / Policy Coordination	Inadequate	We know problems but resources insufficient	
	6	Impacts resulting from a lack of compliance with regulations or	High	Poor messaging through poor government					$ People Information Legislation / Policy			

Issue (Theme)	Group	Threat	Broadly, what is the level of risk? (Considering management arrangements currently in place) Low / Med / High	What locations are affected? (geographical area/sector/assets/ ecosystems)	What management arrangements are in place to manage this risk? (Policy / Action / Structure) (Local / Regional / State)	Is it adequate? Why? (Please explain) (for adequate or inadequate)	Will the threat get worse in future? How? (Population pressure, climate change, trade gateway, etc)	Will the existing management arrangements be adequate to manage the threat in future? (Yes / No)	What needs to improve to manage risk to the threat in the future? How? (Please explain)	Is existing information about the risk Adequate / Moderate / Inadequate?	What are key gaps in information/data/knowledge? (Please explain)	Comments
		lack of compliance effort by Council		design and inaction					Coordination			
	4	Impacts resulting from an insufficient community awareness of the threats and benefits of the coastal environment	High	Dunes / Nature reserves and national parks Riparian areas Buffer areas	Ranges Education campaigns Volunteer groups DCP	Inadequate $ People Information Coordination Other Education and community awareness	Yes More people and changing demographics Increase in tourism	No	$ Information Other Education	Inadequate	Climate change information (frequent and duration of storms / historical information)	
	4	Insufficient community engagement and participation in governance and management of the coastal environment	High	Leasing beach front properties and events National reserves Dunes As above	As above	Inadequate $ People Information Legislation / Policy Coordination	As above	No	$ People Information Legislation / Policy Coordination	Inadequate	Fact sheets and easily digestible information (digital format)	

Appendix G Summary of Byron Bay Embayment Coastal Processes and Hazards

G.1 Coastal Processes and Hazards at Byron

Coastal processes at Byron are highly complex, with interactions at regional to local scales, temporally and spatially. The coastal processes summary provided herein attempts to present key findings of the Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013) (herein 'the Hazard Update') that are widely accepted, and to also present alternative findings where the consensus varies. The aim is to provide a succinct reference point for current knowledge of coastal processes and hazards for Byron, which includes both the agreed and the uncertain elements of that knowledge.

The Hazard Update is the most recent comprehensive coastal hazard assessment undertaken for the CMP study area, including hazard planning lines for immediate, 2050 and 2100 timeframes. While the catalyst for the Hazard Update was the changes to the NSW coastal management framework current at the time, the Hazard Update also allowed for:

- Inclusion of the adopted sea level rise levels of Council to be incorporated into updated hazard assessments,
- The reassessment of coastal processes data incorporating new data, and
- The use of new analytical techniques to determine hazard extents.

The Hazard Update was exceptional from other studies in that:

- A regional scale approach was taken, with both the Byron and Tweed shire coastlines assessed together, and in the context of the entire sediment compartment commencing at the Clarence River; and
- A new regional shoreline processes model (EVO-MOD) was applied, that allows for assessment of both long term change (such as in response to sea level rise) and short term erosion in response to storm events, with the model linked to a dedicated SWAN wave model of the region.

The EVO-MOD model domain covered both the Byron and Tweed Shire coastlines, allowing for wave and water level driven sediment transport processes and interactions to be modelled for the entire sediment compartment in a single model analysis. This regional scale model provided a tool to "test" scenarios relating to the regional longshore sand transport rate, onshore sediment supply, and the presence and influence of coastal protection structures (specifically, seawalls at Jonson Street and Belongil Spit).

The summary of coastal processes and hazards is provided herein.

G.1.1 Sediment Compartment Context

The sediment compartment concept aims to recognise that individual beaches are part of an interconnected coastal system, the largest unit of which is the primary sediment compartment.

The Byron Shire coastline is part of the primary sediment compartment that extends from the Clarence River to Point Danger (Figure G-1). Within this primary compartment are four secondary compartments, with Cape Byron to Point Danger (i.e. including the Byron Bay Embayment) forming the northernmost secondary compartment.

Compartment boundaries may be closed, being where sediment transport is retained within the compartment; or the boundary may be "leaky" where sediment transport may occur across the compartment boundary. The compartment boundary at Cape Byron is "leaky" with sediment transport occurring past Cape Byron and into the Byron Bay embayment.

Figure G-1 NSW North Coast Primary Sediment Compartment from Clarence River to Point Danger

G.1.2 Regional Geology and Geomorphology

The beach system we see today is the product of its geological history and the persistent influence over millennia of the prevailing waves, relative sea level, currents and winds on the unconsolidated sediments of the continental shelf and coastal zone during the late Quaternary period covering the late Pleistocene (from 140,000 years ago) and Holocene (last 10,000 years). Morphological evolution over this period was driven by:

- Changes in relative sea level associated with
  - The last interglacial period ~ 140,000 years ago with sea levels some 5-6 m above present, then
  - The last glacial period 120,000 years ago where sea level was 120 m below present,
  - A post-glacial rising stage from 18,000 years ago to 6-7,000 years ago, with sea levels reaching about 1-2 m above present levels, then
  - A subsequent fall to approximately the present sea level by about 3,000 years ago, after which sea levels have remained relatively constant until the present (Chappell & Polach 1991; Sloss *et al* 2007);
- Wind-generated waves and currents that transport unconsolidated sediments within coastal systems;
- Sources, supply and movement of sediments that comprise the sand that form the beaches; and
- Progressive evolutionary changes of the shorelines, dune barriers and active seabed areas.

The sand that forms the beaches and dune systems is essentially all mature marine sand derived from the continental shelf, not contemporaneously derived fluvial sand (Roy and Crawford 1977; Roy and Thom 1981; Roy *et al* 1994).

Shoreward transport of sand across the continental shelf accompanying the large changes in sea level during the Pleistocene has resulted in a considerable accumulation of sand in extensive dune barriers along the contemporary coastline of northern New South Wales and Southeast Queensland. Two readily identifiable sand dune barrier units in the study area are:

- The older Pleistocene inner barrier deposits, such as the Pleistocene beach ridges are preserved along the Byron Bay Embayment north from Belongil Creek (Figure G-2), and
- The younger Holocene outer barrier dunes that abut un-conformably seaward of (or overlie in the case of Holocene transgressive wind drift) the Pleistocene deposits.

Figure G-2 Pleistocene dune barrier – Byron Bay Embayment (from PWD 1978)

The Pleistocene-Holocene dune barriers increase in width and volume towards the north along the coastline north from the Clarence River to Fraser Island, indicating the importance of the northward wave-induced net longshore transport of sand.

While there is a narrow strip of active beach and dune Holocene sand along the entire coastline, Holocene dune barriers are largely missing along much of northern New South Wales. Here, a thin strip of active (Holocene) beach-dune system directly abuts older, and in some places extensive, Pleistocene beach and dune deposits. For example, the Byron Bay Embayment is cutting into much older (Pleistocene) dune systems, with indurated sands and “sandrock” commonly outcropping in the beach and surfzone, such as at Clarkes Beach. An extensive Pleistocene beach ridge system is evident immediately behind the beach, particularly in the Tyagarah Nature Reserve (see Figure G-2).

The widely held view is that the entire length of the study area coastline is eroding as a result of a substantial gradient in the longshore sand transport (PWD 1978; Stephens et al 1981; WBM Oceanics Australia 2000; 2001; 2003, BMT WBM 2013). In this case, the Holocene barriers that would had developed in the southern parts of the study region have since been removed by erosion associated with the northward drift of sand.

The active outer barrier beaches and dunes as we see them today were supplied with sand most recently following the last post-glacial period (Thom 1984; Roy and Thom 1987; Stephens *et al* 1981). According to Thom (1984), it is likely that the coastline was subject to rapid accretion at 6,000 years BP, followed by a state of slow accretion to approximately 3,000-4,000 years B.P. This period of shoreward supply of sand onto the coast was thought to have essentially ended by

about 3,000 years BP (Thom 1975; Thom 1984; Stephens *et al* 1981), with relative shoreline stability or slow recession characterising the last 3,000 years (BMT WBM, 2013).

It has been suggested (Roy *et al* 1997; Cowell *et al* 2000; Roy 2001; Goodwin *et al* 2005) that there remains a small but relatively significant shoreward supply of up to about 4m^3/m/year, at least in some parts of the coastline, that may completely or partially offset the progressive shoreline recession that may otherwise result from the alongshore gradients in longshore sand transport along the NSW coast. Patterson (2013) utilised modelling of coastline evolution processes involving both cross-shore and longshore sand transport in conjunction with the Pleistocene-Holocene sea level changes to suggest that there remains a net shoreward supply of sand to the beach system from the lower shoreface along most of the regional coastline between the Clarence River and the Gold Coast, of about 1m^3/m/year. This shoreward supply is said to be partially offsetting the shoreline recession that would otherwise be expected along this coastline due to the longshore transport gradient (i.e. the increasing rate of net northerly transport between the Clarence River and Point Danger of about 350,000-400,000 m^3/year) (Patterson, 2013). That is, while shoreline recession is evidently occurring along this coastline, the rates of recession are lower than would otherwise be expected should this residual shoreward supply not be present.

G.1.3 Regional Wave Climate

The regional wave climate is a dominant component of coastal processes. The deep water wave climate of the northern NSW coast comprises a highly variable wind wave climate superimposed on a persistent long period moderate to high energy swell arriving predominantly from the southeast to east direction sectors. Two types of storm wave generation, east coast low cyclones and tropical cyclones, are dominant in determining the prevailing extreme wave climate.

BMT WBM (2013) provided a detailed analysis of the wave energy and weighted mean wave direction. There was found to be a distinct seasonal pattern with more southerly directions in winter and more easterly directions in summer. Annual weighted mean direction was found to be variable around an average value of about 140 degrees. Periods of variability were distinctly evident in the analysis results, such as phases of persistent high mean wave energy (e.g. in 1999 and 2006), progressive shifts to a more easterly wave direction (e.g. during 2004-2005) or towards the south-southeast (e.g. between 2006 to 2008). There appears to be a tendency for high energy storm wave occurrences that can be related to ENSO patterns, including notable periods of high energy southerly waves coincident with El Nino conditions (e.g. 2002-3); and high energy waves from east to east-southeast coincident with La Nina phases (e.g. early 2009 and 2011-2012) (BMT WBM, 2013).

Comprehensive analysis of these correlations is restricted by the relatively short duration of reliably recorded directional wave data. Nevertheless, it is most probable that substantial natural variability in the wave climate occurring over the longer term (years and decades) has significant consequent effects on shoreline behaviour. Southerly waves tend to cause higher rates of northward sand transport along the northern parts of embayments, including more headland bypassing, while having reduced energy and lower sand transport potential in the sheltered southern embayment areas. Easterly waves cause higher transport rates at the more east-west oriented shorelines towards the southern embayment areas but reduced transport (or downcoast

transport) at the north-south oriented northern areas. These alongshore sand transport differentials and varying exposure to wave energy result in differences in erosion and accretion patterns along the coastline.

The prolonged predominantly La Nina phase from 1945 to 1977 is likely to have had a different prevailing wave climate and consequent pattern of shoreline behaviour to the predominantly El Nino phase that followed. Further, the more recent phases of La Nina in 2009 and 2011-12 appear to relate quite strongly to the storm wave occurrence pattern that would be expected (BMT WBM, 2013).

G.1.3.1 Nearshore Wave Climate

The spectral wave modelling package SWAN, which models refraction, bed friction attenuation and other relevant transformation processes, was used to propagate waves from deep water to nearshore areas along the study region, in the Hazard Update (BMT WBM, 2013). Typical nearshore transformation coefficients and wave refraction patterns along the study region indicated:

- The Byron coastline experiences maximum wave height coefficients for deep water wave directions arriving from 50-100 degrees,
- There is relatively direct propagation of the east to north-east waves onto the Byron shoreline (see (a) Figure G-3);
- For more southerly waves, the Byron coastline experiences decreasing wave height coefficients, particularly at those beaches in more sheltered areas immediately north of prominent headlands;
- There are zones of substantial wave height reduction evident along the sheltered beach areas north of headlands for the south east to southerly waves (see (b)-(d), Figure G-3); and
- Cape Byron has a profound effect at the shoreline along the coastline to its north on the more southerly waves, of particular significance for alongshore sand transport associated with large southerly swells generated by east coast lows off the NSW coast, as described by Patterson (2007). That effect may extend north to the Gold Coast for southerly waves.

The varying nature of wave propagation to the shoreline leads to quite different patterns of wave exposure and associated alongshore sand transport along the study region coastline. No particular wave condition results in uniform alongshore transport. The net transport rates at each location along the coast depend on the prevailing range of propagated nearshore waves that is unique to each location and will vary in response to variations in the incident deep water wave conditions.

The plan shape of the shoreline along the region reflects the dominant southeast swell conditions and northward net movement of beach sand. This manifests as a series of crenulate shaped embayments, more hooked at their southern ends and aligned more uniformly and relatively consistently at north-northeast (approx. 20°) at their northern ends.

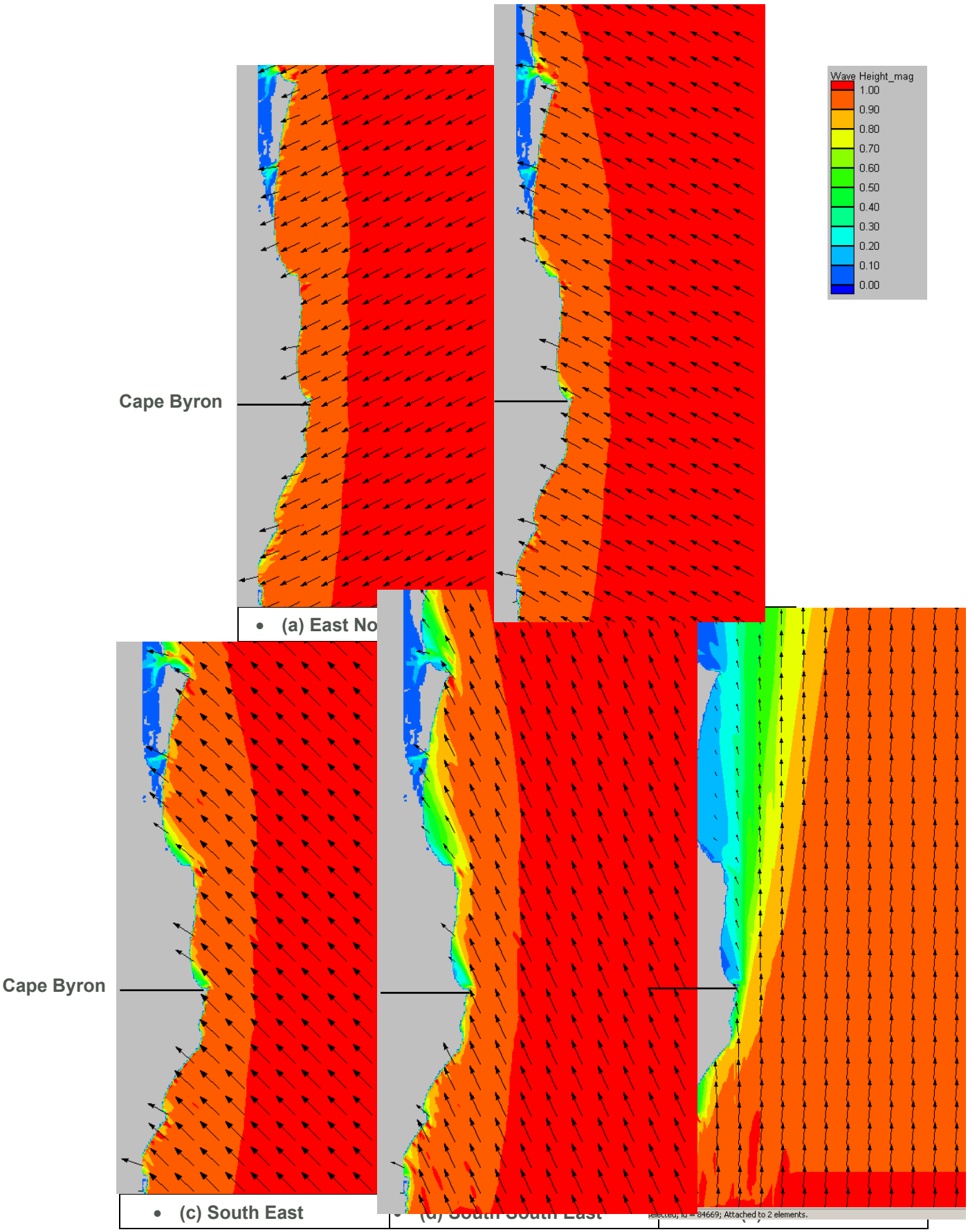

Figure G-3 Wave refraction patterns along study region for various Mean Wave Directions (from BMT WBM, 2013)

G.1.4 Recent Anthropogenic Influences

A brief history of past to present interventions in the Byron Bay Embayment, and their potential influence on the shoreline is summarised below.

- In 1888 a Jetty was constructed measuring 1320 ft long and 26 ft wide jetty on some 66 rows of piles (PWD, 1978), off Jonson Street (Carley et al, 2017). In 1930 the Jetty was declared unsafe, and was removed by 1949. It was therefore considered to have no impact on shoreline conditions evident by 1978 (PWD, 1978).
- A second Jetty was constructed in 1928 (due to decay and storm damage to original jetty), measuring 2,002 feet long and 31 feet wide (PWD, 1978), located between Don and Manfred Street (Carley et al, 2017). By 1938, erosion problems were being experienced, resulting in:
  - nourishment of the area in 1939 with 35,000 m^3 of sand, the benefits of which were short lived;
  - construction of a stub wall in 1941 was between piers 81 and 82, effectively forming a shore parallel breakwater; and
  - due to the success of the first stub wall, further stub walls were constructed in 1942, 1949 and 1950.
  - These features and the jetty were concluded to hold the shoreline position relatively steady, and even stabilise a localised area of beach with formation of a small sand fillet (PWD, 1978).
- The Jetty was badly damaged in 1954, and then eventually completely removed in 1972, having suffered damage from storms over the years. After this, the sand fillet rapidly eroded and the shoreline retreated back in line with adjacent shorelines (PWD, 1978).
- Construction of a harbour and breakwaters at Brunswick Heads commenced in 1960, with the breakwaters completed in 1961, and the majority of the remaining harbour works completed in 1962. PWD determined that accretion was occurring at a rate of 1.1 m/year from 1947 to 1960, which was concluded to be due to the effects of a rocky outcrop on the northern side of the then untrained river mouth. After the Brunswick Breakwaters were completed, the shoreline to the south was analysed by PWD (1978) to be accreting at a rate of 3.3 m/year to 1977. An average rate of 2.5 m/year accretion was analysed from the aerial photographs from 1947 to 1977.
- Severe erosion to the village at Sheltering Palms occurred during storms in the late 1960s and 1970s, culminating in the breakthrough of the ocean into the North Arm of the Brunswick River. The village was abandoned, and land repurchased by the NSW Government under the Coastal Lands Protection Scheme (PWD, 1978). PWD (1978) analysed the rate of recession at Sheltering Palms to be 0.5 m/year from 1947 until construction of the Brunswick breakwaters, increasing to 2.6 m/year after construction to 1977.
- Further north at New Brighton, no detectable change in the recession rate was observed, with an overall rate of 1.1 m/year evident in the aerial photography from 1947 to 1977 (PWD, 1978).

- Extensive sand mining occurred between Byron Bay and Hastings Point from 1963 to 1969, for rutile and zircon. In some places, the re-established dune post mining was located more seaward of the original dune.
- In 1966, the war memorial swimming pool at Byron Bay was opened.
- In the 10-12 years prior to the PWD study in 1978, concerns over erosion threats to Main Beach (and the Byron town centre), the SLSC, the beach front car park and Memorial Swimming Pool resulted in Council placing rock fill on the beach as protection, which essentially formed the now Jonson Street Protection Works. A general pattern of accelerated erosion in the region of the caravan park immediately north was observed by PWD (1978). The Hazard Update (BMT WBM, 2013) concluded that the Jonson Street Protection Works have contributed to the erosion occurring immediately north at the Caravan Park and Belongil Spit, however are not the only factor in the erosion that has occurred. Indeed, BMT WBM (2013) suggest the influence of the works will continue to lessen over time as the shoreline reaches an equilibrium with the structure in place.
- At Belongil Spit various owners took action to protect their land during the 1970s resulting in materials from rock walls to car bodies and heaps of rubber tyres being placed in an uncoordinated and piecemeal manner (PWD, 1978). Carley *et al.* (2017) state that *"all private development on Belongil Spit now has some form of rock, concrete or geotextile container coastal protection - with most of these structures not designed to contemporary engineering standards"*.

G.1.5 Sediment Transport Patterns

G.1.5.1 Interactions with the East Australian Current

A unique element of the Byron Bay coastline is the interaction of typical northerly littoral drift with the East Australia Current. These currents are independent of each other, however their interaction is important, as follows.

- There is a net northerly longshore transport of sand from south to north, driven by the predominant south easterly waves arriving at an angle to the NSW coast, including at Byron Bay where net sediment transport occurs from south to north past Cape Byron.
- The East Australia Current runs from north to south along the east coast of Australia, at typical speeds of 1-2 m/s, and in water depths greater than 40 – 50 m. At these depths, the current does not typically influence sediment transport in the surfzone of east coast beaches.
- Offshore of Cape Byron, however, the shoreface dips sharply and steeply to water depths of 40 to 50 m, at slopes of 1:18 to 1:30 (PWD, 1978). This places the northerly littoral currents immediately next to the southerly directed EAC, resulting in some of the northerly littoral sand being sheared off by the EAC where it is then effectively lost from the coastal system at water depths of 40 m plus. PWD (1978) estimate losses to the Byron lobe (or Byron Slope, see Figure G-4) to be about 50,000 m^3/year.

It is noted that OEH recently captured marine lidar for the entire NSW coast, which provides highly detailed and accurate bathymetric survey out to water depths of 30-40 m. This data is expected

to be available by mid 2019. OEH are also collecting bathymetric survey from 30-40 m out to around the continental shelf edge at various locations under a priority program. This data is expected to be released as it is captured, to eventually provide a complete, accurate and detailed bathymetric survey of the entire NSW coast. Detailed bathymetric data is expected to aide in the interpretation and clarification of key questions regarding coastal processes in Byron, including factors such as longshore transport rates and pathways and patterns of sand deposition and transfer.

G.1.5.2 Sediment transport patterns across the Byron Embayment

PWD (1978) concluded that sand transport northwards around Cape Byron may either be:

- Intercepted by the southwards directed EAC, where they are lost to a deep water sediment sink (as discussed above in Section G.1.5.1);
- Deposited between Cape Byron and Julian Rocks, from where the sediment may be gradually worked northwards towards New Brighton under wave action outside the highly active surfzone; and / or
- Temporarily deposited in a shallow shoal around Cape Byron Reef.

From PWD (1978), Figure G-4 illustrates concurrently (a) the conceptual model of currents, (b) the conceptual model of coastal processes and (c) the offshore sediment types and distribution.

PWD (1978) concluded there to be a highly active littoral zone out to 8-10 m water depth, where longshore and cross-shore sand movements occur, with net littoral movement to the north. Beyond this, and based upon the sedimentological evidence of “outer nearshore sand”, waves produce oscillating forces on the bed out to about 18-25 metres (PWD, 1978).

The above conclusions are markedly similar to those of Patterson (2013) and BMT WBM (2013) who indicate a surfzone littoral current close to shore in 6-8 m water depth; and a broader “cross-embayment” transport out to 15 m water depth or so, moving northwest towards New Brighton, as illustrated in Figure G-5. While the “cross-embayment” transport concept was used by Patterson (2013) and BMT WBM (2013) to explain the somewhat different mechanisms that drive transport within compared with just outside of the surfzone. But when this discussion is directly compared with that of PWD (1978) above, the concepts are arguably the same. That is, both PWD (1978) and Patterson (2013)/BMT WBM (2013) describe littoral transport in the surfzone at around ~ 8 m water depth; and sand movements in the outer nearshore zone at around 15-20 m water depth.

In order to quantify the two sediment transport processes, the Hazard Update relied on the findings of Goodwin *et al* (2013) that recommended that cross-embayment transport comprises some 50% of the total supply to an embayment. In reality, as noted by Patterson (2013), the actual balance between transport in the littoral zone and across the embayment is likely to vary depending on prevailing conditions. BMT WBM (2013) state that

> “*The proportion of sand that follows the littoral zone and the proportion that moves across the Byron embayment have not been quantified reliably. They will almost certainly vary with varying wave and sand transport conditions, with a higher littoral proportion but lower total transport under lower wave energy conditions. Thus, the supply of sand to the embayment*

and the predominant path that it takes are most probably quite variable and highly dependent on the prevailing wave conditions."

Summary of Byron Bay Embayment Coastal Proc

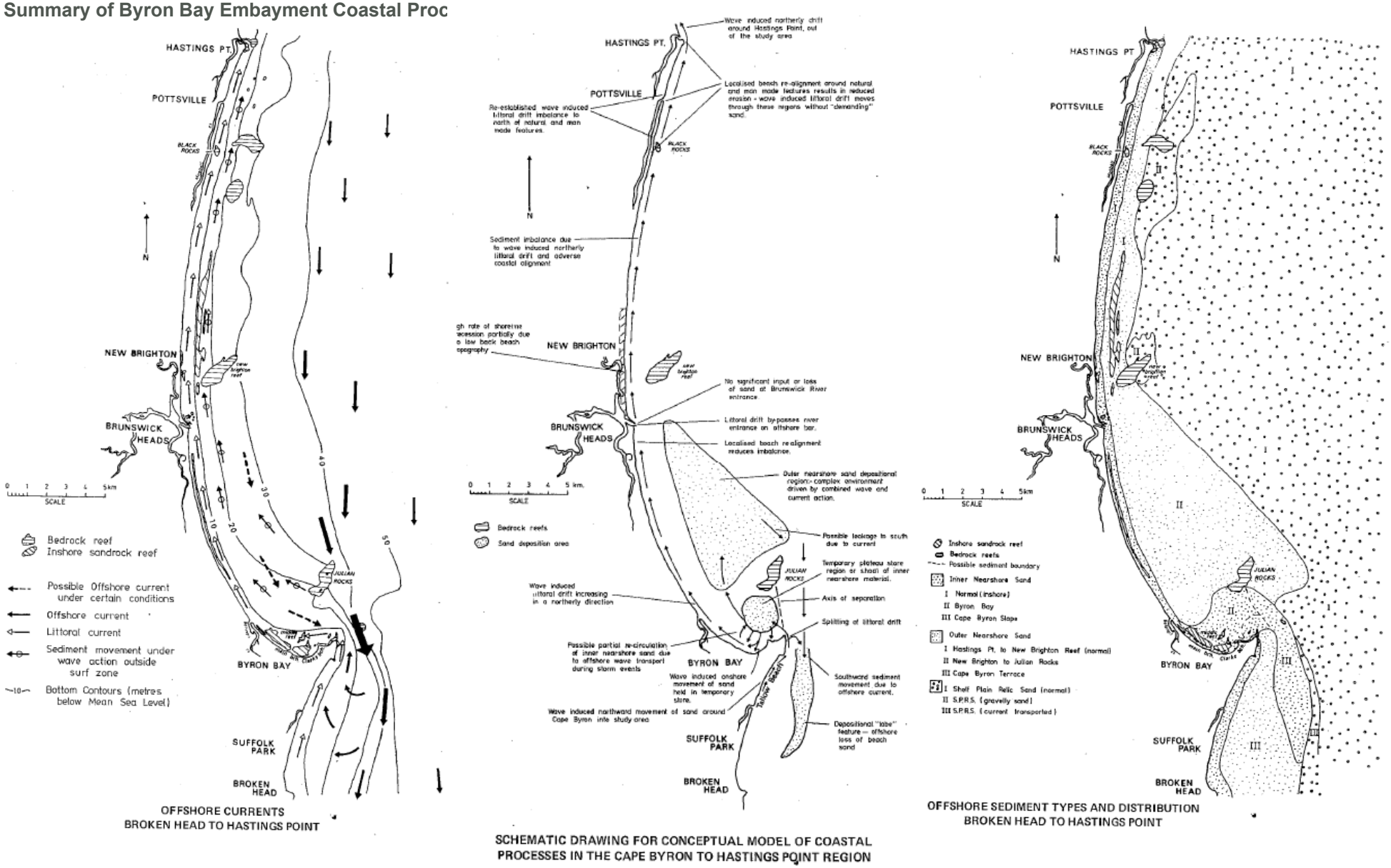

Figure G-4 From PWD (1978) (a) the conceptual model of currents, (b) the conceptual model of coastal processes and (c) the offshore sediment types and distribution

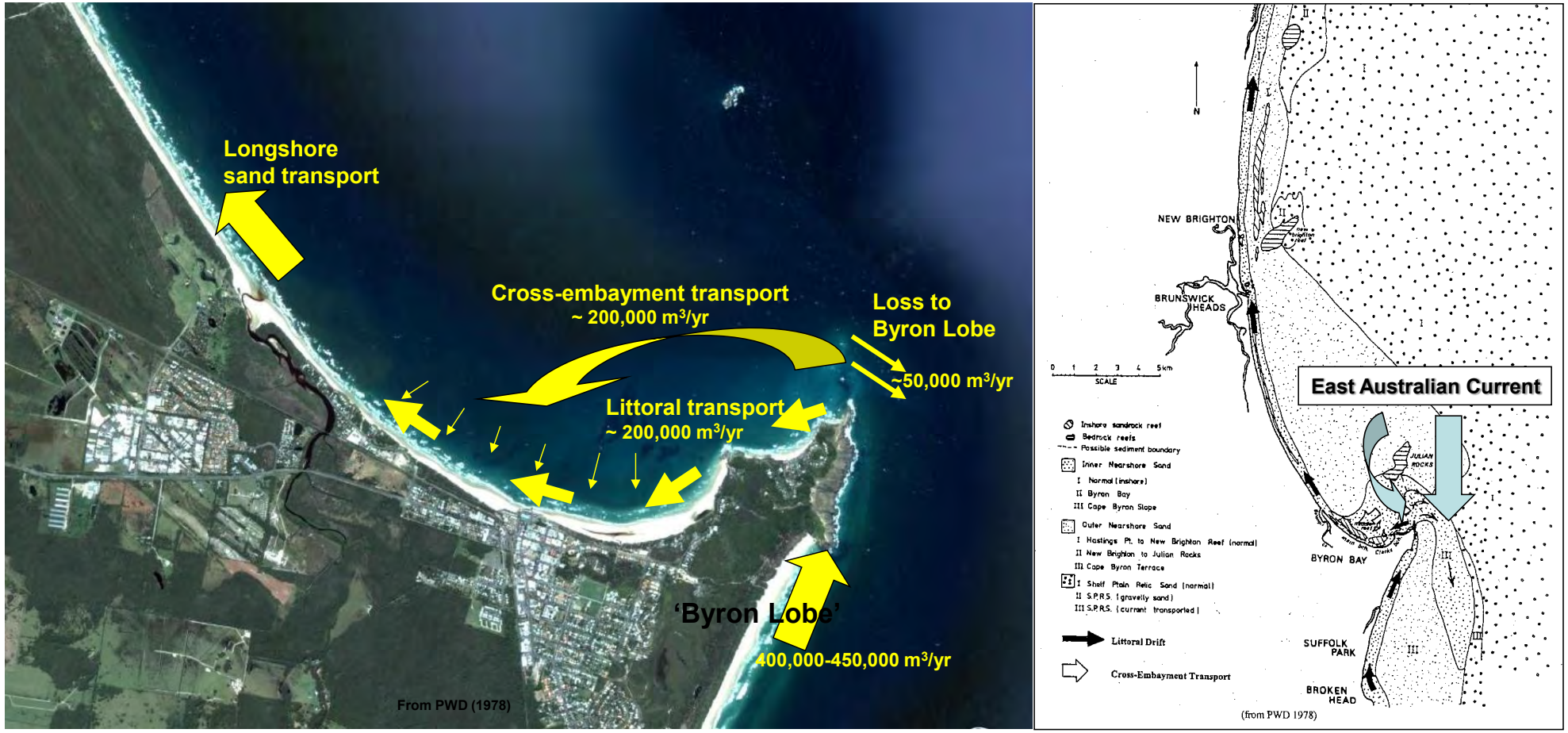

Figure G-5 Conceptual sand transport pattern through the Byron Bay Embayment (from Patterson 2010)

G.1.5.3 Regional Sediment Transport Rates

Definition

Waves approaching the shoreline from an oblique angle generate a current alongshore which, in conjunction with the wave action, transports sediment. Depending on the prevailing wave direction, the alongshore sediment transport may be directed either north or south along the coast. On the northern NSW and south-east Queensland beaches, the net alongshore sediment transport is directed to the north, due to the predominant south east wave climate relative to the general north to south orientation of the coastline. The net regional longshore transport rate may be greater or lower than the average annual rate in any one year and even over years to decades, depending upon the prevailing wave climate conditions. Net sediment transport rates will be enhanced or reduced due to even slight shifts in wave direction and wave height. Wave height and direction also affect the bypassing of sediment past headlands and reefs, and this can also affect shoreline stability (erosion or accretion) of shorelines adjacent to headlands.

Analyses

Understanding the net regional sediment transport into and out of the Byron coastline is important for understanding the long term recession occurring along this coastline.

Figure G-6summarises average annual net longshore transport rates across the regional sediment compartment from the Clarence River to the Gold Coast undertaken to date, including Delft Hydraulics Laboratory 1970; PWD 1978; Pattearson & Patterson 1983; WBM Oceanics Australia 2000; WBM Oceanics Australia 2003; Patterson Britton Partners 2006; Patterson 2007; BMT WBM 2011; Patterson 2013, and BMT WBM, 2013 (i.e. the Hazard Update). Those findings that are of particular relevance to the Byron coastline are outlined in Table G-1, and are discussed below.

PWD (1978) state that a “subjective estimate of the drift rate” of 65,000 m^3/year was determined, based on refraction analysis, sedimentological data and “observations of the quantity of sand which from time to time moves northward around the Cape and appears as a slug of sand off Wategos Beach”. In determining the net sand transport rates at Byron, PWD (1978) noted that data for the study area was very limited in extent, and they were required to synthesise and transpose data of weather and sea state observation records from other locations.

The basis of the PB Partners (2006) assessment is not clear but appears to be a modification of the PWD finding (BMT WBM, 2013).

Patterson’s (2007) approach utilised detailed SWAN modelling and longshore sand transport calculations using the wave data available to that time. This was the first of the previous studies to adopt a regional approach to the longshore sediment transport calculations.

Patterson (2013) used shoreline modelling of the late Pleistocene-Holocene coastline evolution through to present day. Again, a regional approach was adopted. It is known from the geological evolutionary history that there is a continuous alongshore transport of sand along this coastline, and shoreline change responses at particular beaches affect responses at adjacent beaches (BMT WBM, 2013).

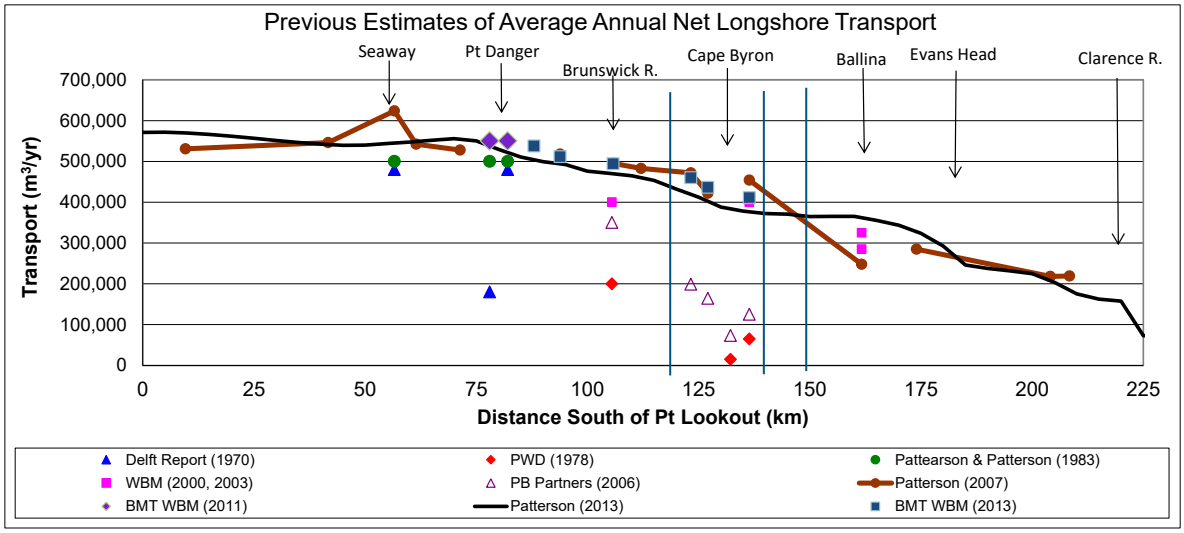

Figure G-6 Historical estimates of average annual net longshore sand transport rates

Table G-1 Net Sediment Transport Rates for the Byron Coastline from Previous Authors

Location / Author	Cape Byron (prio to bypassing) (m^3/yr)	Loss to Byron Lobe (m^3/yr)	Brunswick River (m^3/yr)	Difference (m^3/yr)
PWD (1978)	65,000	50,000	120,000	105,000
WBM (2000, 2003)	400,000	50,000	400,000	50,000
PB Partners (2006	120,000 (approx.)	50,000	350,000	280,000
Patterson (2007)*	450,000	50,000	500,000	100,000
Patterson (2013)*	~ 375,000	50,000	~475, 000	150,000
BMT WBM (2013)*	400,000	50,000	500,000	150,000

** Note that these studies each used different model packages.*

BMT WBM (2013) as part of the Hazard Update established the EVO-MOD model for the entire coastline extending from near the southern Byron Shire boundary on Seven Mile Beach to Point Danger (at the NSW-Queensland Border), again providing a regional approach. Advantages of the EVO-MOD package are described in the Hazard Update (BMT WBM, 2013).

It is important to note that the modelling packages utilised by Patterson (2013) and BMT WBM (2013) are separate and independent. Patterson (2013) developed a separate Shoreline Evolution Model as part of PhD research into the geological evolution of the Clarence to Gold Coast coastline.

An important element of the BMT WBM (2013) study was the development of a long time series wave record for Byron. The Byron waverider buoy has suffered data lapses in the past, and wave direction data has only been recorded since 2000. Previous analyses of longshore sediment transport rates have been hampered by the lack of a reliably defined directional wave climate record. The Byron data set was extended and data gaps filled using available global wave model information, yielding a continuous time series from January 1989 to July 2012 which was then

used in longshore sediment transport calculations and to model shoreline behaviour (BMT WBM, 2013).

The BMT WBM (2013) concluded the net regional transport rate at Cape Byron to be about 400,000 m^3/year. This is substantially larger than that proposed by PWD (1978). Interestingly, there is reasonable agreement between the two studies on the longshore transport differentials within the embayment. Based upon the rates provided at Cape Byron and Brunswick River, a longshore transport differential of 105,000 m^3/year is calculated from the PWD (1978) rates, and a differential of 150,000 m^3/year is calculated from the BMT WBM (2013) rates, see Table G-1.

A key element of the higher longshore sediment transport rates determined particularly by Patterson (2013) and BMT WBM (2013) relates to the regional approach to the study, starting with the longshore supply at the Clarence River. Patterson (2013) determined a net longshore sand transport of about 150,000-200,000 m^3/year at the Clarence River, which he noted is contrary to the generally accepted understanding. However, his research included analysis of the net supply of sand from the lower Clarence River estuary and found agreement with the rate derived by Floyd and Druery (1976) from bar growth data of about 120,000m^3/year, which is additional to about 70,000m^3/year being supplied from further south (i.e. the Coffs Region). The sand is found to be predominantly marine sand previously accumulated in the lower estuary basin that is now being displaced by fluvial sediment currently depositing there (Patterson, 2013).

The regional analysis by Patterson (2013) and BMT WBM (2013) determined a positive gradient in the longshore transport northward from the Clarence River to Point Danger, with the longshore transport rate increasing from 150,000-200,000 m^3/year at the Clarence River to about 550,000 m^3/year at Point Danger, as illustrated in Figure G-7.

The positive gradient from the Clarence River to Point Danger of about 350,000-400,000m^3/year along 150 km corresponds to an average loss of about 2.3-2.7m^3/m/yr, which would potentially lead to average shoreline recession for an active vertical zone of about 0.15-0.18m/yr. The photogrammetry analyses undertaken previously (WBM Oceanics Australia 2000; 2001; 2003) and updated by BMT WBM (2013) indicate a regional average shoreline recession rate of about 0.05-0.1m/yr, corresponding to an average sand loss of about 0.75-1.5m^3/m/yr (BMT WBM, 2013).

Roy (2001), Cowell *et al* (2000), Goodwin (2005) and Patterson (2013) suggest that there may remain a significant shoreward sand supply from the continental shelf that could be sufficient to at least partially offset the alongshore transport gradient and associated shoreline recession, see Figure G-7. A shoreward supply of this nature and rate has not yet been proven by field data, but would be necessary to reconcile the difference between the regional shoreline recession rates expected in consideration of the alongshore transport gradient and the relatively low rates of regional recession evidenced in the photogrammetry of less than 0.1 m/yr noted above. This indicates a delicate natural balance between alongshore transport gradients, relatively small shoreward sand supply and shoreline change.

An average supply of 1-2m^3/m/yr along the 150km coastline from the Clarence River to Point Danger would offset 150,000-300,000m^3/yr of the 350,000-400,000m^3/yr gradient in the longshore transport rate, and reducing the average recession to less than 0.1m/yr. This is most

probably a significant component of the explanation for the relatively low rates of regional shoreline recession identified to date in the photogrammetry data (BMT WBM, 2013).

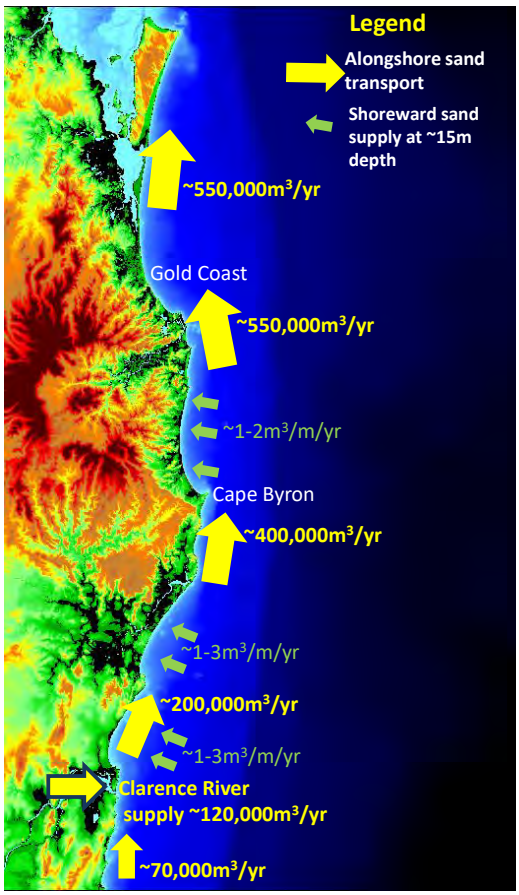

Figure G-7 Regional Sand Transport Regime (BMT WBM, 2013)

WRL (2010) caution the adoption of the cross-embayment transport rates recommended by Patterson (2013), due to the lack of field data. However, it should be noted that field data is very rarely available for studies of this kind. Instead, longshore sediment transport calculations, such as prepared by Patterson (2007) utilising SWAN wave modelling of measured wave data, are regularly applied and adopted for studies of this kind.

The PWD (1978) study was highly rigorous, and allowed for extensive data collection particularly of offshore sedimentological data. However, the authors themselves noted that most available data sets were either immature, or unavailable at the time. For the Patterson (2013) and BMT WBM (2013) studies, a further 40 years of highly accurate photogrammetric and lidar topographic beach profile data was available, and a long time series wave record is available from various sources including a local wave ride buoy. Mathematical modelling programs and capabilities are also substantially improved compared with what was available in 1978. That is, while the PWD (1978) was highly rigorous and remains invaluable, we also have the benefit of a vastly expanded and improved data set and analytical tools with which to assess key elements of the Byron Bay coastal system.

The BMT WBM (2013) and Patterson (2013) studies provide an extension of the 1978 PWD study, having utilised the data and incorporated the findings of the earlier work. The BMT WBM (2013)

and Patterson (2013) studies also adopt a regional approach that required consideration of the interactions with adjacent embayments. As noted by WRL (2010), the application of a regional scale, sophisticated modelling tool allows greater insight into the coastal processes of Byron Bay.

A field data collection exercise would confirm transport rates. Similarly, a probabilistic modelling approach also allows exploration of a range of longshore sediment transport rates in determining hazard extents. Either or both of these approaches would add to the richness of understanding of coastal processes in this complex location.

G.1.6 Beach erosion and shoreline recession hazard definition

G.1.6.1 Hazard Estimates Applied to the Study Area

Calculations for long term recession and short term erosion that have been applied to the study area are outlined in Table G-2 below. The long term recession estimates of PWD (1978) are also provided, as these formed the basis of the current coastal planning regime applied by Council.

Table G-2 Long Term Recession and Short Term Erosion Estimates for the Study Area

	Discussion
Long term recession	
PWD (1978)	Based upon ~ 30 years photogrammetry (with "excellent" coverage for 17 years). The 50 and 100 year recession lines projected by PWD (1978) were adopted by Council as the "Part J" coastal planning lines. • Entire embayment: -0.6 m/year, +/- 0.3 m/year • Byron Bay: -1.5 m/year • New Brighton: -1.8 m/year • Brunswick breakwaters: 2.5m/year accretion
BMT WBM (2013) *(Adopted)*	Long term regional recession trend of -0.05-0.1m/year, noting that recession is not uniform along the coastline, being less immediately updrift (south) of headlands and greater downdrift (north). The longer term recession trend has at times been masked by the superimposed short term erosion events and medium term variability in wave conditions and thus longshore transport relating to ENSO and IPO. For example: • higher rates of recession calculated by PWD (1978) have not been realised, with an over-estimate calculated due to the shorter photogrammetric record and the masking effect of the severe cyclone erosion over that period; and • a period of sustained shoreline accretion despite the longer term erosion trend at Main-Clarkes Beach after 1973 to around 2009. Long term trends are further complicated by the coastal protection works at Jonson Street (anchoring the shoreline) and along Belongil Spit (which has transferred recession losses to the north).
Short term erosion	
BMT WBM (2013) *(Adopted)*	Short term erosion of 250 m^3/m for all beaches, noting 150-200m^3/m as typical. Short term erosion rates given in the study are consistent with other regional studies. PWD (1990) and WRL (2016) indicate that erosion of 200m^3/m would entirely remove the dune fronting Manfre Street, permitting washover directly into the street behind, and presumably Belongil Creek.

G.1.6.2 Approach to Hazard Definition, incorporating variability and uncertainty

The erosion hazards were determined and presented in terms of:

- The immediate erosion hazard which includes provision for the design storm bite with provision for the effects of wave climate variability over the next few years, determined on the basis of analysis of the available photogrammetry data for each location.
- The future erosion hazards for which the immediate erosion hazard extent is projected to 2050 and 2100 respectively by incorporating the effects of underlying recession trends and sea level rise, with provision for uncertainties about those processes leading to hazard extent ranges from 'minimum' through 'best estimate' to 'maximum'.

The 'maximum' and 'minimum' extents of the erosion hazard represent the range within which the erosion hazard is most likely to apply, allowing for uncertainty inherent in the data interpretation and modelling, as well as other factors that are difficult to quantify reliably, particularly the natural variability operating at short, medium and long time frames. The conceptual pattern of shoreline variability and progressive long term change is illustrated in Figure G-8.

Provisions for expected storm bite and future recession lead to erosion hazards that extend into developed areas to varying distances within the Byron Bay township area, with likely breakthrough of Belongil Spit and/or recession of the shoreline to Belongil Creek where it remains unprotected by seawall structures.

The western shoreline of Belongil Creek will be subject to significant change involving potential erosion, particularly with sea level rise as the coastal shoreline retreats back into the creek, for a distance commensurate with the extent of shoreline recession.

For the Byron Bay Embayment and Belongil Creek, two additional erosion hazard scenarios were assessed, as outlined below.

- **Scenario 1**: Retention and permanent maintenance of all existing coastal erosion protection works. That is for Scenario 1, it was adopted that the entire shoreline from Border Street to the northern end of the existing most northern seawall (north of Manfred Street) is protected and maintained to prevent recession along the existing seawall alignment, including the presently unprotected section north of Don Street, and the dune strengthened to prevent overtopping.
- **Scenario 2**: Retention of only the Jonson Street protection works and removal of all other existing coastal erosion protection works and interim beach access stabilisation works along the Byron Bay Embayment, with the shoreline allowed to recede as it would have in their absence.

The outcomes of this scenario testing were intended to inform future decisions about how the coastline is managed.

The erosion hazard extent is reduced in protected areas and along the section of shoreline between Jonson Street and Border Street in Scenario 1, but is increased compared with Scenario 2 along those parts of the shoreline north of the Belongil Spit seawalls. The impacts of the coastal protection works along Byron Bay / Belongil Spit are now being experienced at Byron North Shore, north of Belongil Creek. Future recession there will be greater under Scenario 1 than Scenario 2.

Hazard maps are available within the Hazard Update report (BMT WBM, 2013) which is publicly available, and so have not been reproduced here.

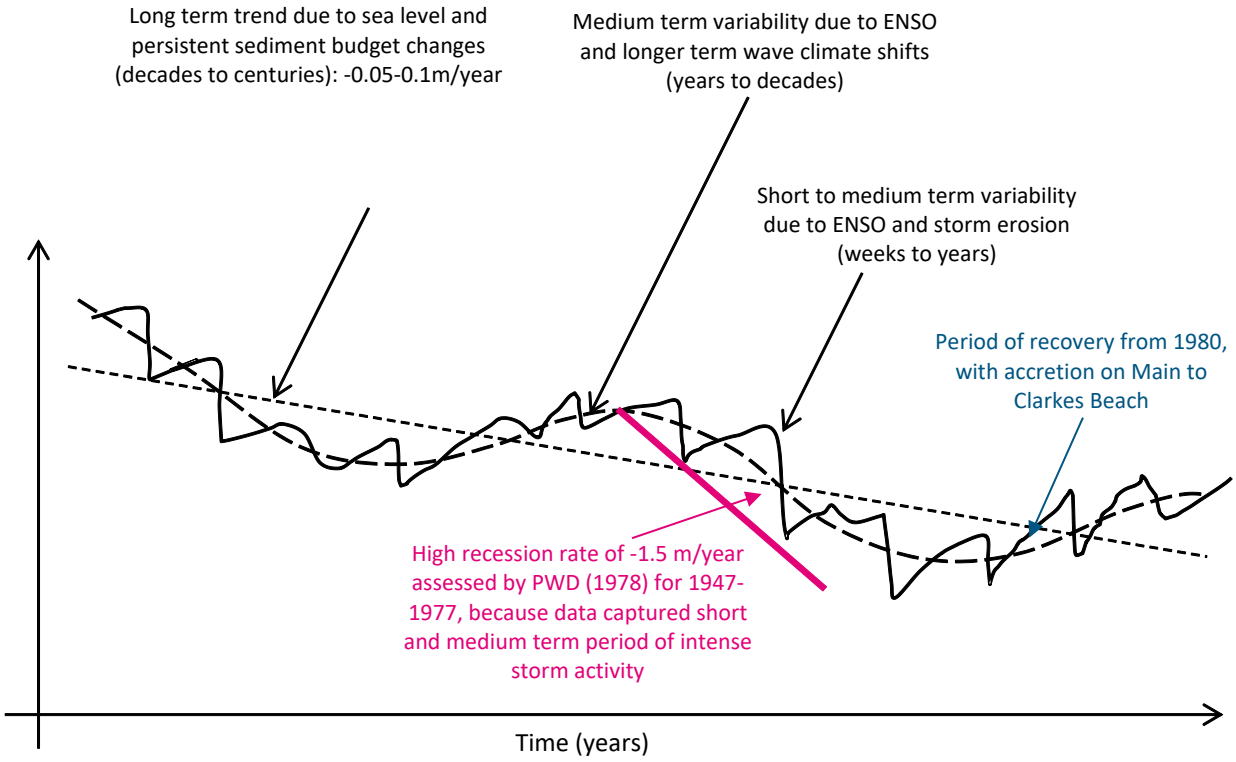

Figure G-8 Conceptual Shoreline Variability and the Byron Bay Embayment

G.1.7 Coastal Inundation

G.1.7.1 Wave Overtopping

The Byron Bay Embayment is subject to varying incident wave conditions along its length due to the variation in its generally north-facing orientation, the nature of wave propagation from deep water and its location relative to Cape Byron. SWAN wave modelling outputs were used to determine nearshore conditions for wave run-up determination.

The design deep water conditions for assessment of wave run-up and overtopping potential were:

- 100 year ARI significant wave height of 7.5m from direction just north of east (with wave coefficients greatest at the shoreline under this wave direction);
- 100 year ARI storm tide (or, ocean water) level of 1.84m AHD, consistent with Byron Shire Council's flood planning scenario design level policy. This level is conservatively high, being 0.4m higher than commonly adopted for the NSW coastline of 1.44 m (from Fort Denison).

Design run-up levels relative to existing mean sea level (approximately AHD) for the different parts of the embayment are calculated for both natural beaches, using the method of Nielsen and Hanslow (1991) which includes wave set-up, and for typical rock seawalls (using conventional methodology for permeable rubble slopes set out in the Shore Protection Manual (1984) and an adopted armour slope of 1:2), as listed in Table G-3. Due to the effects of wave refraction to the Byron embayment, the nearshore wave heights and corresponding run-up levels are significantly lower than along more exposed sections of coastline. Potential run-up levels for the 2050 and

2100 scenarios are also provided in Table G-3 based on a linear addition of the projected sea level rise components of 0.34m and 0.84m respectively to the present day levels.

Run up levels provided in Table G-3 assume the seawalls are rough, permeable rock structures. For the impermeable, smooth sand bag wall structures, the general 'rule of thumb' suggests the run-up component (i.e. not whole water level) may be almost twice that of properly designed permeable rock structures.

Table G-3 Calculated 'Immediate' wave run-up levels on 1.84m (AHD) storm tide

Location	Nearshore Wave Heigh (H_s, m)	Run-up Component (m)		Run-up Level Inc. Storm Tide + SLR					
				Presen	(m AHD	2050	(m AHD	2100	(m AHD
		Seawall	No seawal	Seawal	No seaw	Seawal	No Seaw	Seawal	No Seaw
Main Beach	2.85	N/A	2.43	N/A	4.6	N/A	5.1	N/A	4.27
Jonson Street	3.00	3.1	2.49	5.3	N/A	5.8	N/A	4.94	4.33
Belongil Spit	3.58	3.1	2.73	5.3	4.9	5.8	5.4	4.94	4.57
Byron North Shore	4.30	N/A	3.0	N/A	5.2	N/A	5.7	N/A	4.84
Brunswick Hea	5.7	3.46		5.30		5.64		6.14	
New Brighton	6.0	3.55		5.39		5.73		6.23	
South Golden	6.0	3.55		5.39		5.73		6.23	

The calculated 'Immediate' wave run-up levels result in overtopping hazards as follows.

- No potential for overtopping along Main Beach where dune heights are in excess of 6m (AHD), significantly higher than potential run-up levels.
- Minor overtopping at the eastern end of the Jonson Street protection works.
- The dune crest levels along Belongil Spit are generally greater than 6.0m (AHD), with overtopping unlikely along most of its length; however:
  - In Scenario 1 (seawalls retained), site-specific analysis of seawall crest levels are needed to determine the vulnerability to overtopping; and
  - A significant overtopping potential exists at Manfred Street where the present dune crest level is approximately RL+4m, well below the run-up limit.
- A clear potential for overtopping and/or inundation within the mouth area of Belongil Creek where the berm levels are generally at RL+1 to +3m (AHD).
- Sufficient dune height along the North Shore area (generally >8m) to prevent wave overtopping.
- Generally sufficient height of existing frontal dunes at New Brighton and South Golden Beach, however, the expected dune erosion during major storm events will extend to lower hind-dune areas that are significantly lower, making those areas vulnerable to inundation by wave overtopping.

Future overtopping hazards are as follows.

- The future evolution and potential for wave overtopping and inundation of the Belongil Spit area is intimately determined by the retention or removal of the protective seawalls and the associated shoreline recession behaviour. With no change to the existing protection, the potential for overtopping will increase further due to shoreline recession into the lower hind-dune areas along Belongil Spit where the prevailing dune levels are relatively low, and due to the higher sea levels relative to the existing dune and seawall crest levels. Assessment of management options involving seawalls should involve review of these run-up and inundation considerations in terms of design and cost requirements for adequate wall crest levels to protect the land behind.
- The level of the hind-dune area about 20m further landward of the immediate erosion escarpment, to which the storm bite would extend as shoreline recession proceeds, are low, making the New Brighton to South Golden shoreline vulnerable to immediate and future inundation by wave overtopping (in the absence of mitigating action).

G.1.7.2 Ocean Storm Inundation and Tidal Inundation

The design elevated water levels adopted for Belongil and Brunswick River as listed in Table G-4 were based on Council's policy for the 100 year design elevated ocean levels at estuary mouths for flood planning scenarios with storm surge events and climate change. Council's policy design levels for estuary flooding include provisions for:

- The design storm tide level, including climate change induced increased storm surge;
- A wave setup component; and
- Climate change induced future sea level rise.

Based upon these design storm tide levels, the extents of potential inundation within Belongil Creek and Brunswick River were mapped, using a 'bathtub' approach with the present creek bathymetry. The maps are available in the Hazard Update (BMT WBM, 2013) and therefore are not reproduced here.

Table G-4 Design Storm Tide Levels

Immediate (mAHD)	2050 (mAHD)	2100 (mAHD)
2.29	2.89	3.49

Tidal inundation, or inundation of land adjacent to Belongil Creek and Brunswick River associated with high spring tides will become more extensive with future sea level rise. Mapping has been undertaken of the extents of inundation by a tide of 0.94m above mean sea level for the immediate and projected 2050 and 2100 year scenarios, using a 'bathtub' approach.

While the mapping described above provides very useful tools for planning in lieu of hydrodynamic modelling, the following recommendations are made with regard to mapping the storm event and regular tidal inundation risks in Belongil Creek and Brunswick River:

- A dedicated flood study that investigates the inundation extents and velocities with coincident catchment rainfall and ocean tide events plus future sea level rise is required, and will provide substantially improved mapping of inundation, flood hazard, and flood planning levels;

- In addition, and conducted as part of or separate to the above, a dedicated hydrodynamic investigation of tidal inundation (considering, for example, mean high water, high high water solstice springs (i.e. “king tide) or highest astronomical tide) with future sea level rise would provide a more accurate indication of the permanent impacts of sea level rise on water levels and adjacent foreshore land within the estuaries, particularly for Belongil Creek which is affected by periodic entrance closure.

G.1.8 Coastal Entrance Dynamics

A specific investigation of the combined sediment transport and entrance dynamics, considering the influences of both fluvial inputs and open coastal transport processes, including shoreline recession impacts, has not been completed to date. Council is currently undertaking a Belongil Creek Entrance Opening Study, to investigate the dynamics of the entrance and better defined artificial opening limits. BMT WBM (2013) have provided an overview of coastal entrance instability issues, as below.

The Belongil Creek mouth is untrained and its migration affects the adjacent beaches. The creek mouth tends to close during times of low catchment run-off, which is insufficient compared with the movements of sand in the beach system. The entrance is artificially opened to mitigate flooding and perceived water quality and flushing impacts, and this may be needed several times per year depending on conditions. The creek tends to scour and open naturally during periods of very heavy rainfall.

Aerial photography and geological surveys indicate evidence of historical northward migration of Belongil Creek entrance, as well as local perturbations of the shoreline to the north and south associated with the meandering of the outlet channel and sediment inflow/outflow. More recently, the pattern appears to be one of southward migration associated with shoreline recession. Figure G-9 illustrates the nature and extent of the entrance changes relative to the cadastral boundaries, defined a century or more ago. Figure G-9 also shows that the western creek bank has eroded substantially over that time. Erosion associated with entrance meandering and channel re-alignment has affected land and development adjacent to Belongil Creek.

Figure G-9 Belongil Creek mouth: morphology and cadastral boundaries

The behaviour of the creek in response to shoreline recession that would break through to the creek behind Belongil Spit is somewhat speculative and uncertain. There is a high likelihood that the creek could break through south of its current entrance location in the short to medium term (< 20-50 years), due to continued shoreline recession and wave overtopping. The Belongil Spit dune is relatively narrow and reduces in height landward of the dune crest, meaning the dune is of low volume and low height, making it more susceptible to shoreline recession resulting in breakthrough and wave overtopping. The following scenarios were considered possible.

- The entrance could break through in the Manfred Street area where the creek turns northward behind the Spit, with the North Shore shoreline having to adjust its form and alignment to the receded shoreline alignment.
- Alternatively, the creek could meander northwards again, at a more landward alignment in line with the receding shoreline. This would resulting in the creek channel migrating westwards, in turn further eroding the western bank of the creek entrance, at a distance commensurate with the extent of shoreline recession.

In either case, the present fundamental processes of creek behaviour are expected to continue into the future, albeit at a higher sea level and at a more landward shoreline position.

G.1.9 Beach Hazard Summaries

The Hazard Update provided illustrative summaries of key findings for sections of coastline, as reproduced for the Byron Bay Embayment in Figure G-10 and for Brunswick Heads to South Golden Beach in Figure G-11 below.

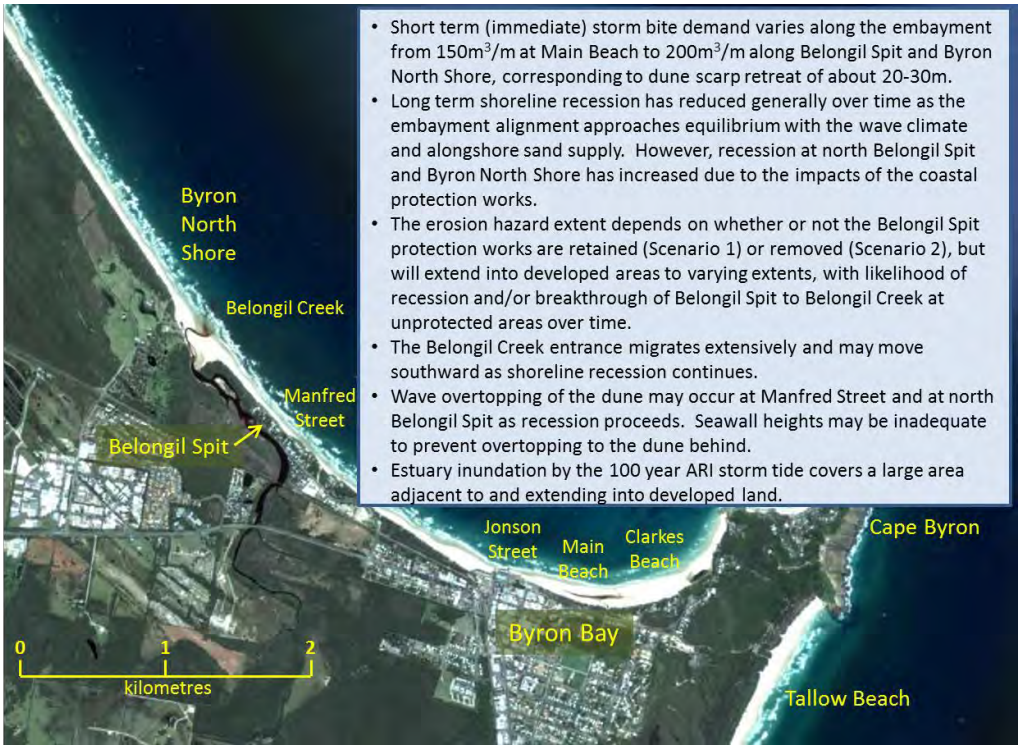

Figure G-10 Byron Bay Embayment Coastline Hazards

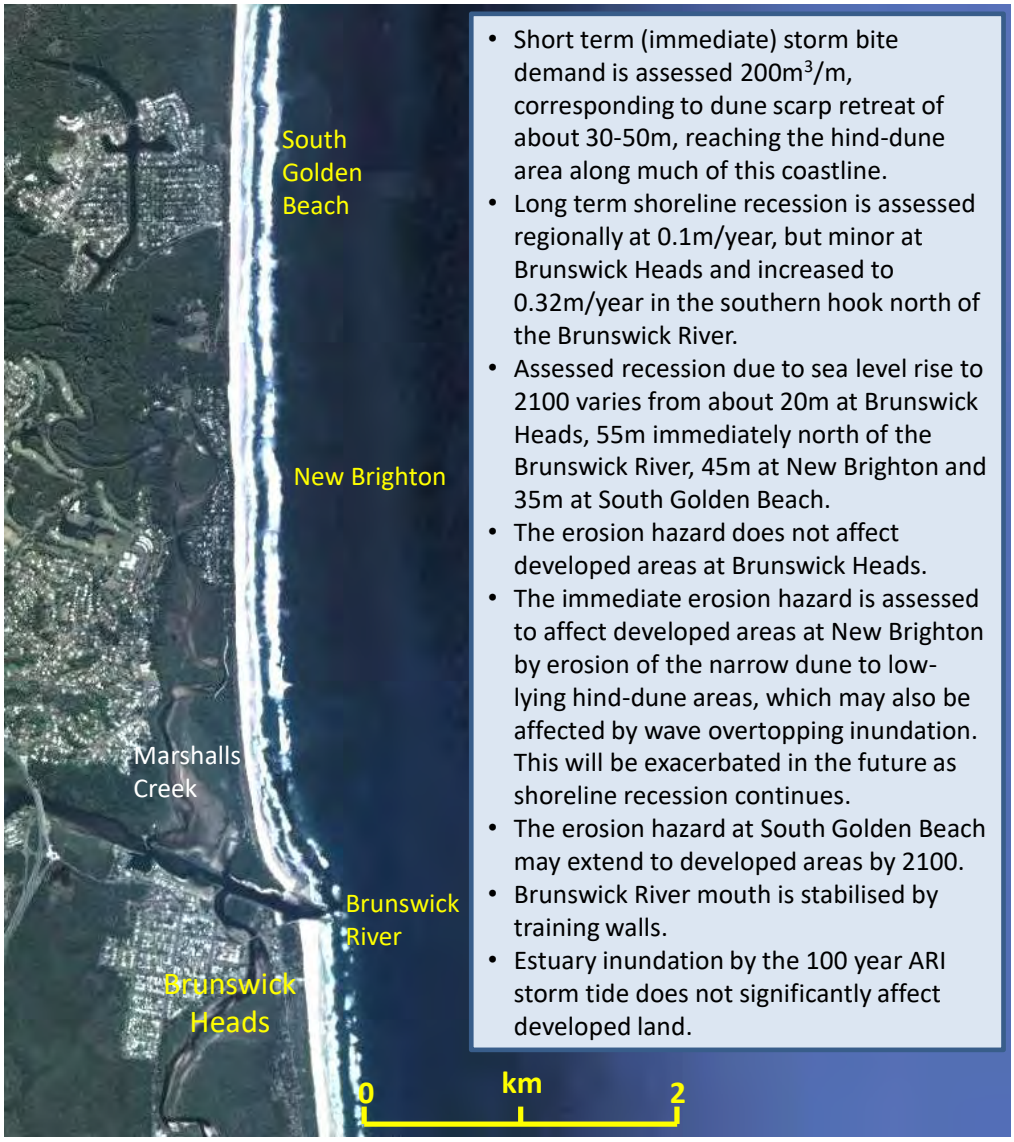

Figure G-11 Brunswick Heads to South Golden Beach Coastline Hazards

G.1.10 Cited References in this Technical Appendix

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Appendix H Summary of NPWS Reserves in the CMP Study Area

Billinudgel Nature Reserve (NR)

Coastal Landscapes including barrier dunes and floodplain. There has been historical draining of floodplain wetlands. The reserve POM seeks to address this issue and improve water regimes for wetlands.

There are over 170 species of fauna recorded in the reserve. There are over 30 species of threatened fauna associated with the reserve including the following; Wallum froglet, Loggerhead turtle, Green turtle, Magpie goose, Flesh footed shearwater, Black-necked stork, Black bitten, White-bellied sea eagle, Square tailed kite, Eastern osprey, Sooty oystercatcher, Pied oystercatcher, Comb-crested Jacana, Little Tern, Mangrove Honey eater, White eared monarch, Spotted-tailed quoll, Common planigale, Koala, numerous species of bat.

There are approximately 450 flora species recorded in the reserve and several endangered ecological communities are present including Floodplain swamp communities and Littoral rainforest.

There are numerous Aboriginal sites in the Reserve including a ceremonial double bora ring and numerous middens occur in local sand dunes. The “Old Dune” is understood to be a central point to Aboriginal use and occupation of the area.

Significant areas of CM SEPP wetland and small but significant Littoral rainforest areas.

There are few built assets within the reserve. The main assets are tracks/roads including the Billinudgel Coast Track that runs parallel to the beach.

Marshalls Creek Nature Reserve (NR)

Over 25 threatened fauna occur in proximity to the reserve including: Loggerhead turtle, Green turtle, Magpie Goose, Black- necked Stork, Black bittern, White-bellied sea-eagle, Eastern osprey, Beach stone-curlew, Pied oystercatcher, Sooty oystercatcher, Black-winged petrel, Greater sand-plover, Great knot, White tern, Sooty tern, Little tern, Collared kingfisher, Mangrove honeyeater, White-eared monarch, Koala, numerous bat and flying-fox species.

There are over 15 threatened flora in proximity to the reserve including: Davidson's plum, White lace Flower, Stinking cryptocarya, Green-leaved rose Walnut, Scrub turpentine, Native guava, Red lilly pilly, Durobby, Hairy jointgrass, White yiel yiel, Rough-shelled bush nut, Spiny gardenia, Scented Acronychia, Yellow satinheart, Harnieria hygrophiloides, Slender marsdenia, Marblewood.

Significant areas of CM SEPP wetland and small but significant Littoral rainforest areas.

There are few built assets in this reserve.

Brunswick Heads & Tyagarah Nature Reserve (NR)

These two reserves are included in the Byron Coast Group of Nature Reserves plan of management along with Broken Head NR (out of scope).

These reserves incorporate Littoral rainforest, wet and dry heath, eucalypt forest and woodlands and freshwater and estuarine wetlands including mangroves and salt marsh.

Weeds, pests and fire threats are management concerns as are the provision and management of access and the protection of cultural heritage.

There are significant Aboriginal sites within these reserves including middens, ceremonial and mythical sites

There are over 25 threatened species found in and in proximity to the eastern section of Brunswick NR including Loggerhead turtle, Green turtle, Magpie goose, Flesh-footed shearwater, Black-winged petrel, Black-necked stork, White-bellied sea-eagle, Eastern osprey, Bush stone-curlew, Beach stone-curlew, Sooty oystercatcher, Pied oystercatcher, Greater sand-plover, Great knot, White tern, Sooty tern, Little tern, Collared kingfisher, Mangrove honeyeater, White-eared monarch, Koala, Grey-headed flying-fox, Common blossom-bat, Eastern long-eared bat and Little bent-winged bat.

There are 13 threatened flora species in the eastern section of Brunswick NR including Harnieria hygrophiloides, Marblewood, White lace flower, Queensland xylosma, Stinking cryptocarya, Green-leaved rose walnut, Red lilly pilly, Durobby, Brown fairy-chain orchid, White yiel yiel, Rough-shelled bush nut, Spiny gardenia, Scented acronychia

There are over 25 threatened fauna associated with Tyagarah NR including: Wallum froglet, Green and golden bell frog, Olongburra frog, Black-necked Stork, Black bittern, White-bellied sea-eagle, Eastern osprey, Pale-vented bush-hen, Bush stone-curlew, Sooty oystercatcher, Pied oystercatcher, Comb-crested jacana, Curlew sandpiper, Glossy black-cockatoo, Little tern, Collared kingfisher, Koala, Long-nosed potoroo, Mitchell's rainforest snail and several species of bat.

There are 6 threatened flora species recorded in Tyagarah NR reserve including: Corokia, Marblewood, Stinking cryptocarya, Green-leaved rose walnut, Arrow-head vine, Red lilly pilly.

There are extensive CM SEPP wetlands and coastal heath.

Cumbebin Swamp Nature Reserve (NR)

A small area of beach and adjoining vegetation in the reserve is included in the study area at Belongil Beach. Vegetation within the study area includes banksia woodlands, regenerating Littoral rainforest and grasslands.

Threatened fauna in and in proximity to the study area within the reserve include: White-bellied sea eagle, Eastern osprey, Sooty oystercatcher, Pied oystercatcher, Little tern, Beach-stone curlew, bush stone-curlew, , Grey-headed flying-fox, Common blossom-bat, Little bent-winged bat. Birds protected under international migratory bird agreements also occur.

The Reserve is crucial habitat for the Mitchell Rainforest Snail, found in remnant vegetation on the coastal plain between the Richmond River and Tweed River on the NSW north coast.

The reserve’s beaches are popular with tourists.

There are no built assets in the reserve.

Arakwal National Park (NP)

Arakwal NP (the Park) is the first national park in Australia to be created under an Indigenous Land Use Agreement (ILUA) with the traditional owners, the Byron Bay Arakwal people in joint management with the NPWS. The Arakwal people have been engaged in coastal management for approximately 22,000 years. The park is an important part of country to the Aboriginal community.

The reserve protects extensive areas of coastal heath and woodlands and includes CM SEPP wetlands.

The Wallum banksia heath – Byron Bay dwarf graminoid clay heath is an endangered ecological community in the reserve.

Threatened fauna in and in proximity to the reserve include: Wallum froglet, Olongburra frog, Loggerhead turtle, Green turtle, Red-tailed tropicbird, Wompoo fruit-dove, White-bellied sea eagle, Eastern osprey, Pale-vented bush-hen, Sooty oystercatcher, Pied oystercatcher, Comb-crested Jacana, White tern, Sooty tern, Spotted-tailed quoll, Koala, Grey-headed flying-fox, Common blossom-bat, Eastern long-eared bat, New Zealand fur-seal, Australian Fur-seal, Humpback whale, Little bent-winged bat.

Threatened flora in and in proximity to the reserve include: Dwarf heath casuarina, White lace flower, Queensland xylosma, Stinking cryptocarya, Native guava, Byron Bay diuris, Pink nodding orchid, Dark greenhood, Basket fern, Scented acronychia.

The reserve provides walking tracks, a lookout and beach accesses for visitors.

Cape Byron State Conservation Area (SCA)

The study area for the scoping study incorporates all the reserve's beaches (excluding Tallow Beach) and a band of adjoining land and vegetation. The reserve is very popular with tourists and the study area incorporates tourist accommodation, a boat ramp, a lookout, day use areas, beach access tracks and parts of the Cape Byron walking track. The Cape Byron Lighthouse occurs within the reserve, outside of the study area.

Vegetation of the study area includes grasslands, shrublands, dry and wet sclerophyll woodlands and forests and littoral rainforest. Threatened flora in and in proximity to the study area includes: Dwarf heath casuarina, Queensland xylosma, Stinking cryptocarya, Native guava, Pink nodding orchid and Scented acronychia.

Threatened fauna in and in proximity to the study area within the reserve includes: Loggerhead turtle, Green turtle, White-eared monarch, Wompoo fruit-dove, White-bellied sea eagle, Eastern osprey, Sooty oystercatcher, Pied oystercatcher, Koala, Grey-headed flying-fox, Common blossom-bat, New Zealand fur-seal, Australian Fur-seal, Humpback whale, Little bent-winged bat.

Small but significant CM Littoral rainforest areas.

The reserve includes places of cultural significance to the Aboriginal community, including middens.

Reserve Plans of Management (POM) can be accessed here: https://www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-management/plans-of-management

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