



Coastal Management Program Scoping Study (Stage 1) for the Southern Byron Shire Coastline and Belongil Estuary

Final Scoping Study (Stage 1)

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This Scoping Study is Stage 1 of a larger program and final outcomes of the overall program will be produced in fully accessible format.

If you have trouble accessing any information provided in this document, or for more information or alternatives (read alternate text of figures, etc.), please speak with Council's Coast and Estuary staff on (02) 6626 7000.

Acknowledgements

Acknowledgement of Country

In preparation of this document, Council acknowledges the Bundjalung of Byron Bay – Arakwal people are the Traditional Custodians of the land in Byron Shire, and form part of the wider Aboriginal nation known as the Bundjalung.

Byron Shire Council and the Traditional Custodians acknowledge the Tweed Byron Local Aboriginal Land Council and the Jali Local Aboriginal Land Council under the *Aboriginal Land Rights Act 1983*.

Council also acknowledges all Aboriginal and Torres Strait Islander people who now reside within the Shire and their continuing connection to country and culture.

Acknowledgment of Financial Assistance

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

Executive Summary

Planning for the Byron Shire coastal zone has started under the NSW Government's coastal management framework. This involves the preparation of a Coastal Management Program(s) (CMPs).

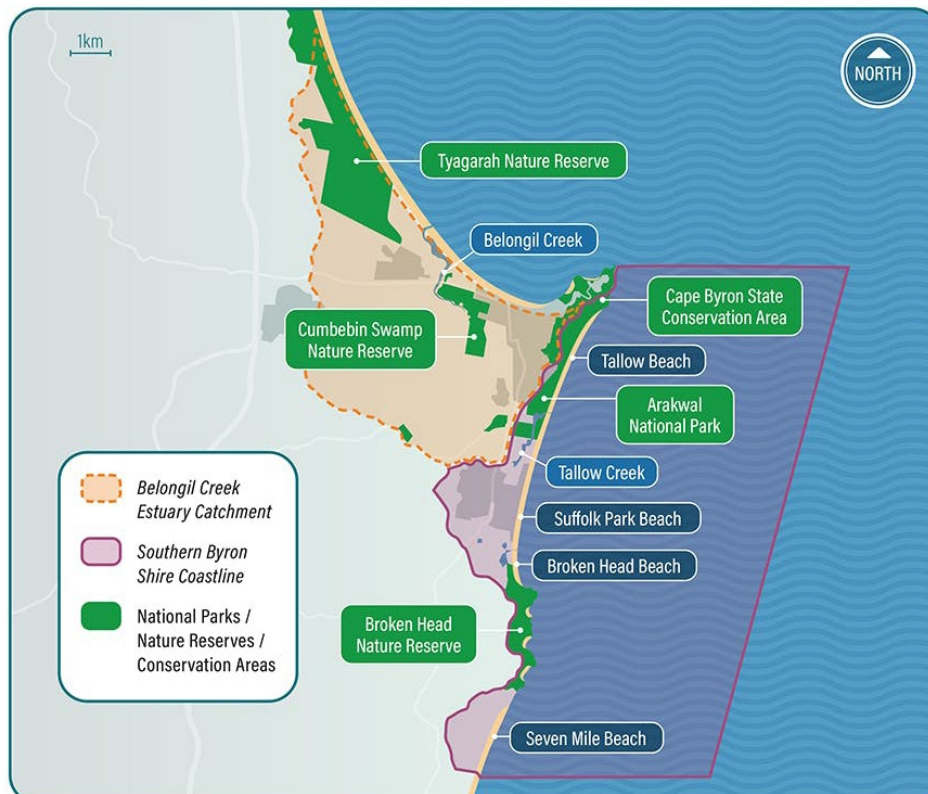
A CMP is a plan of action for Council, public authorities and land managers responsible for management of the coastal zone to:

- Address coastal hazard risks
- Preserve habitats and cultural uses
- Encourage sustainable agricultural, economic and built development in the coastal zone
- Maintain or improve recreational amenity and resilience
- Adapt to emerging issues such as population growth and climate change.

A CMP is prepared in five stages:

- Stage 1: Identify the scope of a CMP
- Stage 2: Determine risks, vulnerabilities and opportunities
- Stage 3: Identify and evaluate options
- Stage 4: Finalise, exhibit, certify and adopt the CMP (including integration of actions into Council Integrated Planning and Reporting (IP&R) Framework)
- Stage 5: Implementation monitoring and reporting.

This document completes Stage 1 for the southern Byron Shire coastline from Cape Byron to the southern boundary of the Shire at Seven Mile Beach and including the Belongil Creek estuary (see Study Area Map below). Further information on the study area can be found in Section 1.2.



Coastal Management Purpose, Vision and Context

The purpose of the CMP, as defined in the *Coastal Management Act 2016*, is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objectives of the *Coastal Management Act 2016*.

A CMP will provide a strategic and collaborative approach for relevant land managers to implement a range of credible, evidence-based actions to address current and future risks, not only from coastal hazards, but for a broad range of community, stakeholder, economic, climate change, catchment processes and environmental issues and values. Certification of a CMP would allow Council to access significant State Government funding to implement coastal management actions on a prioritised basis for the coastline, estuaries and catchments of the study area.

The vision established for coastal management of the Southern Byron Shire Coastline and the Belongil Creek estuary is:






The Byron Shire's coast is resilient and adaptive to ensure it retains its iconic natural, conservation and cultural values now and into the future. These values underpin the coast's Aboriginal cultural heritage, ecological function, amenity, recreational use, local and tourism uses, and they are kept central in the development of future management approaches.

Coastal management addresses existing and emerging threats to the status quo and seeks to manage conflicts in coastal uses, values, and natural processes. Coastal management is flexible, adaptive and innovative.

Supporting the vision are a series of coastal management objectives which have been developed to align with those in the *Coastal Management Act 2016*, as further detailed in Section 2.3.

The strategic context for coastal management in the Southern Byron Shire Coastline and Belongil Creek catchment study area has been defined in Section 3 of this scoping study to set the environmental, social/cultural, economic and legal/planning context for coastal management.

A key outcome was understanding how the community value the coastal zone. A prioritised list of eleven key values was identified through the community consultation undertaken from 17 December 2020 to 1 February 2021, as shown in the table below. A discussion on coastal values is provided in Section 3.4 and Section 4.3.1.

Theme	Values
 Healthy environment	Value 1 – Natural, healthy character Value 2 – Biodiversity and ecosystem integrity
 Good water quality	Value 3 – Good water quality
 Aboriginal cultural heritage and use	Value 4 – Aboriginal cultural heritage and use
 Recreational values	Value 5 – Accessibility and safety Value 6 – Amenity and recreation Value 7 – Socialisation and participation Value 8 – Education / scientific
 Economic values	Value 9 – Tourism Value 10 – Fishing (commercial, recreational and cultural) Value 11 – Agricultural, industrial and urban lands

Threats to the Coastal Zone

Threats to the coastal zone (refer Section 4.3.2) have been considered across a range of planning timeframes and pathways from now to 20, 50, 100 years and beyond, where appropriate.

A first-pass risk assessment process was applied to better understand the severity of known threats in the study area, at present and in the future. The level of risk associated with each threat over a 100 year timeframe is shown below. More detailed information on the risk assessment process and outcomes is provided in Section 7.

Risk Rating (+100 years)	Threat
	Coastal Hazards
Extreme	Coastal inundation Tidal inundation Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters
High	Beach erosion Shoreline recession Coastal watercourse entrance variability Coastal watercourse entrance modifications

Risk Rating (+100 years)	Threat <i>Coastal Hazards</i>
	Dune slope instability
Medium	Coastal cliff instability
<i>Recreational Activities</i>	
High	<p>Conflict over resource access and use</p> <p>Habitat (physical) and wildlife disturbance</p> <p>Poorly located, poorly maintained and/or inappropriate access and supporting facilities</p> <p>Anti-social behaviour and unsafe practices</p> <p>Active recreational use</p>
Medium	Passive recreational use
<i>Coastal Development</i>	
Extreme	<p>Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)</p> <p>Water pollution from urban stormwater and treated effluent discharge</p>
High	<p>Water pollution from agricultural diffuse source runoff</p> <p>Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics</p> <p>Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLs</p>
<i>Engagement, Governance and Compliance</i>	
High	<p>Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)</p> <p>Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment</p> <p>Insufficient or inappropriate governance and management of the coastal environment</p> <p>Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment</p>

Existing Management Arrangements, Roles and Responsibilities

Federal, State and Local level organisations are involved in governing the coastal zone with their governance role largely tied to land tenure (refer Section 5.1 for further detail). The study area comprises a mixture of land tenure and land management arrangements including private freehold land, Council public land (community and operational land), Crown (unreserved), Crown land that is reserved or dedicated (called Crown Reserves and Crown Dedications), state conservation areas / national parks / nature reserves / Aboriginal Areas, marine park, road reserve, and railway lands. Key agencies involved in the CMP process include:

- Byron Shire Council
- Department of Planning, Industry and Environment – Environment, Energy and Science
- Department of Planning, Industry and Environment – Crown Lands
- National Parks and Wildlife Service
- Heritage NSW
- NSW Department of Primary Industries - Fisheries (including Marine Parks).

Large parts of the study area are also owned, managed and/or under Native Title. Key Aboriginal organisations involved in land management include the Bundjalung of Byron Bay Aboriginal Corporation (BOBBAC) (Arakwal) RNTC and Jali Local Aboriginal Land Council (Jali LALC).

A variety of coastal and catchment management arrangements are currently in place including State Government (e.g. CM SEPP) and Council coastal planning controls (Local Environmental Plans and Development Control Plans); a draft Emergency Action Sub-Plan, entrance management arrangements for Tallow Creek and Belongil Creek, and a variety of management plans that have been prepared by Council, public authorities and other major land holders in response to management issues. A review of these management arrangements is provided in Sections 5.2 and 5.3.

Best practice management of the coastal zone currently aims towards a connected catchment-to-coast approach. This is particularly relevant for estuaries such as Belongil and Tallow Creek which, due to the natural tendency for the entrance bar to periodically close, are more susceptible to catchment inputs during their “closed” state. This Scoping Study considers the threats and inputs from the broader Belongil Creek and Tallow Creek catchments in managing the coastal zone.

Forward Plan

To address the threats identified as high or extreme risk, a range of coastal management measures will be identified and assessed as part of Stage 3 of the CMP. However, before management measures can be developed, several additional studies are required to better understand the vulnerabilities of the coastal zone to the key threats identified.

A forward plan, supported by a business case, has been developed that identifies the program of works required through Stages 2 to 4 of the CMP, provided in the table below. Detailed information on the business case can be found in Section 8 and **Appendix H** whilst Section 9 provides further detail on the forward plan.

The total cost of preparing the CMP is estimated to be between \$187,000 and \$365,000, with the next stage (Stage 2) of the CMP expected to cost between \$62,000 and \$130,000. The range provides for uncertainty in the costs of certain activities as recommended in the forward program. As the lead agency, Council has the ability to apply for a variety of grants to assist with the cost of implementation. All actions recommended in the forward plan to complete the CMP are eligible for funding from state government at a ratio of 2:1, i.e. Council is only required to provide one third of the costs to complete the CMP.

Recommended Studies and Actions		Estimate Cost Range
Stage 2	Coastal Hazard Assessment (2021)	Already funded
	Consider mapping of erosion escarpment as an outcome of Coastal Hazard Assessment (2021)	\$10,000 - \$20,000
	Coastal planning framework audit and consideration of coastal vulnerability area mapping	\$10,000 - \$20,000
	Verification of Littoral Rainforest and Coastal Wetlands Mapping	\$5,000 - \$10,000
	Identify water pollution sources	\$5,000 - \$10,000
	Preliminary Aboriginal cultural heritage and values mapping	\$10,000 - \$15,000
	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A	\$5,000 - \$10,000
	Activities involving engagement of Aboriginal cultural knowledge holders	\$5,000 - \$10,000
	Integrated hydrodynamic and water quality model for Tallow Creek	Already funded
	Review and update Tallow Estuary entrance opening strategy	\$10,000 - \$30,000
	Review and update Belongil Estuary entrance opening strategy	\$2,000 - \$5,000
Stage 3	Develop draft coastal management planning controls	\$10,000 - \$20,000
	Identify and assess coastal management measures	\$30,000 - \$60,000
	Prepare a business plan	\$15,000 - \$30,000
	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A	\$5,000 - \$10,000
	Activities involving engagement of Aboriginal cultural knowledge holders	\$5,000 - \$10,000
Stage 4	Prepare Draft CMP	\$30,000 - \$40,000
	Planning Proposal (only as required) to adopt the coastal vulnerability mapping as a "Coastal Vulnerability Area" of the coastal zone in the <i>Coastal Management SEPP</i>	\$10,000 - \$20,000
	Finalise CMP	\$10,000 - \$20,000
	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A	\$5,000 - \$15,000
	Activities involving engagement of Aboriginal cultural knowledge holders	\$5,000 - \$10,000

Stakeholder and Community Engagement

A range of stakeholder and community engagement activities have been undertaken to assist in the preparation of the Scoping Study and to develop a robust Community and Stakeholder Engagement Strategy for the future stages of the CMP.

Engagement activities undertaken as part of this Scoping Study are further detailed in Section 1.4 and include:

- Community survey to identify values and management issues associated with the study area
- Agency workshops to assist in scoping the CMP and undertaking a first pass risk assessment
- Meeting with Aboriginal cultural representatives on Country to scope the CMP, understand cultural values, management issues and set objectives for coastal management within the context of Aboriginal cultural and existing community connections.

A Community and Stakeholder Engagement Strategy has been developed for this CMP Scoping Study and is provided in Appendix A. The strategy outlines:

- Which individuals and organisations should be involved in the review, preparation and implementation of the CMP
- How and when they may be offered engagement opportunities
- How their input may be incorporated into the planning process.

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Appendices

Appendix A Community and Stakeholder Engagement Strategy

Appendix B Community Survey Results

Appendix C Aboriginal Engagement Outcomes

Appendix D Data Compendium

Appendix E Coastal Processes Report

Appendix F Review of Draft Coastal Zone Management Plan (BSC, 2010) and Belongil Estuary Study and Management Plan (Parker and Pont, 2001)

Appendix G First Pass Risk Assessment Methodology and Outcomes

Appendix H Preliminary Business Case

Acronyms and Abbreviations

Acronym/Abbreviation	Full text
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ASS	Acid Sulfate Soils
BBIWMR	Byron Bay Integrated Water Management Reserve
BBURWS	Byron Bay Urban Recycled Water Scheme
BOBBAC	Bundjalung of Byron Bay Aboriginal Corporation (Arakwal)
BSC	Byron Shire Council
BVL	Brunswick Valley Landcare
CAP	Catchment Action Plan
CBMP	Cape Byron Marine Park
CM Act	NSW <i>Coastal Management Act 2016</i>
CMA	Catchment Management Authority
CMP	Coastal Management Program
CM SEPP	NSW <i>State Environmental Planning Policy (Coastal Management) 2018</i>
CZMP	Coastal Zone Management Plan
DCP	Development Control Plan
DEC	Former NSW Department of Environment and Conservation
DO	Dissolved Oxygen
DPE	Former NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
EAC	East Australian Current
EEC	Endangered Ecological Community
EMP	Estuary Management Plan
EPA	NSW Environment Protection Authority
EPI	Environmental Planning Instrument

Ha	Hectares
HEV	High Environmental Value
ICAM	Incident Cause Analysis Method
ICOLLs	Intermittently Closed and Open Lakes and Lagoons
IPR	Integrated Planning and Reporting
km ²	Square kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
m ²	Square metres
m ³	Cubic metres
m/s	Metres per second
m ³ /s	Cubic metres per second
MEMA	NSW Marine Estate Management Authority
NPWS	NSW National Parks and Wildlife Service
NRAR	NSW Natural Resources Access Regulator
NSW	New South Wales
OEH	Former NSW Office of Environment and Heritage
PoM	Plan of Management
RDA	Regional Development Australia
RFS	NSW Rural Fire Service
RMS	Former NSW Roads and Maritime Services
SCU	Southern Cross University
SEPP	State Environmental Planning Policy
STP	Sewage Treatment Plant
TARA	New South Wales Marine Estate Threat and Risk Assessment Report
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
WRL	Water Research Laboratory

Glossary*

Term	Definition
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average recurrence interval (ARI)	The average time between which a threshold is reached or exceeded (e.g. large wave height or high water level) of a given value. Also known as Return Period.
Benchmarks	A standard by which something can be measured or judged. For example, predicted amounts of sea level rise to incorporate into planning considerations.
Cadastre, cadastral base	Information in map or digital form showing the extent and usage of land, including streets, lot boundaries, water courses etc.
Catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
Climate change	A process that occurs naturally in response to long-term variables, but often used to describe a change of climate that is directly attributable to human activity that alters the global atmosphere, increasing change beyond natural variability and trends.
Crest level	The level in metres Australian Height Datum (mAHD) of the top of a particular foreshore type.
Coast	A strip of land of variable width that extends from the shoreline inland to the first significant landform that is not influenced by coastal processes (such as waves, tides and associated currents).
Coastal hazard	Coastal hazards, as defined by the CM Act, include beach erosion, shoreline recession, coastal lake or watercourse entrance instability, coastal inundation, coastal cliff or slope instability, tidal inundation, and erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.
Coastal inundation	Coastal inundation occurs when a combination of marine and atmospheric processes raises the water level at the coast above normal elevations, causing land that is usually 'dry' to become inundated by sea water. Alternatively, the elevated water level may result in wave run-up and overtopping of natural or built shoreline structures (e.g. dunes, seawalls). In the case of an estuary, coastal inundation may be caused by a combination of processes including high tides, storm surge and wave run-up onto the foreshore.
Coastal processes	Coastal processes are the set of mechanisms that operate at the land-water interface. These processes incorporate sediment transport and are governed by factors such as tide, wave and wind energy.

Term	Definition
Coastal Zone	<p>The coastal zone, as defined by the CM Act, means the area of land comprised of the following coastal management areas:</p> <ul style="list-style-type: none"> (a) the coastal wetlands and littoral rainforests area, (b) the coastal vulnerability area, (c) the coastal environment area, (d) the coastal use area.
Design storm event	A significant event to be considered in the planning process.
Development	<p>As defined in the <i>Environmental Planning and Assessment Act 1979</i>.</p> <p>New development refers to development of a completely different nature to that associated with the former land use, e.g. the urban subdivision of an area previously used for rural purposes. New developments involve re-zoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power.</p> <p>Infill development refers to the development of vacant blocks of land that are generally surrounded by already developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development.</p> <p>Redevelopment refers to rebuilding in an area, e.g., as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either re-zoning or major extensions to urban services.</p>
Environmental Planning Instrument	<p>Environmental Planning Instruments is the collective name for Local Environmental Plans (LEPs), State Environmental Planning Policies (SEPPs), and Regional Environmental Plans (REPs). The <i>Environmental Planning and Assessment Act 1979</i> and the <i>Environmental Planning and Assessment Regulation 2000</i> are also included in this classification.</p>
Estuary	The CM Act defines an estuary as any part of a river, lake, lagoon, or coastal creek whose level is periodically or intermittently affected by coastal tides, up to the highest astronomical tide.
Extreme Ocean Water Level	The highest elevation reached by the sea/ocean as recorded by a tide gauge during a given period (after MHL, 2018).
Extreme Storm Event	Storm for which characteristics (wave height, period, water level etc.) were derived by statistical 'extreme value' analysis. Typically, these are storms with average recurrence intervals (ARI) ranging from one to 100 years.

Term	Definition
Foreshore	The part of the shore, lying between the crest of the seaward berm (or upper limit of wave wash at high tide) and the ordinary low water mark, that is ordinarily traversed by the uprush and backrush of the waves as the tides rise and fall; or the beach face, the portion of the shore extending from the low water line up to the limit of wave uprush at high tide. The CM Act defines the foreshore as ‘the area of land between highest astronomical tide and the lowest astronomical tide’.
Foreshore Crest/Edge	Generally, the landward limit of the foreshore. In some cases, it may be located higher than the upper limit of wave wash at high tide.
Foreshore type	The nature of the foreshore at any given location, e.g. retaining wall, sandy beach, rocky foreshore.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas, including inundation as a result of sea/ocean storms and other coastal processes or catchment flows.
Flood risk	<p>Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk is divided into three types, existing, future and continuing risks as described below:</p> <p>Existing flood risk is the risk a community is exposed to as a result of its location on the floodplain.</p> <p>Future flood risk is the risk a community may be exposed to as a result of new development on the floodplain.</p> <p>Residual flood risk is the risk a community is exposed to after floodplain risk management measures have been implemented.</p>
Geographical information system (GIS)	A system of software and procedures designed to support the management, manipulation, analysis and display of spatially referenced data.
High Tide	The maximum height reached by a rising tide. The high water is due to the periodic tidal forces and the effects of meteorological, hydrologic, and/or oceanographic conditions.
Highest astronomical tide (HAT)	<p>The highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions. In Australia HAT is calculated as the highest level from tide predictions over the tidal datum epoch (TDE), this is currently set to 1992 to 2011.</p> <p>The HAT and the Lowest Astronomical Tide (LAT) levels will not be reached every year. LAT and HAT are not the extreme water levels which can be reached, as storm surges may cause considerably higher and lower levels to occur.</p>
Longshore gradients	A flux in the rates of sediment transport which are a result of difference in longshore currents from the influence of natural immobile features, man-made structures and differences in wave climate.

Term	Definition
Mean high water mark (MHWM)	The line of the medium high tide between the highest tide each lunar month (the springs) and the lowest tide each lunar month (the neap) averaged over out over the year. In NSW, the methods for determining the position of the MHWM are outlined in the <i>Crown Directions to Surveyors - No. 6 Water as a Boundary</i> .
Mean High Water Springs (MHWS)	The MHWS is the highest level which spring tides reach on the average over a period of time (usually several years).
Mean Low Water Springs (MLWS)	The MLWS is the lowest level which spring tides reach on the average over a time period (usually several years).
Mean Sea Level (MSL)	MSL is a measure of the average height of the sea or ocean's surface such as the halfway point between the mean high tide and the mean low tide. At present, mean sea level is approximately equivalent to 0 mAHD (reported as 0.03 mAHD in MHL, 2019).
Plan of Management	<p>Plan of Management (PoM) means different things depending on the land type and land management arrangements. All PoMs must consider Aboriginal heritage and land rights and native title interests and be consistent with both the <i>Native Title Act 1993</i> (Cth) and <i>Aboriginal Land Rights Act 1983</i> (NSW).</p> <p>Some, but not all, non-Council managed Crown land and water will have a Plan of Management (PoM) adopted by the Minister administering the <i>Crown Land Management Act 2016</i> (CLM Act). Those PoMs can define the value, use, management practices and intent for the broad public purpose for which the land has been reserved or dedicated.</p> <p>A PoM is required for Crown reserves managed by Council that have been classified as 'community land'. Those PoMs define the value, use, development and authorised tenures for the land and are prepared under both the CLM Act and the <i>Local Government Act 1993</i>.</p> <p>Land reserved under the <i>National Parks and Wildlife Act 1974</i> (NPW Act) also requires a PoM (i.e. national park, state conservation area, nature reserve, Aboriginal area, etc). Those PoMs developed and maintained in accordance with the NPW Act guide how the land will be sustainably managed. PoMs contain information about the natural environment, Aboriginal heritage, history, and recreational opportunities of the reserved land.</p>
Probability	A statistical measure of the expected frequency or occurrence of flooding.
Risk	The chance of something happening that will have an impact on objectives, usually measured in terms of a combination of the consequences of an event and likelihood of occurrence.
Sea	Tasman Sea, to the east of Byron Shire.

Term	Definition
Sea level rise	A rise in the level of the sea surface that has occurred or is projected to occur in the future, as measured from a point in time. The rise can be reported as a global mean or as measured at a specific point or estimated for a specific part of the sea or ocean.
Shoreface	The zone between the mean low water mark and some distance beyond the breaker zone. The shoreface encompasses a zone in which littoral sand transport processes occur, i.e. longshore sand transport and cross-shore sand transport.
Shoreline	The intersection between the sea and the land. The line delineating the shoreline is often approximated as the Mean High Water Mark, however, the definition can vary depending on the application.
Storm surge	The increase in coastal water level caused by the effects of storms. Storm surge consists of two components – the increase in water level caused by the reduction in barometric pressure and the increase in water level caused by the action of wind blowing over the sea surface (wind set-up).
Storm tide	An abnormally high water level that occurs when a storm surge combines with a high astronomical tide. The storm tide must be accurately predicted to determine the extent of coastal inundation.
Tidal inundation	The inundation of land by tidal action under average meteorological conditions and the incursion of sea water onto low lying land that is not normally inundated, during a high sea level event such as a king tide or due to longer-term sea level rise. For planning controls, it is defined as the land that is inundated up to the level of Highest Astronomical Tide (HAT).
Wave run-up	The vertical distance above mean water level reached by the uprush of water from waves across a beach or up a structure.
Wave set-up	The rise in the water level above the still water level when a wave reaches the coast. It can be very important during storm events as it results in further increases in water level above the tide and surge levels.
Wind waves	Waves resulting from the action of the wind on the surface of the water.

*Many of the glossary terms here are derived or adapted from the *Coastal Management Glossary* (OEH, 2018d) and for consistency with Council's existing CMP Scoping Study also from BMT (2020).

1 Introduction

The Byron Shire coastal zone is comprised of approximately 35 km of open coast from south of Broken Head to South Golden Beach and a number of estuaries including Tallow Creek, Belongil Creek and the Brunswick River. Over 260 km² of coastal catchments drain to the estuaries and open coast.

The Byron Shire coastal zone has endured a long history of coastal storms and coastal erosion and has been identified as an area undergoing long-term coastal recession. Also, as a result of pressures from population growth, development and tourism, concerted effort has been and continues to be required to manage coastal hazards and the estuaries, maintain beach amenity, beach access, the natural environment, social and cultural values. Byron has an iconic coastal zone and high priority issues that require action. Coastal hazards, as defined in the New South Wales (NSW) *Coastal Management Act 2016* (CM Act), include beach erosion, shoreline recession, coastal lake or watercourse entrance instability, coastal inundation, coastal cliff or slope instability, tidal inundation, and erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

Byron Shire Council (Council) has a central role in managing the coastal zone of the local government area (LGA) under the provisions of the CM Act. In order to set out the management issues and how to manage them, Council is preparing a series of Coastal Management Programs (CMPs) under the guidance of the NSW Government to set out the long-term strategy for management of the coastal zone in this area. Council has already commenced preparation of CMPs for its coastal zone (**Figure 1-1**), with the CMP Scoping Study for the northern portion of the LGA, being Cape Byron to South Golden Beach, the first in Council's series of CMP steps now complete (BMT, 2020) and Stage 2 studies planned or in progress.

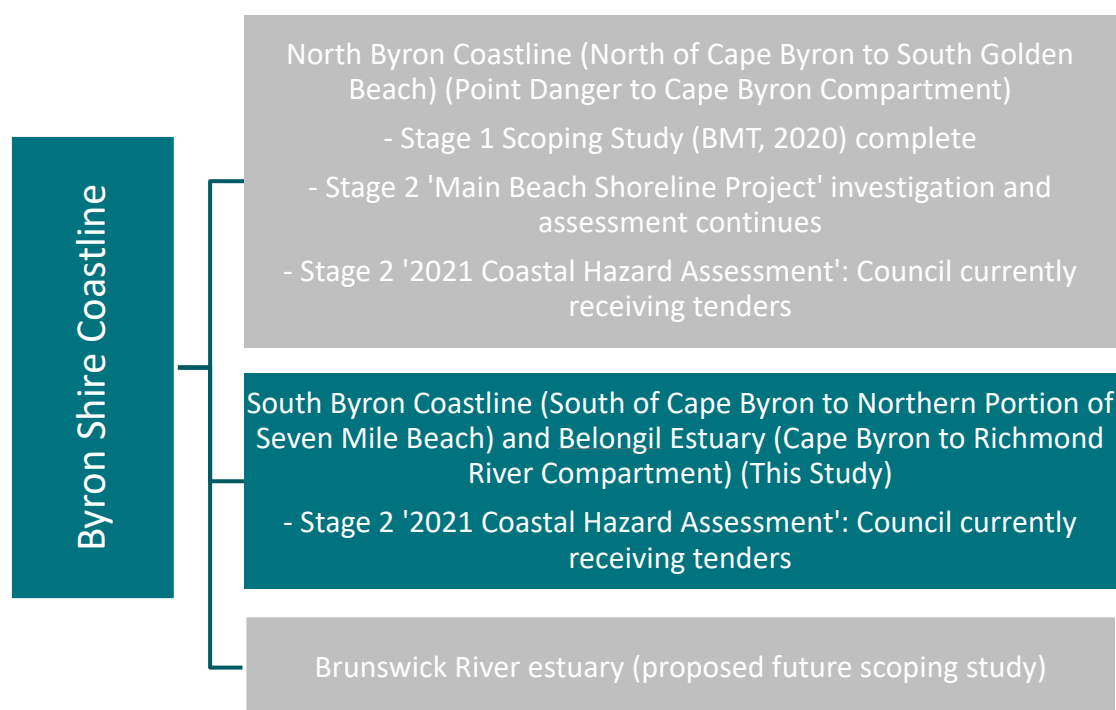


Figure 1-1 Byron Shire Council CMP Scoping Studies

This study forms the first stage of the next CMP Scoping Study in the series. Pending the outcome of this CMP Scoping Study, Council will consider whether to prepare a CMP for the entire coastal zone, or whether to prepare two or more CMPs for discrete areas of the coast.

1.1 Coastal Management in NSW

Local Councils in NSW are to undertake management of their coastal areas (including estuaries such as Tallow Creek and Belongil Creek) in accordance with the coastal management framework (**Figure 1-2**), underpinned by the CM Act and *State Environment Planning Policy (Coastal Management) 2018* (CM SEPP). To achieve this, Councils are required to develop CMPs. The NSW Coastal Management Manual (OEH, 2018) provides information and guidance to Councils in preparing their CMPs. There are a range of other legislation to be considered in the preparation of CMP, as discussed in **Section 3.3**



Figure 1-2 Coastal Management Framework (adapted from OEH, 2018a)

NSW Government provides a coastal management toolkit that contains information and guidance to help councils to manage the NSW coast and prepare coastal management programs. The toolkit provides information to help councils to meet the requirements of the CM Act, the CM SEPP and the NSW Coastal Management Manual (the CM Manual).

The CM Manual imposes mandatory requirements and provides guidance regarding the preparation, adoption, implementation, amendment, review and the contents of a CMP.

CMPs are intended to manage coastal issues, vulnerabilities and risks as well as help foster opportunities for coastal communities. A CMP is prepared in five stages, as shown in **Figure 1-3**.

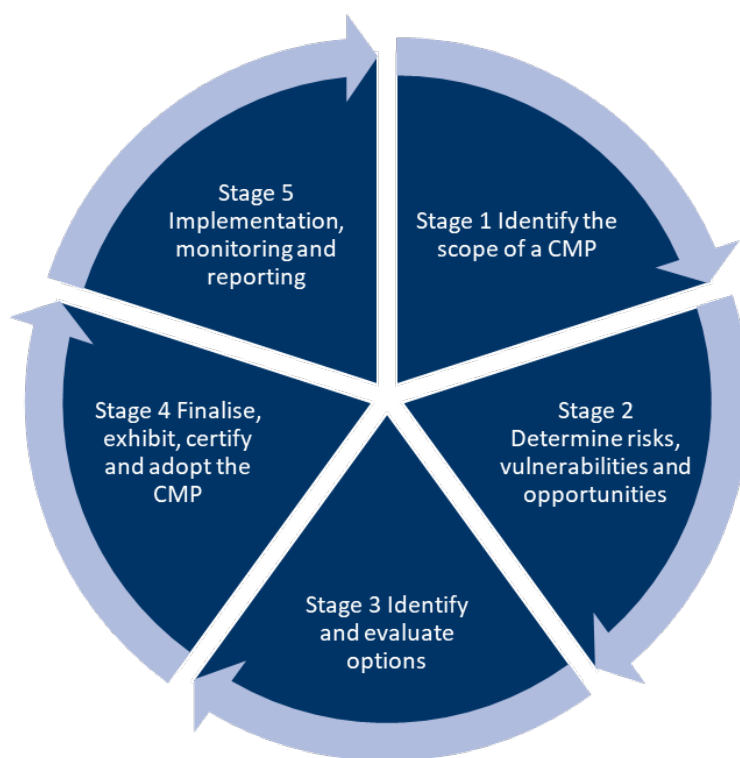


Figure 1-3 The five stages of a CMP (adapted from OEH, 2018a)

The area covered by a CMP may be at a regional scale (e.g. for issues in coastal environment areas or coastal use areas) or sediment compartment scale (for issues in coastal vulnerability areas), meaning that a CMP may need to be prepared in cooperation with adjoining Councils, to ensure that actions are undertaken at an appropriate scale to address the issues.

1.2 Study Area

As shown on **Map G001**, the study area for this CMP Scoping Study includes the southern Byron Shire coastal zone, from the local government boundary at Seven Mile Beach in the south, to Cape Byron in the north, encompassing Tallow Creek and Ti Tree Lake (also known as Taylors Lake) estuaries. This study area 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) and includes the full extent of the related estuary catchments, while the oceanic extent stretches to the NSW State limit of three nautical miles offshore, as shown on **Map G001**. The study area also includes the Belongil Creek estuary and its catchment, but not Belongil Beach, which has been included in the Coastal Management Program Scoping Study for Cape Byron to South Golden Beach (BMT, 2020).

The open coast portion of the study area is located within the secondary sediment compartment known as the *Cape Byron to Richmond River* compartment. The portion of the compartment to the south beyond the study area limit is located within the Ballina Shire Council local government area. The Belongil Estuary is located within the sediment compartment to the north of the *Cape Byron to Richmond River* compartment, being the *Point Danger to Cape Byron* compartment. The regional compartment context is shown in **Map G002**.

In addition to the coastal estuaries, key beaches in the study area (from south to north), include:

- Seven Mile Beach (northern portion, approximately 2.1 km of the total 8.4 km embayment, the southern portion being located within the Ballina Shire Council LGA)
- Whites Beach
- Brays Beach
- Kings Beach
- Broken Head Beach/Suffolk Park Beach/Tallow Beach embayment (a total embayment length of 7.3 km).

The key natural headlands within the study area are (from south to north):

- Jews Point
- Snapper Rock
- Broken Head
- Cape Byron.

It contains coastal features including:

- Brays Waterhole
- Cocked Hat Rocks (also known as the Three Sisters)
- Cape Byron.

1.3 Scoping Study Requirements and Report Structure

The required components of a Scoping Study as specified in the Coastal Management Manual Part B (OEH, 2018c) and their location in this report are outlined in **Figure 1-4** below.

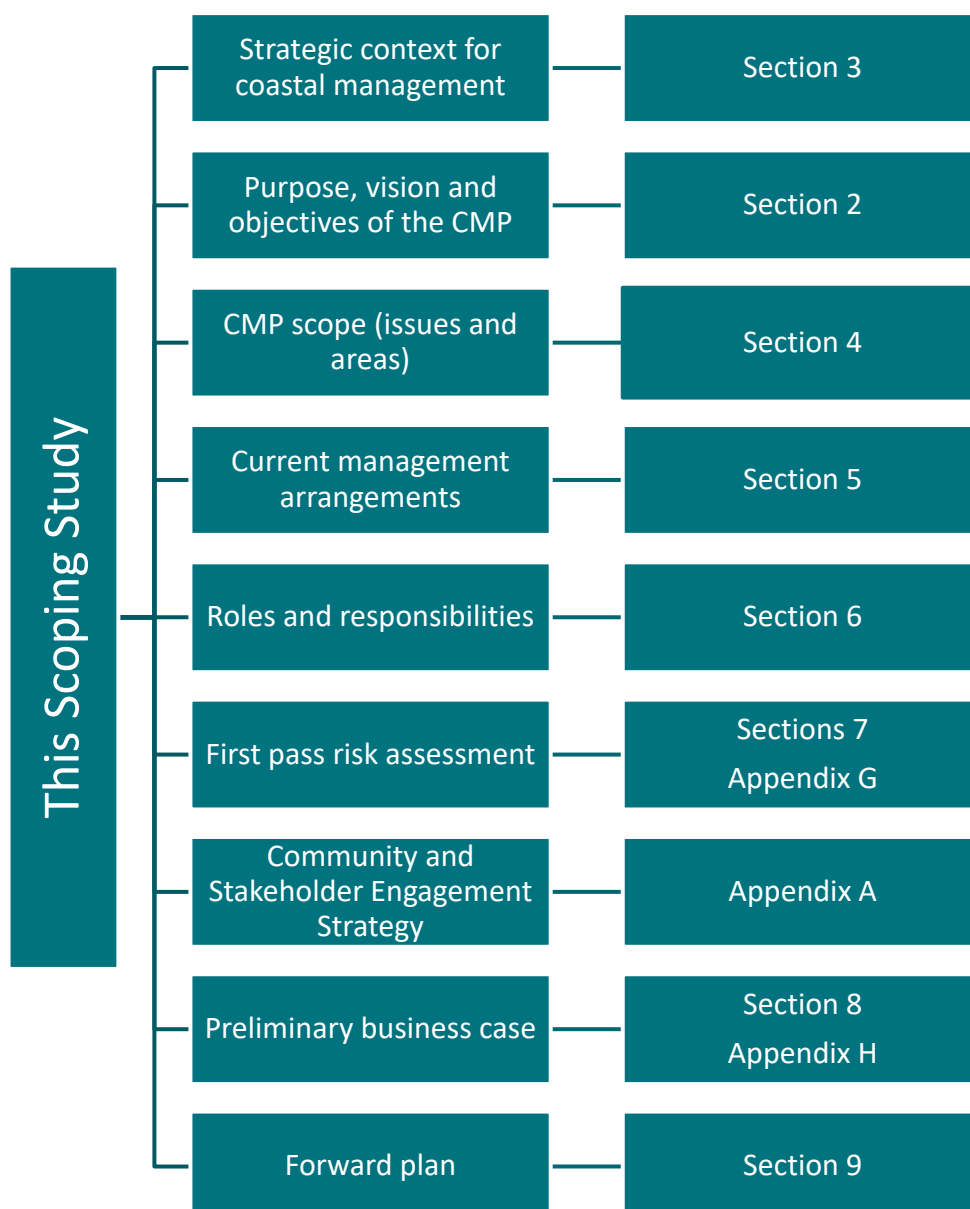


Figure 1-4 Components of CMP Scoping Study and structure of this report

1.4 Community and Stakeholder Engagement

A range of stakeholder and community engagement activities have been undertaken to assist in the preparation of the Scoping Study and to develop a robust Community and Stakeholder Engagement Strategy (**Section 6.3** and **Appendix A**) for the future stages of the CMP.

Engagement activities undertaken as part of this Scoping Study include:

- Community survey to identify values and management issues associated with the study area
- Agency workshops to assist in scoping the CMP, undertaking a first pass risk assessment, and gaining feedback on the Forward Plan and recommendations of the Scoping Study.
- Meeting with Aboriginal community representatives on Country to scope the CMP, understand cultural values, management issues and set objectives for coastal management within the context of Aboriginal cultural and existing community connections.
- Placing the draft Scoping Study on Council's website for public comment.

1.4.1 Community Survey

For this Scoping Study, community consultation was undertaken from 17 December 2020 to 1 February 2021, in the form of an online feedback survey hosted on Council's website. The survey was developed with Council and aimed to understand the community's environmental, cultural, recreational and economic values for the study area, and what the community considers are the threats, conflicts and management issues surrounding those values. In total 149 survey responses were received, predominantly from residents of Byron Shire and the surrounding LGAs. Results from this survey are provided in full in **Appendix B**.

1.4.2 Stakeholder Workshops

Stakeholder workshops were held on 28 October 2020 (Purpose, Vision and Objectives and CMP Scope Workshop) and 15 February 2021 (First Pass Risk Assessment Workshop). Details of these workshops are provided below, with outcomes of these two stakeholder workshops discussed in Sections 2 and Section 7, respectively.

1.4.2.1 Workshop 1

This agency workshop was held in October 2020 to provide input to the purpose, vision and objectives, as well as the scope of the CMP. Participants also provided input to the environmental, social and economic values of the study area and threats to the coastal zone of the study area.

Attendees to the workshop included some of the stakeholders involved in the management of the Byron coastal zone:

- Byron Shire Council staff from various departments: Utilities, Assets and Major Projects, Open Spaces, Social and Cultural Planning, Sustainable Development, Environmental and Economic Planning, Public and Environmental Services
- Coastal Estuary Catchment Panel (members of Council panel group)
- Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) Registered Native Title Prescribed Body Corporate (RNTBC) (referred to as 'BOBBAC')
- Department of Primary Industries – Fisheries (DPI – Fisheries)
- Department of Planning, Industry and Environment – Environment, Energy and Science (DPIE – EES)
- National Parks and Wildlife Service (NPWS).

The Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) is the Registered Native Title Prescribed Body Corporate for the Bundjalung of Byron Bay Arakwal People, established in 1996. An RNTBC has prescribed functions under the *Native Title Act 1993*.

Feedback at the workshop was used to revise relevant content in this CMP, such as the purpose, vision, objectives of the CMP, as discussed in **Section 2**.

1.4.2.2 Workshop 2

The First Pass Risk Assessment Workshop was held in February 2021 to provide input to the threats – known hotspots, current management arrangements and data, particularly where this may not have been identified through the data review, and to provide insight into the consequence and likelihood assigned to each threat.

Attendees to the workshop included some of the stakeholders involved in the management of the Byron coastal zone:

- Byron Shire Council staff from various departments: Utilities, Open Spaces, Social and Cultural Planning, Environmental and Economic Planning, Public and Environmental Services
- Coastal Estuary Catchment Panel
- BOBBAC (Arakwal)
- Heritage NSW
- DPI – Fisheries
- DPIE – EES
- NPWS.

Council also had a meeting with DPIE – Crown Lands representatives following the workshop to obtain their feedback.

Issues and questions raised at the workshop were investigated using the information gathered from the data and information review. These findings were used to update the risk assessment (including the confidence assessment), as discussed in **Section 7**.

1.4.2.3 Workshop 3

A series of virtual workshops were held with the relevant agencies to present the outcomes of the draft Scoping Study, specifically the first pass Risk Assessment, Forward Plan and Business Case. This included the following workshops:

- 31 May 2021: DPI – Fisheries
- 1 June 2021: Crown Lands
- 1 June 2021: NPWS

Comments received during the workshops were used to inform the finalisation of the Scoping Study. The attending agencies also provided written comment on the draft Scoping Study.

1.4.3 Aboriginal Engagement

At the project inception, the project team (Council, DPIE-EES and Rhelm) met with Arakwal Traditional Owners to discuss the CMP with an aim to ensure cultural management practices are considered in proposed coastal management approaches and actions, and to develop robust objectives with regards to Aboriginal cultural heritage in the study area.

The engagement included a round table discussion with representatives from BOBBAC (Arakwal) and from Jali LALC facilitated by maps, followed by site inspections on Country at Tallow Creek entrance, Ti Tree Lake and The Pass on 27 October 2020. A discussion also took place with a representative from Tweed-Byron LALC on 9 November 2020.

Notes from the day are provided in **Appendix C**, including agreed actions for this Scoping Study and later stages of the CMP.

1.4.4 Public Comment on Draft Scoping Study

The draft Scoping Study was placed on Council's website in May 2021 with the public invited to provide comment. A total of 11 submissions were received from the community. These submissions were considered in the finalisation of the Scoping Study.

2 Purpose, Vision and Objectives of the CMP

This chapter sets the purpose, vision and objectives of the CMP for coastal management in the Southern Byron Shire Coastline and Belongil Creek catchment study area. This has been achieved through development of a vision statement, which reflects the local context while remaining consistent with the states overarching vision of managing the coastal environment.

2.1 Purpose

The purpose of a CMP is defined in the CM Act as follows:

The purpose of a coastal management program is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objectives of the CM Act.

This statement was discussed at the Agency Workshop in October 2020, specifically with regards to the meaning and intention of ‘long-term strategy’ and ‘coordinated management’. It was confirmed that the purpose of this CMP should be consistent with the wording of the CM Act (above), with consideration of the issues summarised in **Table 2-1**.

Table 2-1 CMP purpose considerations (Agency Workshop, October 2020)

Considerations raised by stakeholders for the timeframe of the CMP (i.e. long-term strategy)	Considerations raised by stakeholders for ‘coordinated management’
<ul style="list-style-type: none"> CM Manual requires 20, 50 and 100 Year timeframes to be considered There should be a focus on the 20 year timeframe as there is good data availability and knowledge on sea levels, climate etc. However, longer timeframes should also be considered The CMP needs to acknowledge the limitations of models to predict future scenarios Timeframes should be linked to the management issues Identification of triggers will be important in the CMP and what those triggers mean (actions, review, etc.). Trigger may include climate events, or sea level rise values being exceeded There is a difference between the planning horizon and the “life” of the CMP; CMP will be reviewed every 5 to 10 years. 	<ul style="list-style-type: none"> Agencies have been targeted as key stakeholders to be consulted with as part of the Scoping Study Other organisations and community groups will need to be included in the engagement strategy for the CMP Look for opportunities to source relevant studies undertaken by private organisations.

2.2 Vision Statement

A local vision statement that is consistent with the state's vision while reflecting the local context helps communities identify with the future of their coast, encourages a sense of community ownership of the actions in the CMP and fosters commitment to its preparation and implementation.

Vision statements from related studies and plans have been reviewed in the preparation of a vision statement for the Southern Byron Shire Coastline and Belongil Creek estuary. Of key importance was ensuring consistency, where appropriate, with the vision statement developed for the CMP by BMT (2020) for the CMP Scoping Study for Cape Byron to South Golden Beach.

The following vision statement has been developed for the study area, based on existing vision statements and discussion at the Agency Workshop in October 2020:

The Byron Shire's coast is resilient and adaptive to ensure it retains its iconic natural, conservation and cultural values now and into the future. These values underpin the coast's Aboriginal cultural heritage, ecological function, amenity, recreational use, local and tourism uses, and they are kept central in the development of future management approaches.

Coastal management addresses existing and emerging threats to the status quo and seeks to manage conflicts in coastal uses, values, and natural processes. Coastal management is flexible, adaptive and innovative.

2.2.1 Related Visions

Related visions from existing relevant documentation, many of which were identified by BMT (2020), are listed in **Table 2-2**. The vision developed for this CMP is consistent with and supports these related visions for the coastal zone.

Table 2-2 Related visions for the coastal zone

Vision Source	Related Vision Statements
<i>Coastal Management Program Scoping Study for Cape Byron to South Golden Beach</i> (BMT, 2020)	"Adequately resource and fund management of the iconic and internationally recognised Byron coastal zone 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 coastal zone that is prepared to address multiple challenges in a flexible and adaptive manner; including consideration of novel funding approaches".
<i>NSW Coastal Management Manual</i> (OEH, 2018)	"Thriving and resilient coastal communities living and working on a healthy coast, now and into the future".

Vision Source	Related Vision Statements
<i>Coastal Management Act 2016</i>	“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”.
<i>NSW Marine Estate Management Strategy 2018 – 2028 (MEMA, 2018)</i>	“A healthy coast and sea managed for the greatest wellbeing of the community, now and into the future”.
<i>Arakwal National Park Plan of Management (NPWS, 2007)</i>	A selection of the visions for Country: “As many of our people as possible are working to look after Country. Our history with Country is recognised and protected. Country is looked after so it is healthy and provides us with plants to use, for animals to live and for visitors to see. Country is repaired so the animals continue to return. Country is rid of weeds and other pests so it is healthy. Country needs a helping hand. It was damaged by large scale sand mining and needs equally intensive rehabilitation. Fire is carefully managed to make Country safe and healthy. Country is looked after and continues to provide us with food and materials. Visitors are made welcome to share and enjoy Country in a way that respects our culture. We want to show people our Country so they understand our culture and provide employment for our young people”.
<i>North Coast Regional Plan 2036 (DPE, 2017)*</i>	“The best region in Australia to live, work and play thanks to its spectacular environment and vibrant communities”.
<i>North Coast Local Strategic Plan 2016 – 2021 (North Coast LLS, 2016)</i>	“Resilient communities in productive healthy landscapes”.
<i>Northern Rivers Catchment Action Plan 2013 – 2023 (Northern Rivers CMA, 2013)</i>	“Healthy landscapes and seascapes managed to be sustainable, resilient and productive by viable industries and vibrant, prosperous local communities”.
<i>Our Byron Our Future Our Community Strategic Plan 2028 (BSC, 2018d)</i> <i>Byron Shire Local Strategic Planning Statement (BSC, 2020b)</i>	“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

Vision Source	Related Vision Statements
	arts and cultural activities, respect and acknowledge our first peoples and celebrate and embrace diverse thinking and being”.
<i>Draft Byron Shire Sustainable Visitation Strategy 2020 – 2030</i> (BSC, 2020c)	“Byron Shire welcomes visitors and supports a visitor economy that cares for and respects our residents, creates low-impact visitor experiences, protects our natural environment, celebrates our cultural diversity and shares our social values”.
<i>Crown land 2031 – State Strategic Plan for Crown land</i> (DPIE, 2021)	“Crown land supports resilient, sustainable and prosperous communities across NSW”.

* It is assumed that this Plan supersedes the *Far North Coast Regional Strategy 2006-31* (DEC, 2006a).

BMT (2020) identified that overall, these visions identify a variety of key descriptors and directives relevant to the study area, modified for this scoping Study as follows:

- **Environment** – managed, spectacular, iconic, healthy, productive, resilient, adaptive, protected and provided with appropriately located and sustainable development
- **Social** – empowered, vibrant, diverse, resilient, creative, innovate, welcoming, listened to, supported, respectful communities and visitors where lifestyle / culture / spirit protected
- **Economy** – prosperous with local business and industry supported
- **Governance** – innovative, adequately resourced, managed and adequately funded.

These were considered in the preparation of the vision statement provided in **Section 2.2**.

2.3 Objectives

The objectives set out in the CM Act were discussed at the Agency Workshop undertaken in October 2020. The objectives in the CM Act have been localised, expanded and refined based on feedback from stakeholders to ensure they are specific to the study area, achievable and measurable. The objectives in the CM SEPP and the five objectives in the *Our Byron Our Future Our Community Strategic Plan 2028* (BSC, 2018d) were also considered when developing the CMP objectives.

Key performance indicators (KPIs) have also been developed for each of the CMP objectives so that the progress of their implementation is measurable, realistic and can be clearly communicated. The CMP objectives and KPIs are presented in **Table 2-3**.

It should be recognised that the 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.

As an outcome of the Agency Workshop in October 2020 it was identified that there are conflicts between some of the CM Act objectives, particularly with regards to Aboriginal cultural heritage objectives. These conflicts are identified in **Table 2-3**.

Table 2-3 CMP objectives and KPIs

CM Act Objectives	Study Area Specific CMP Objectives	Proposed KPI	Opportunities to Support Aboriginal Cultural Values
a) To protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience	To identify locations along the southern coastline and estuaries of Byron Shire with conservation values (including coastal wetland and littoral rainforests) and to devise strategies and controls to ensure those values are protected and enhanced/rehabilitated where necessary.	Council's high environmental value (HEV) mapping updated to incorporate coastal and estuarine vegetation of conservation value (e.g. CM SEPP coastal wetlands; Coastal Swamp Oak Woodland). Coastal, estuarine and riparian vegetation considered in Council's identification and mapping of wildlife corridors. Coastal, estuarine and riparian vegetation considered in Council's restoration priority mapping for private and public land. Suitability of CM SEPP mapping of coastal wetlands and littoral rainforest reviewed and amended (if necessary) by planning proposal. Opportunities for enhancement on private (via EPIs) and public lands (via Open Space Asset Management Plans) identified.	Consultation on strategies and controls prior to adoption.
	To identify and protect areas of high natural scenic value along the southern coastline and estuaries of Byron Shire.	Definition of coastal zone in DCP Part A reviewed and amended to reflect current legislation. Definition of a visually prominent site within the coastal zone reviewed to ensure consistency with the objectives of CM Act.	N/A
	To improve the quality of estuarine (Belongil Creek, Tallow Creek and Ti Tree Lakes) and South Byron coastal waters.	Baseline for water quality set using monitoring data and opportunities for improvement identified through stormwater, wastewater and groundwater management.	Identify ICOLL opening strategy compatibilities with cultural practices (see also below).
	To balance the protection of assets from flooding with protection of other values (e.g. water quality, ecological process and Aboriginal cultural values).	Entrance Management Policies for Belongil and Tallow Creeks updated in accordance with ICOLL best management practices.	Encourage involvement of Aboriginal people in the preparation of these policies and artificial opening strategies.
b) To support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety	To provide for appropriate and sustainable public access to the estuaries (Belongil Creek, Tallow Creek and Ti Tree Lakes) and South Byron coast.	Existing formal and informal access points mapped and assessed for sustainable use. Access strategy created in accordance with <i>Australian Standard 1428</i> , taking into consideration environmental and cultural sensitivities.	Public access has the potential to impact Aboriginal cultural heritage values or places (e.g. Ti Tree Lake is a sacred woman's site).
	To effectively manage all significant cultural heritage places, items and landscapes.	All listed and known places, items and landscapes reviewed to identify those at risk from coastal processes and/or other threats i.e. recreational activities.	Encourage Aboriginal community to identify cultural sites and landscapes which are at risk.
	To manage conflicts over coastal and estuarine area access and use.	Incidents of illegal camping, dog related safety incidents, and access related damage to habitat or culturally sensitive locations reduced.	Include knowledge of damage to Aboriginal culturally sensitive locations.
c) To acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone	To ensure interests of the local Aboriginal community are identified, including Native Title Rights and Interests.	CMP clearly documents the interests of the local Aboriginal community including Native Title Rights and Interests.	See KPI
	To involve the local Aboriginal community in the coastal zone decision making process.	Representatives of LALCs and BOBBAC (Arakwal) on relevant committees, taskforces and other representative groups involved in decision making. Aboriginal Cultural Heritage Mapping and Management Plan completed. On-Country Aboriginal Cultural Centre supported as a knowledge sharing cultural education facility which also supports opportunities for Aboriginal People to work on Country.	See KPI

CM Act Objectives	Study Area Specific CMP Objectives	Proposed KPI	Opportunities to Support Aboriginal Cultural Values
d) To recognise the coastal zone as a vital economic zone and to support sustainable coastal economies	Support local Aboriginal people to work on Country.	Council employment/ contract/ procurement process in place that considers employment of Aboriginal people on-Country in the management of coastal lands of high-cultural importance.	See KPI
	Ensure CMP does not just acknowledge but includes prescriptive actions to ensure Aboriginal cultural use and values are recognised and valued in this CMP.	List of prescriptive actions within CMP for implementation.	See KPI
	Protect and increase the economic prosperity and sustainability of industries supported by the estuaries and the coastal zone, while also protecting the estuarine and coastal values that contribute to coastal economies.	Baseline dollar value of the Byron coastal economic zone established. Key local contributing factors and sectors determined and how they can continue in a sustainable manner. Understanding of how the ICOLLs contribute to fisheries and carbon sequestration improved through investigation.	See protection of Aboriginal culture as a way to help grow sustainable coastal economies.
	Recognise economic value of Aboriginal culture and heritage for the area.	Collaborative opportunities for coastal-related cultural tourism, products and services identified by Aboriginal representatives (e.g. On Country Aboriginal Cultural Centre).	The conservation of Aboriginal cultural heritage creates a more culturally rich area and can inspire business, tourism and connection for locals and visitors.
e) To facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making	Ensure ecologically sustainable development in the coastal zone through appropriate land use planning controls. Ecologically sustainable development should be carried out in a manner that does not adversely affect coastal and estuarine processes.	Provisions included in the LEP/DCP and other relevant EPIs that ensure development is consistent with coastal processes, considering both existing and future sea levels. Provisions included in the LEP/DCP and other relevant EPIs to mitigate impacts on and enhance coastal wetlands and littoral rainforest area. Inclusion of up to date mapping for Coastal SEPP (including vulnerability mapping).	Ensure land use planning processes consider Native Title Act, Aboriginal land rights and indigenous cultural heritage protection requirements.
f) To mitigate current and future risks from coastal hazards, taking into account the effects of climate change	To reduce the impact of coastal hazards on existing developed areas.	Coastal hazards are identified and mapped through the CMP. Adaptation strategies and/or interventions to manage the impacts of coastal hazards have been identified or are identified in future studies.	Consultation with Aboriginal stakeholders in early stages of planning and design of strategies and/or works.
	To reduce the impact of coastal hazards on Aboriginal culture and heritage.	Provisions included in the LEP/DCP and other relevant EPIs that ensure development is consistent with coastal processes, considering both existing and future sea levels.	N/A
	To facilitate the presence of beaches, dunes and the natural features of foreshores, including the natural features of estuaries, taking into account the beach system operating at the relevant place and recognising the natural resilience they provide against coastal erosion.	Foreshore building lines are set within EPIs that allow for coastal processes.	Gather cultural knowledge of beach processes and natural features.
	To ensure plans and strategies are in place that deal with the threat, onset and aftermath of large coastal storms.	Coastal zone emergency action subplans have been prepared, adopted and are being reviewed.	N/A
	To encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions.	Mapping and provisions included in the LEP/DCP and other relevant EPIs that ensure development is consistent with risk from coastal hazards.	N/A
	To improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.	Resilient building guidelines prepared and implemented.	N/A

CM Act Objectives	Study Area Specific CMP Objectives	Proposed KPI	Opportunities to Support Aboriginal Cultural Values
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	To raise awareness within the local community and visitors to the region that natural coastal processes may result in the loss of coastal land to the sea and tidal waters.	Baseline community awareness measured and re-measured following awareness program and following major coastal events. See KPIs for Objective (h).	N/A
	To ensure that future coastal zone development and land-use is compatible with coastal hazards, including the potential effects of climate change.	See KPIs for Objective (f).	See KPI
	To improve the capacity of the estuaries to adapt to future increases in tidal inundation, by allowing for migration of fringing habitats with sea level rise.	See KPIs for Objective (f). Suitable land for estuary and habitat landward migration identified.	N/A
	To improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration.		Ensure compliance with Native Title Act in this process.
h) To promote integrated and co-ordinated coastal planning, management and reporting	Ensure all stakeholders in the study area are consulted during development of this CMP and responsibilities are clearly documented and agreed.	Stakeholder engagement plan prepared and implemented.	N/A
	To enable consistent and complementary decision making, linkages shall be made with other coastal planning instruments, strategies and plans.	All relevant EPIs, strategies and plans have been identified.	N/A
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	Encourage resilience of coastal assets to the impacts of climate change through appropriate land use planning controls.	Provisions included in the new LEP/DCP that encourage resilience of coastal assets to the impacts of climate change.	Aboriginal culture and heritage should be seen and listed as an 'asset'.
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	As per CM Act Objective (j).	All existing studies, policies, strategies and plans relevant to the study area are documented in the Scoping Study. Agreement obtained from all relevant agencies on responsibilities of actions resulting from the CMP.	Aboriginal land managers included in coordinated activities, as required under the <i>Native Title Act 1993</i> and <i>Aboriginal Land Rights Act 1983</i> .
k) To support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions	As per CM Act Objective (k).	See KPI for Objective (h).	See KPI
	To encourage education regarding what coastal zone looks like to Aboriginal management of Country.	Intangible Aboriginal Cultural Heritage to be considered in planning and public awareness and education.	See KPI
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	As per CM Act Objective (l).	The current land tenure arrangements in the study area are documented to assist in identification of land in the coastal zone for acquisition by public or local authorities. Properties most at risk and where acquisition may be the most suitable option to manage that risk (voluntary or compulsory) are identified. Sea level rise extents have been considered to identify land acquisition required for this process.	Opportunities for protecting and enhancing cultural use and values on newly created public land should be identified (e.g. access to coastal areas for cultural practices)
m) To support the objects of the <i>Marine Estate Management Act 2014</i>	As per CM Act Objective (m).	Relevant local actions have been extracted from the Marine Estate Strategy and linked in the CMP.	N/A

3 Strategic Context for Coastal Management

This chapter sets the strategic context for coastal management in the Southern Byron Shire Coastline and Belongil Creek catchment study area. This is achieved through a high-level interpretation of existing published materials. It sets the environmental, social/cultural, economic and legal/planning context for coastal management.

3.1 Existing Information Relevant to Coastal Management

There is a great deal of information from a range of sources relating to the physical processes and management of the Byron Shire coastal zone. A critical review of this information was conducted to determine content and currency of the reports that are 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 (threats) or threatening processes that may be reducing or undermining these values
- 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)
- Spatial mapping and data.

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

This 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 (**Section 2**).

Outcomes of the data and information review have been used to summarise information contained in the following sections and was also used to develop the first pass risk assessment, in particular, to help identify coastal zone values and threats in conjunction with community and agency feedback obtained through the community survey and workshops. The information also helped to determine the adequacy of existing management, and of existing information to manage known threats at present and in the future and the appropriate priorities to be assigned to management tasks.

3.2 Strategic Direction

The strategic direction for the study area is formulated through acknowledging existing visions, strategies and directives outlined in existing documentation by state, regional and local strategic planning documents, some of which are shown in **Figure 3-1**. These related visions are discussed and listed in **Section 2.2.1**.



Figure 3-1 Some of the Strategies and Plans that set the strategic context of the CMP

3.2.1 State, Regional and Local Level Plans and Strategies

The key State level plan for the Byron coastal zone is the coastal management framework, as explained in **Section 1.1**. A detailed outline of the state, regional and local level plans and strategies relevant to the study area can be found in BMT (2020), which have been listed in summary in **Table 3-1** in this report, with additional strategies and plans added and discussed where required. All plans and strategies reviewed are listed and a summary of each document provided in **Appendix D**.

Table 3-1 Strategies and Plans that set the strategic context of the CMP

Plans and Strategies	Summary of Relevance to the CMP
NSW Marine Estate Management Strategy (2018-2028) (MEMA, 2018) and Marine Estate Management Act 2014	<p>The Strategy sets the overarching framework for the NSW Government to coordinate the management of the marine estate over the next decade in accordance with the objects of the <i>Marine Estate Management Act 2014</i> and the NSW Government's vision for the marine estate.</p> <p>The Strategy outlines how we can manage threats to the environmental assets, as well as to the social, cultural and economic benefits the community derives from the marine estate. It identifies evidence-based management priorities and sets policy directions to manage the marine estate as a single continuous system. This CMP aligns with the objectives of the Strategy.</p>
New South Wales Marine Estate Threat and Risk Assessment Report (TARA; BMT WBM, 2017)	<p>The Marine Estate Management Authority (MEMA) completed an evidence-based threat and risk assessment for the NSW marine estate. The assessment identifies, assesses and prioritises threats and risks to the environmental assets and the social and economic benefits of the marine estate. Threats and their associated risks were assessed at a state and regional scale with Byron Shire being part of the North region.</p> <p>All identified threats and risks as outlined in the TARA have been considered during the preparation of this study (see Section 4), with particular note given to Table 5-2 in the TARA (Ranked Priority Threats for the North Region).</p>
North Coast Regional Plan 2036 (DPE, 2017)	<p>This Plan forecasts population and demographic mix at 2036, and provides a variety of regional priorities relating to housing, economy and employment.</p> <p>Two key priorities specific to the study area involving the Belongil Creek catchment include:</p> <ul style="list-style-type: none"> Investigate opportunities for additional employment land at West Byron Bay Deliver housing at West Byron. <p>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 national parks, nature reserves or similar and not subject to future coastal development. Generally, it is expected that growth needs in existing</p>

Plans and Strategies	Summary of Relevance to the CMP
	population centres of relevance to the study (i.e. Byron Bay, Suffolk Park and Broken Head) will be met through intensification of existing development.
North Coast Local Strategic Plan 2016 – 2021 (North Coast LLS, 2016)	This Plan outlines Local Land Service’s approach and commitment to building the sustainability of the North Coast Region’s primary industries, natural environment and local communities. The Plan includes four goals, along with associated priorities and outcomes, actions and performance measures.
North Coast Regional Strategic Weed Management Plan 2017 – 2022 (North Coast LLS, 2017)	This Plan focuses on managing weeds to improve the region’s biosecurity, with a vision to protect the North Coast’s environment, landscape, livelihood, cultural and lifestyle values from weeds by strengthening the sustainability of the natural environment, primary industries, and local communities in the region.
Northern Rivers Catchment Action Plan 2013 – 2023 (Northern Rivers CMA, 2013)	This is an all-of-government and all-of-community plan to guide the sustainable management of natural resources (soils, biodiversity, rivers, estuaries, wetlands, and coastal and marine environments) in the Northern Rivers Region for the next decade.
Byron Local Environmental Plan 2014 (Byron LEP 2014) and Byron Local Environmental Plan 1988 (Byron LEP 1988) for deferred matters	Section 5.2.1 discusses the history of development of coastal management provisions in Council’s LEPs and DCPs in response to changes in the coastal management framework.
Byron Development Control Plan 2014 (Byron DCP 2014) and Development Control Plan No 1 (DCP 1988)	See Section 5.2.1 , as mentioned above.
Our Byron Our Future Our Community Strategic Plan 2028 (BSC, 2018d)	The Integrated Planning and Reporting (IPR) Framework is set out in the <i>Local Government Act 1993</i> . The IPR Framework in NSW requires all councils to adopt a suite of strategic plans. This Community Strategic Plan outlines the vision, community objectives and supporting strategies which will guide Council’s long-term decision making. Section 9.3 discusses integration with the IPR Framework in greater detail.
Byron Shire Local Strategic Planning Statement (BSC, 2020b)	This was adopted by Council in late June 2020 and is currently awaiting endorsement.
Byron Shire Destination Management Plan 2014 – 2020 (BSC, 2014a)	This identifies “conservation and enhancement of the rich natural environment, flora, fauna, beach, marine life and coastline” as a community core value.

Plans and Strategies	Summary of Relevance to the CMP
<i>Draft Byron Shire Sustainable Visitation Strategy 2020 – 2030 (BSC, 2020c)</i>	This Strategy is currently being prepared by Council and once finalised, will replace the current <i>Byron Shire Tourism Management Plan 2008 to 2018</i> (BSC, 2009). It outlines a framework to minimise the impacts and maximise the benefits that tourism can bring, whilst maintaining and protecting the Shire's natural and built environment, culture, community and heritage.
<i>Byron Shire Biodiversity Conservation Strategy 2020 – 2030 (BSC, 2020a)</i>	This Strategy was adopted by Council in June 2020 and aims to conserve and enhance the Shire's biodiversity.
<i>Byron Shire Recycled Water Management Strategy 2017 – 2027 (BSC, 2018a)</i>	This Strategy details the Byron Bay recycled water management system, which comprises of the Byron Bay Integrated Water Management Reserve (BBIWMR) and the Byron Bay Urban Recycled Water Scheme (BBURWS), which together recycle 38% of effluent from the Byron Bay Sewage Treatment Plant (STP) and divert this treated effluent from discharge to Belongil Creek estuary.
<i>Climate Change Strategic Planning Policy No 14/006 (BSC, 2014b)</i>	This Policy sets out Council's accepted climate change parameters to inform the decision-making process for strategic, infrastructure and operational planning.
<i>Byron Bay Town Centre Masterplan (McGregor Coxall, 2016)</i>	The Masterplan provides a vision, strategy, and a holistic and integrated solution to revitalising Byron Bay Town Centre. Strategies are recommended for access and movement, public domain, natural environment (e.g. flood mitigation, WSUD, coastal erosion protection, increased tree network), culture (e.g. improving interpretation), economic development and built form and aesthetics. Specific actions and catalyst projects are planned for delivery over the next 20 years. For example, Sub-strategy 1a "A resilient town centre" includes flood mitigation, WSUD and coastal erosion protection actions to minimise flooding and coastal erosion through balancing soft and hard mitigation measures.
<i>Byron Shire Open Space and Recreation Needs Assessment and Action Plan 2017 – 2026</i>	Identifies that recreation associated with beaches and creeks is the second most popular form of recreation for Shire residents and going to the beach is the most popular form of recreation for visitors. Identifies minor and major beach access points, assesses levels of service for beach access points as adequate to meet demand and contains an action to develop a beach access point renewal program, with major access points to be the highest priority.
<i>Cape Byron Marine Park Operational Plan (DPI, 2010)</i>	The ocean extent of the NSW marine estate is to the limit of state waters, which is three nautical miles from the coast. This is significant as it means that potentially some future actions, such as sourcing beach nourishment material from the offshore sand lobe, may be outside the state border and therefore Commonwealth legislative considerations may have to be taken into account. At this

Plans and Strategies	Summary of Relevance to the CMP
	<p>stage it is understood that the sand lobe likely to be used for beach nourishment is fully contained within State Waters, however the sand lobe is within the Cape Byron Marine Park (CBMP).</p> <p>The CBMP extends 37 km along the coastline from Lennox Head in the south to the Brunswick River northern training wall in the north. All of the study area coastline and the tidal limit of the Belongil and Tallow Creek estuaries are within the CBMP. The study area extends 3 nautical miles offshore to the boundary of CBMP.</p>
Plans of management for public land	<p>Crown Land that is dedicated or reserved that is managed by Council that is classified as ‘community land’ will be subject to Plans of Management developed by Council under both the <i>Crown Land Management Act 2016</i> and <i>Local Government Act 1993</i>.</p> <p>NPWS manages a substantial area of land within the study area including the:</p> <ul style="list-style-type: none"> • Cape Byron State Conservation Area (Cape Byron Headland Reserve) (Wildsite Ecological Services, 2002) • Arakwal National Park (NPWS, 2007) • Ti Tree Lake Aboriginal Area (NPWS, 2020a) • Broken Head Nature Reserve (NPWS, 2019a) • Cumbebin Swamp Nature Reserve (NPWS, 2012) • Tyagarah Nature Reserve (partly within the study area) (NPWS, 2020b). <p>These areas are managed under various Plans of Management developed by NPWS. These plans identify their extent, values and sensitivities and provide extensive management information for the environment and community use of the areas.</p>
Crown land 2031 – State Strategic Plan for Crown land (DPIE, 2021)	<p>This Plan outlines a 10 year vision for Crown land in NSW. The Plan reflects Government and community aspirations to deliver social, environment and economic benefits from Crown land.</p> <p>The Plan includes the following five priorities:</p> <ul style="list-style-type: none"> • Strengthen community connections with Crown land • Accelerate economic progress in regional and rural NSW • Accelerate the realisation of Aboriginal land rights and native title in partnership with Aboriginal people • Protect cultural heritage on Crown land • Protect environmental assets, improve and expand green space and build climate change resilience.

3.3 Legislative and Policy Context

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 and includes a CM SEPP which covers the four coastal areas that the CM Act recognises as making up the “Coastal Zone”. Additional legislation and policy governing the management of the

study area is complex and includes several Commonwealth and State level Acts, Regulations and agreements, and numerous State, Regional and Local level plans and policies.

Table 3-2 provides a snapshot of the legislation and policy that have a major influence in the management of the Byron Shire coastal zone.

Table 3-2 Relevant legislation and environmental planning instruments

NSW Coastal Zone Legislation and Policy	Additional Key Legislation and EPIs Supporting or Interacting with Coastal Management
<i>Coastal Management Act 2016</i> <i>Coastal Management SEPP 2018</i> <i>Marine Estate Management Act 2014</i>	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> <i>Native Title Act 1993</i> Japan-Australia Migratory Bird Agreement China-Australia Migratory Bird Agreement Republic of Korea-Australia Migratory Bird Agreement NSW <i>National Parks and Wildlife Act 1974</i> <i>Environmental Planning and Assessment Act 1979</i> <i>Mining Act 1992</i> <i>Local Government Act 1993</i> <i>Fisheries Management Act 1994</i> <i>Heritage Act 1977</i> <i>Protection of the Environment Operations Act 1997</i> <i>Water Management Act 2000</i> <i>Local Land Services Act 2013</i> <i>Crown Land Management Act 2016</i> <i>Aboriginal Land Rights Act 1983</i> <i>Biodiversity Conservation Act 2016</i> <i>Draft Environment SEPP</i> <i>SEPP (Aboriginal Land) 2019</i> <i>SEPP (Housing for Seniors or People with a Disability) 2004</i> <i>SEPP (Infrastructure) 2007</i> <i>SEPP (Koala Habitat Protection) 2019</i> <i>SEPP No 19 – Bushland in Urban Areas</i> <i>SEPP No 21 – Caravan Parks</i> <i>SEPP No 36 – Manufactured Home Estates</i> <i>SEPP No 50 – Canal Estate Development</i> <i>SEPP No 55 – Remediation of Land</i>

3.4 Coastal Values




The key inputs used to develop this chapter of the CMP were the outcomes of the community consultation undertaken from 17 December 2020 to 1 February 2021, in the form of an online feedback survey hosted on Council's website, which aimed to understand the community's environmental, cultural, recreational and economic values for the study area. The results from this survey are provided in full in **Appendix B**.



In addition, there have been several recent (and historic) assessments of the environmental values of the study area and surrounds, such as the *Coastal Management Program Scoping Study for Cape Byron to South Golden Beach* (BMT, 2020), *Byron Coastline Values Study* (BSC, 2000), *Coastal Hazard Management Study – Byron Bay Embayment* (WRL, 2016) and various draft Coastal Zone Management Plans for the Byron Bay Embayment area (BSC, 2016 and BSC, 2018c). Community consultation undertaken as part of this CMP Scoping Study generally confirms previous findings.

Cultural, social and ecological values specific to Belongil Creek and Tallow Creek estuaries have also been discussed by Alluvium (2019b) in their final draft report *Belongil Creek Entrance Opening Strategy* and Alluvium (2019c) in their draft report *Tallow Creek Fish Kill ICAM Investigation*, respectively.

In interpreting the outcomes of the community consultation undertaken for this Scoping Study (particularly Question 2), a prioritised list of values and attributes has been identified for the study area, as shown in **Table 3-3**. The main attributes of these values are discussed in more detail in **Sections 3.4.1 to 3.4.4**.

Table 3-3 Values and attributes of the study area as determined through community consultation

Icon	Theme	Values	Attributes
	Healthy environment	Value 1 – Natural, healthy character Value 2 – Biodiversity and ecosystem integrity	<ul style="list-style-type: none"> • Healthy vegetation in estuaries, littoral rainforest and dunes providing habitat for wildlife and sand/soil erosion protection • Functioning ecosystems with high flora and fauna biodiversity • Natural systems are maintained to the greatest extent possible, allowing natural coastal and estuarine processes to occur
	Good water quality	Value 3 – Good water quality	<ul style="list-style-type: none"> • Good water quality in the estuaries and open ocean that can support functioning ecosystems with high biodiversity and recreational opportunities
	Aboriginal cultural heritage and use	Value 4 – Aboriginal cultural heritage and use	<ul style="list-style-type: none"> • Aboriginal cultural heritage and values of the area are communicated and respected by users of the study area

Icon	Theme	Values	Attributes
	Recreational values	Value 5 – Accessibility and safety Value 6 – Amenity and recreation Value 7 – Socialisation and participation Value 8 – Education / scientific	<ul style="list-style-type: none"> • Safe and adequate access to beaches and estuaries, including adequate disabled access • Personal safety when accessing the study area • Natural features such as wide sandy beaches and surf breaks support passive recreational opportunities such as swimming and surfing • Adequate and maintained recreational facilities such as picnic tables, BBQs, play equipment, etc • Adequate and maintained supporting facilities such as public toilets, car parking and rubbish bins
	Economic values	Value 9 – Tourism Value 10 – Fishing (commercial, recreational and cultural) Value 11 – Agricultural, industrial and urban lands	<ul style="list-style-type: none"> • A thriving tourism industry, promoting environmentally, socially and culturally respectful tourism • Supported and environmentally sustainable agricultural and industrial businesses • A viable and environmentally sustainable fishing industry • Suitable and well located future urban development

3.4.1 Healthy Environment Values

The study area consists of a wide variety of environments including open coastal waters, sandy/ rocky shorelines, coastal dunes, estuaries and creeks, littoral rainforest and wetlands/ heathlands and water dependent ecological communities. The marine environment includes the Cape Byron Marine Park, which encompasses the coastal waters to three nautical miles and estuarine areas of Belongil, Tallow and Ti-Tree Creeks. Offshore benthic habitat consists of deep sandy soft sediment benthic communities and nearshore and offshore subtidal reefs (WBM Oceanics Australia, 2003). offshore subtidal reef locations can be viewed on Seamap Australia (seamapaustralia.org). This diversity of coastal environments contributes significantly to the Shire's overall biodiversity, and also exhibit high biodiversity in their own right (BSC, 2000). A review of available ecological data is provided in **Section 3.5.3**.

As detailed in the *Byron Shire Biodiversity Conservation Strategy 2020 to 2030* (BSC, 2020a), Byron Shire is located at the heart of the wet subtropical bioregion, one of the most biodiverse regions in Australia, with significant biodiversity value. The region's high biodiversity directly supports community values associated with a healthy environment, such as functioning ecosystems and healthy vegetation in estuaries, littoral rainforest and dunes.

The area is considered a unique environment as it is strongly influenced by the East Australian Current (EAC) as warm waters from the north come together with cooler waters from the south. The Cape Byron Marine Park was established in this area to conserve many subtropical marine habitats which support high levels of biodiversity including threatened and protected species of fish, sharks, turtles and marine mammals (DPI, 2020a; DPI, 2020b). The area also supports an abundance of

bird species, particularly waders and shorebirds, and bird habitat, providing an important winter-feeding resource for migratory birds.

High Environmental Value (HEV) vegetation was mapped for Byron Shire in 2017. There are 24,300 ha of HEV vegetation in the Shire comprising 43% of the Shire's land area. The study area contains coastal features of high environmental value, including coastal wetlands and littoral rainforest, many of which align with listing for Threatened Ecological Communities (TECs) under both the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. There is high biodiversity associated with Belongil Creek and Tallow Creek which have variable entrance conditions, termed as Intermittently Closed and Open Lakes and Lagoons (ICOLLS). The value of these areas is recognised in the CM Act and CM SEPP.

The wetlands values are also interlinked with the Shire's broader water management strategy. The Byron Bay Wetlands within the Belongil Creek catchment are an integral part of the Byron Bay Integrated Water Management Reserve for management of treated effluent from the Byron Bay STP. This is further discussed in **Section 3.5.1**.

Healthy and functioning ecosystems also support tourism and economic values, as the study areas pristine naturalness and iconic visual landscape values are some of the qualities that attract tourists to the area. Visitors show a strong preference toward natural landscape attractions and experiences over man-made experiences when visiting the Byron Shire. Council's consultation for its *Draft Byron Shire Sustainable Visitation Strategy 2020 – 2030* (BSC, 2020c) reinforced that many visitors also want to protect the natural beauty and untouched environment.

3.4.2 Good Water Quality Values

Good water quality in the estuaries was ranked near equally as high a value as a healthy environment in the community survey, which is appropriate as good water quality in the estuaries and oceans would support and lead to healthy and functioning ecosystems with high biodiversity. Good water quality also supports community values associated with passive and recreational opportunities within the beaches and estuaries.

A review of available water quality data is provided in **Section 3.5.1** and identifies coastal waters of the study area are highly suitable for safe swimming, with various issues prevalent within the estuaries. All waters in the study area are considered of value to aquatic ecosystem health and visual amenity, while the coastal waters are considered to be of high value to primary contact recreational use (DEC, 2005), and areas of the creeks for primary and secondary recreational use (DEC, 2006b).

There is high variability in water quality in the estuarine portion of the study area due to diffuse source water pollution and to variable entrance conditions for the ICOLLS. Water quality in the ICOLLS is dependent on freshwater and saline inflows as well as factors such as catchment runoff, groundwater inflows, wetland drainage and direct rainfall (Alluvium, 2019b). Artificial openings of the Belongil Creek and Tallow Creek estuaries to mitigate flood impacts from catchment flood events have at times resulted in fish kills. It is noted that some natural openings have also resulted in fish kills (Alluvium, 2019c). The reason for past fish kills is not well known and may have included mechanisms such as sudden increase in salinity or low dissolved oxygen in the waterway. An artificial opening event in Tallow Creek in June 2019 resulted in a significant fish kill, thereby prioritising this CMP Scoping Study for this study area. Water quality values are also important for fish and crustaceans that rely on the ICOLLS for refuge and recruitment.

3.4.3 Aboriginal Cultural Heritage and Use Values

Much of Byron Shire lies in the Arakwal Jugun ‘Country’ within the Bundjalung Nation. It is home to the Traditional Owners and Custodians of the land – the Bundjalung of Byron Bay Arakwal People. Arakwal Jugun boundaries begin from south of the Brunswick River, extend west to Mullumbimby, Bangalow and Newrybar and to the south of Broken Head (BSC, 2020a).

The study area is extremely important for the Arakwal People, with the landscape holding a rich cultural story for the Arakwal People, including cultural connections along the coastal zone beyond the study area boundaries. Their relationship with this Country is more than just a place to live, it is the living, breathing source of all life, their spiritual home and home of their ancestors’ spirits (BSC, 2020a). In recognition of this, Native Title under the Commonwealth *Native Title Act 1993*, has been determined over the majority of the study area, (refer National Native Title Register number NCD2019/001 - Bundjalung People of Byron Bay #3). The NSW *Aboriginal Land Rights Act 1983* and the Commonwealth *Native Title Act 1993*, provide a framework for recognising the rights and interests of Aboriginal people with respect to Crown land.

Several existing management plans and strategies have worked to identify the values of Aboriginal cultural heritage and use of Country within the study area. One example within the study area is the *Arakwal National Park Plan of Management* (NPWS, 2007), which identified cultural values through consultation with BOBBAC (Arakwal) in 2003 and 2004. Park values and issues identified during this consultation included the following:

- Caring for Country (plants, animals, special places and sites, bush tucker)
- Recognition as Traditional Owners
- Joint management
- Maintaining family connections with Country
- Cultural tourism to share Country with others
- Protecting and accessing Country
- The transfer of knowledge among family
- Cultural education
- Provisions for cultural use and activities
- Reconciliation
- Economic opportunities
- Employment of young people with the NPWS.

With regards to the estuaries in the study area, Tallow Creek estuary is an extremely important place for the Arakwal People, who used the estuary as a refuge during European settlement and into the mid 20th century. The estuary was and continues to be an important resource for Traditional Owners and Custodians providing sources of fish, crabs and shellfish. The Traditional Owners and Custodians have a deep connection to the waterway and understand the changing nature of the estuary (i.e. periods of opening and closing) in terms of “cultural seasons” which consider fish movements (i.e. mullet runs), rainfall and oceanic conditions (tides, waves etc.) (Alluvium, 2019c).

Ti Tree (Taylors) Lake and surrounding area is also an extremely important place for the Arakwal People, recognised through the reservation of the Ti Tree Lake Aboriginal Area as an Aboriginal Place under the NPW Act (NPWS, 2020a). An Aboriginal Place is an area of special significance to Aboriginal culture. Declaration provides recognition of the significance of the area and its heritage values, which relate to traditions, observances, customs, beliefs or history of Aboriginal People. Ti Tree Lake Aboriginal Area is of particular significance to women and is an acknowledged sacred site (NPWS, 2020a).

Broken Head Nature Reserve is co-managed by NPWS and the Arakwal People, acknowledging the cultural significance of this land to Traditional Owners and Custodians. Three Sisters, previously known as Cocked Hat Rocks, is an important cultural site representing a story about a young Aboriginal woman who was caught in a strong current when swimming in this area. When her sister attempted to save her, they both drowned and were transformed into stone. This story was told to warn children not to swim in the strong and dangerous currents here (NPWS, 2021).

Cumbebin Swamp is located adjacent to the township of Byron Bay and is connected to Belongil estuary. It is an important part of Country for the Arakwal People as a place of plenty supporting sustainable living. Cumbebin wetlands are homelands where hunting and gathering occurred associated with separate men's and women's business. Men would go to the swamp to catch food such as birds, eels, turtles and snakes. Women would gather bush tucker and materials from the swamp including ferns for making baskets and paperbark to build their homes. Cumbebin Swamp is now a Nature Reserve jointly managed by the Arakwal community and NSW National Parks and Wildlife Service under a co-management agreement (Arakwal People of Byron Bay, 2011).

3.4.4 Recreational and Economic Values

Byron Bay's surf, beaches and waterways along with aspect (i.e. views, landmarks and whale watching) etc. were identified amongst the top destination drivers for the area for both domestic and international tourism alike (BSC, 2014a). Tourism and hospitality related services are considered as the LGA's largest employer and of a scale similar to larger tourism focused cities. Over the period of 2018/2019 the LGA was estimated to have had 2.21 million visitors. This was the highest on record at the time and set a new record for 'visitor nights' of 5.5 million (BSC, 2020c).

In comparison to the BMT (2020) CMP Scoping Study for Cape Byron to South Golden Beach study area, the southern coastal zone has more remote and pristine locations with a distinct lack of facilities and fewer beach access points. However, it has recently experienced a large increase in visitation pressure with social media advertising features that were previously only known to locals. This was also observed during the site inspection of the study area on 22 September 2020, with a large number of visitors and surfers present at Broken Head, Brays Beach and Whites Beach and an overflow of vehicles parked in non-designated parking spots.

The estuaries are an important part of the Byron Bay community. The Tallow Creek estuary opening area along Tallow Beach is a popular picnic spot and recreational area. The main bike path and walkway between Suffolk Park and Byron Bay also traverses the estuary and provides significant scenic amenity values (Alluvium, 2019c).

The study area also includes agricultural and industrial lands, such as the Arts and Industrial Estate within the Belongil Creek catchment. A land use mapping exercise undertaken for the Scoping Study identified a large portion of agricultural land within the study area (approximately 1,293 ha), primarily within the Belongil Creek catchment (approximately 1,060 ha). The majority (approximately 90%) of these agricultural lands are used for grazing, with 1,171 ha of grazing lands within the study area and 946 ha within the Belongil Creek catchment. For the mapping exercise agricultural lands were considered to be grazing (native vegetation and modified pastures), cropping, horticulture and intensive animal/plant production areas as well as rural residential with agriculture areas. Note that plantation forests were not included as an agricultural land use.

The Belongil Creek catchment supports a range of ecological, economic, social and recreational values. A higher-level summary of some of these values, as documented in the *Belongil Creek Catchment Issues Study* (Alluvium, 2019a), include:

- The ecological values of the estuarine, terrestrial and wetland communities that still exist within the catchment including the ecosystem services they provide (i.e. urban cooling, water treatment, flood detention, fish nursery, erosion protection, etc.)
- The significant economic values from the businesses and industries that exist within the Byron Bay township and Arts and Industrial Estate areas
- The economic benefits provided by the tourism and agricultural industries. Agricultural lands in the study area are primarily used for grazing
- The social and recreational values provided due to scenic values, bird watching, swimming and canoeing/kayaking.

The community survey results for this CMP indicated ongoing tourism and future urban development in coastal areas were less important values of the study area to the respondents, with instead a strong emphasis on protection and preservation of natural coastal areas. This aligns with what has been noted in the *Draft Byron Shire Sustainable Visitation Strategy* (BSC, 2020c); that many residents see visitors as disrespectful toward the environment and have voiced the need for an increase in education, signage, infrastructure and enforcement, as well as the need for tourism businesses to reinforce environmentally friendly and sustainable messages.

3.5 Environmental Context

3.5.1 Coastal Processes

A review and assessment of coastal processes in the study area was undertaken. The detailed report showing these findings is provided in **Appendix E**. A summary of the key coastal processes in the study area is provided below.

The study area comprises a diverse range of environments including open coast beaches, estuaries and their catchments, dunes, foreshores and the nearshore environment. The major embayment within the dynamic and active coastal sediment compartment (**Section 1.2**) contains Broken Head Beach, Suffolk Park Beach and Tallow Beach. Beaches within the study area are impacted by waves, tides, wind and minor human modification, all of which vary longshore.

Key elements regarding the current state of knowledge in the open coast study area from Broken Head to Cape Byron is presented graphically in **Figure 3-2**. Conceptual sand movement pathways shown in **Figure 3-2** are based on adopted relevant study (WBM BMT, 2013) carried out within the area. The current understanding on coastal processes relevant to the study area are summarised as:

- The wave climate at the site is predominately from the south-southeast to southeast
- Longshore sand transport rates vary longshore within the study area. Gradients in the longshore currents due to spatial differences in wave exposure and obliqueness result in the longshore differences in sediment transport along the beaches
- The larger boundary circulation from the EAC generates southbound current flows offshore of the study area
- The separation eddy off Cape Byron tends to produce a rotation flow within the Tallow Beach environment causing a northerly flow inshore particularly when there is a strong south bound EAC
- Significant temporal variations in longshore transport and shoreline position particularly due to the bypassing of sand around headlands and seasonal or long-term variation in wave climate and some uncertainty as to the net longshore transport input of sand from the south
- The Cape Byron – Ballina Shelf Sand Body (SSB) extends approximately between the 10m and 35m depth contours offshore of Broken Head to Cape Byron and creates a convex up coastal profile offshore of Tallow Beach (Ribo *et al.*, 2020). The northern end of this SSB has

also been referred to as the 'Cape Byron Sand Lobe' and it is in this area the SSB interacts with littoral sand movement around the Cape and the Cape's interference with the EAC and nearshore current. The volume of the sand deposition has been estimated as approximately 370 million cubic metres (Mm³) (PBP, 2006)

- The extensive SSB is reasoned to promote onshore supply of sand to Tallow Beach offering a stabilising or accretional effect to the shoreline
- This onshore sand supply from the shoreface which can occur during storm events provides sand for the longshore transport system
- There is uncertainty with regards to net longshore transport in from the south and the sediment budget proposed by BMT WBM (2013). The sedimentary evidence in Ribo *et al.* (2020) seems to contradict the cross embayment sediment movement proposed by BMT WBM (2013). The evidence of Ribo *et al.* (2020) and the apparent stability of the entrance of Tallow Creek suggests that the net littoral drift may well be less than what BMT WBM rely on for their 2013 shoreline hazard modelling (BMT WBM, 2013)
- In addition to sand mining at Tallow Beach in the 1960's, large variations due to storms in the late 1960, 1970's and 1999 as well as potential inconsistencies in photogrammetry data create difficulty in identifying clear long-term trends of shoreline change at this beach
- Infrequent tropical cyclones can be linked to widespread coastal erosion and inundation
- The embayment has two key ICOLLs that interact with the open coast processes, being Ti Tree (Taylors) Lake and Tallow Creek. Longshore sand transport and a relatively small tidal compartment results in periodic closing of these entrances as well as the Belongil Creek entrance
- The entrances of Tallow Creek and Ti Tree (Taylors) Lake are predominately in a closed state and show little evidence of migration and can be considered relatively stable during future planning periods (BMT WBM, 2013)
- At Belongil Creek, dynamic entrance behaviour is a known issue (BMT, 2020).



Figure 3-2 Summary of the current coastal processes knowledge for Broken Head Beach/Tallow Beach Embayment

3.5.2 Water Quality and Quantity

3.5.2.1 Open Coast Waters

As reported in BSC (2018c), oceanic waters of the study area are in a location of convergence of warmer northern waters and cooler southern waters. Upwelling of cooler nutrient rich waters is reported to occur in the region as a result of local geomorphology and the impact of the outstand of Cape Byron into the shelf component of the EAC. These processes support high biodiversity as discussed in **Section 3.5.3**.

In relation to recorded water quality, Council, in association with the former NSW Office of Environment and Heritage (OEH; now DPIE) participated in the NSW Government's Beachwatch program over the period 2009 to 2013 (OEH, 2010; OEH, 2011; OEH, 2012; OEH, 2013) and after a temporary withdrawal from the program, commenced again in December 2020. 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 on a weekly basis over the summer season 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*.

Council monitored a number of ocean and estuarine sites within the LGA from 2009 to 2013, two of which were located along Tallow Beach; one at the northern end and one at Suffolk Park. In 2010 another monitoring point within the study area was added to the program at Broken Head. Results reported in the annual State of the Beaches reports indicate the Beach Suitability Grade was 'very good' at all three of these monitoring sites for each year of monitoring. Sites rated as 'very good' are considered suitable for swimming almost all of the time, with few potential sources of faecal contamination. Within the present Beachwatch monitoring program, Council monitors four locations, one of which is within the study area (Tallow Beach at Suffolk Park). Results over the period December 2020 to February 2021 reported 'very good' water quality at this location.

There are no known changes in the Southern Byron Shire coastal zone open coast study area which are considered likely to have changed or increased pollution to the waters of the southern study area since this time, particularly following the closure of the South Byron STP on Tallow Creek.

It is important to note that flows from Belongil Creek interact with the Northern Byron Shire coastline open coast study area (Cape Byron to South Golden Beach). These interfaces are discussed in brief in **Section 3.5.1**.

3.5.2.2 Estuarine Waters

There are three estuaries within the study area:

- Belongil Creek
- Tallow Creek
- Ti-Tree (Taylors) Lake.

Given the key contribution of wider catchment inputs to these systems such as urban and commercial stormwater runoff, and in the case of Belongil Creek, diffuse source agricultural runoff, acid sulfate soil runoff, and recycled effluent, the catchments of these estuaries form the extent of the study area (**Map G001**). The CMP(s) prepared for the Belongil and Tallow Creek estuaries and their catchments will take the place of Catchment Management Plans as further detailed in **Section 5.2.4**.

Within the study area there are a number of stormwater pipes that discharge into ICOLLs (see **Section 3.5.2.2**) or in some cases to beaches (e.g. at Broken Head Beach). The main outlet to Belongil Creek estuary is the Town Drain, which drains Byron Bay town centre. The outfalls are important for conveying stormwater from urban areas to reduce potential for local flooding. Yet they are somewhat undesirable given untreated urban stormwater can present an environmental issue for the ICOLLs as well as a health risk to beach users (through primary contact) as well as transport litter to the beach.

There is currently limited primary stormwater treatment infrastructure within the study area with future options limited due to low relief, land availability and drainage capacity (Alluvium, 2019a). For example, it is understood from discussions with Council staff that a GPT (HumeCepter) near the Butler St drain which didn't have sufficient head and was removed as part of the bypass works. However, Council has applied for a grant to design the Byron Bay drainage upgrade and if successful, that would include a constructed wetland (located at Butler Street drain). A constructed wetland is also planned (but not yet funded) as part of the Sandhills precinct project. In the Tallow catchment, the main stormwater treatment system is the Baywood Chase Lake, a discussion of which is provided below.

It is important to note that groundwater is also a contributing factor to estuarine water quality. An evaluation of groundwater information has not yet been completed. However, an important future issue that may require consideration is the potential for salt intrusion into the groundwaters in the low lying areas of Tallow Creek, Ti-Tree (Taylors) Lake and Belongil Creek as a result of sea level rise.

It should be noted that there are several water quality datasets within Council relevant to different functions/services of Council and to different projects, but there is no collated dataset of all water quality monitoring results for the catchments and estuaries. There is also, for example, catchment data that exists associated with the environmental impact statements for reconstruction of STPs (covering approximately 2004 to 2010), however this data is not collated and has not been reviewed as part of this Scoping Study.

Belongil Creek

The Belongil Creek estuary drains a catchment area of approximately 34 km² which supports a diverse range of land uses and industries including urban and industrial areas, agricultural areas and high value ecological areas including Cumbebin Swamp Nature Reserve and Tyagarah Nature Reserve. The Byron Bay township and Arts and Industrial Estate are the two major urban and industrial centres within the catchment, which discharge to the estuary via the Town Drain (also known as Butler St Drain) and the Union Drain, respectively. Agricultural areas are primarily used for grazing (Alluvium, 2019a).

In the last 100 years, particularly the most recent 50 years, there has been significant urban and industrial development within the Belongil Creek catchment, resulting in increased runoff and pollution into Belongil Creek. To manage flood risk and water quality issues within the catchment the estuary mouth is mechanically opened, which has allowed agriculture and urban development to expand within the catchment (Alluvium, 2019a). Regardless of whether the entrance is open or closed, one of the major drivers of estuary water quality in the system is inputs from the catchment (Alluvium, 2019a). Several land use developments within the catchment have impacted the Belongil Creek catchment and waterways as noted by Alluvium (2019a), including:

- Swamp drainage which resulted in loss of floodplain/wetland connectivity, changes to groundwater levels, changes to the extent of tidal influences and water quality impacts. Artificial drainage of land has also led to the oxidation of acid sulfate soils (ASS) through lowering of the water table and drying out the soil profile (particularly in the organic peat

layer). Following a rainfall event, the drains convey surface runoff along with the oxidation products directly into the downstream estuary

- Raising of Ewingsdale Road which impacts drainage pathways
- Filling to create railway embankments, blocking original drainage paths
- Past uses such as sandmining, meat works, whaling station, fish processing and dairy products processing which in part impacted water quality in and around the catchment but are no longer contributing to issues for the Belongil
- Current agricultural use and agricultural runoff is understood to increase nutrient and sediment loads into the estuary
- Significant development of Byron Bay town centre and the Byron Arts and Industrial Estate which increased stormwater generation and influenced drainage. This has also resulted in poor quality stormwater entering the estuary via the Town and Union Drains. Typically, this water is characterised by high biochemical oxygen demand, low dissolved oxygen and high inorganic nitrogen,
- Operation of the Byron Bay STP (formerly referred to as the West Byron STP, which commenced in 2005) and related effluent discharge and reuse within the catchment, and
- Byron Bay landfill site which impacted drainage pathways and water quality.

Belongil Creek catchment's drainage system has been significantly altered over time to enable the expansion of urban and agricultural development across the catchment's extensive low-lying areas. A large portion of the drainage network within the catchment is in the form of constructed drains, including the Union Drain from the west of the catchment. It is estimated that approximately 80% of land within the Belongil Creek catchment has either been cleared, drained or altered in some way, which has significantly altered the catchment condition and processes (Alluvium, 2019a).

A water balance performed for the estuary taking into account modelled catchment inputs, Byron Bay STP (previously referred to as West Byron STP), effluent releases and modelled tidal exchange (AWC, 2016a) identified that the key contributor of water to the estuary is the tide (68%), followed by catchment flows (31%), followed lastly by STP discharges (1%).

The Byron Bay recycled water management system was developed in 2005 as part of the Byron Bay STP upgrade, which included the decommissioning of the South Byron STP within the Tallow Creek catchment. The Byron Bay recycled water management system, comprising of the Byron Bay Integrated Water Management Reserve (BBIWMR) and the Byron Bay Urban Recycled Water Scheme (BBURWS), recycles 38% of effluent from the Byron Bay STP (BSC, 2018a).

The Byron Bay STP sits within the BBIWMR. Currently the STP discharges water to a 22 ha constructed wetland which provides treatment (e.g. reduction of phosphorous loads) and wetland habitat as well as the opportunity for evapotranspiration. Up to 3 ML/day of dry weather flow is discharged from the constructed wetland into the upper Union Drain, which then discharges to Belongil Creek. In addition, approximately 1 ML/day is recycled on the 24 ha irrigation area of regenerating floodplain forest/wetland which form part of the 100 ha BBIWMR (Alluvium, 2019a), and a portion is also discharged to the urban reuse scheme.

The increased effluent volume to the catchment and estuary:

- Provides important base flow during dry conditions in some areas and is likely to have reduced the impact of acid sulfate soils (ASS) and reduced the incidence of peat fires though this influence is not discernible on a catchment scale (AWC, 2020c)
- Correlates with more regular unassisted (i.e. natural) opening of the entrance, a reduced frequency of artificial opening events (on average, from five per year pre-2006 to two per year post-2006), and a reduced magnitude of rainfall required to trigger an opening event. This would have flow on effects for the catchment, including a decrease in flood events

within the Byron CBD and likely lower water levels within the lower Belongil Estuary (AWC, 2016a).

In wet weather, recycled water use is reduced, however uses such as toilet flushing and STP on-site reuse continue. The constructed wetlands and 24 ha irrigation area (also known as 24 ha Melaleuca site) include a buffer capacity to cope with excess effluent flows and irrigation is carefully controlled depending on groundwater levels. During extended periods of wet weather, surface and groundwater dynamics appear to be controlled by rainfall (and a subsequent increase in STP flows) and the status of the entrance (open vs closed) (AWC, 2019b; AWC, 2020c). STP flows likely account for a very minor fraction of the water moving through the drainage/creek system during these wet weather periods, estimated at approximately 0.05% of total wet weather catchment flows, which are currently discharged directly to the Upper Union Drain.

Nutrient and bacterial concentrations of effluent discharged/reused from the STP is generally well below the STP licence requirements and is typically of higher quality than elsewhere within the wider Belongil Creek catchment (AWC, 2020c). BSC are required to monitor total phosphorous fortnightly at the discharge point from the BBIWMR wetlands to the Upper Union Drain (EPA 4). The sampling results indicate that Total Phosphorus (TP) in effluent discharged is consistently under the EPL 90th percentile concentration limit of 0.3 mg/L with an average of 0.07 mg/L (Oct 2013 – Oct 2015; and Aug 2016 – Feb 2021), among the lowest of all surface water sites monitored in the catchment.

Council undertakes water quality sampling in Belongil Creek as part of the Byron Bay Surface Water Quality Monitoring Program, which has recently been expanded in 2020 to include additional monitoring sites in the Belongil and Tallow catchments. A brief review of water quality data collected under this Program and by AWC (2020c) identified that:

- Belongil Creek regularly has low dissolved oxygen (DO) and pH (i.e. acidic) at some sites
- Nutrients (NH₃-N, Total Nitrogen (TN) and TP) are regularly elevated throughout Belongil Creek, mostly associated with a closed entrance condition and/or extreme dry weather periods, which reduce catchment runoff (AWC, 2020c)
- There are some spikes in health indicators (faecal coliforms and enterococci) in Belongil Creek at times, most likely linked to rainfall events
- The Butler Street Drain which drains Byron Bay town centre experienced the highest levels of faecal contamination and was also an area of concern in terms of elevated nutrient concentrations
- Morans Drain appears to be an area susceptible to ASS oxidation and a source of Total Suspended Solids (TSS) and Ammonium (NH₄) to downstream environments.

Council also undertakes activity/event-based water quality sampling pre and 6 days post entrance management activity taking place i.e. berm scraping or an opening of the mouth. This sampling is focussed on physiochemical parameters only, including pH, turbidity, electrical conductivity (EC), DO and temperature at five sites.

Past management strategies for the catchment have had a significant focus on managing underlying humic acid sulfate soils in the low lying agricultural areas, particularly around Morans Drain and the Upper Union Drain with strategies recommended such as drain reshaping (shallowing), the vegetation regeneration of priority ASS areas, and installation of structures (e.g. drop boards/weirs) to decouple the upper catchment from the estuary. The regeneration of the 24 ha Melaleuca site within the adjacent BBIWMR and irrigation with STP effluent has reduced the incidence of acid runoff in the upper catchment, however the Morans Drain still experiences frequent periods of low pH (<3.5) surface water runoff. Future changes to the recycled water management scheme (e.g.

diversion of STP effluent away from the Upper Union Drain under the Additional Flow Path Project) should take into account the potential for ASS impacts in this area.

The proposed expansion of the industrial area and residential development of the West Byron area will result in increased loading of the STP which will be reflected in the outfall discharges. Impacts from future average dry weather flow (ADWF) scenarios were modelled as part of the Capacity Assessment of the Belongil Creek Drainage System: Development of a Preferred STP Effluent Flow Path (AWC, 2016a). The study incorporated a hydraulic capacity assessment (HAC) for current flows and projected 5ML/day and 8ML/day flows. The HAC accounts for key flow components (i.e. BBSTP, catchment and oceanic exchange), pollutant inputs/outputs and nutrient processes and provides a temporal prediction of pollutant concentrations within the estuary. The results indicated that a future potential increased discharge capacity (to 8ML/d) and commissioning of an alternative flow path (the Additional Flow Path Project) to the estuary via the Byron Arts and Industry Estate industrial drain, currently being designed is likely to:

- Result in little change in inundation and therefore ecological structure of the Belongil estuary and surrounding vegetation
- Result in short term changes in salinity and total nutrient occurring at times when the entrance is obstructed and further exacerbated when combined with a low rainfall period (which reduces catchment runoff to the estuary). During these periods, which are typically of the order of weeks to a couple of months, nutrients and salinity levels can increase more noticeably, but would still be regarded to fall within the range of water quality observed in an ICOLL style estuary
- Require continuation of some discharge via the existing release point to the Upper Union Drain to ameliorate potential impacts from acid runoff events and/or peat fires as have occurred in the past
- Require a detailed environmental monitoring plan, complete with triggers and actions including a review of the water quality monitoring program for the Belongil estuary to ensure fit for purpose for any additional flows including collection of baseline data prior to commissioning.

It is already apparent that for Belongil Creek, issues of water quality and tidal inundation, including the interaction of tidal waters and waves with catchment floodwaters, as well as ASS and land use of marginal, low lying agricultural land in the face of future risks such as climate change will be priority areas to be considered and addressed in the following stages of the CMP including the refinement and / or development of planning standards to manage water quality and flooding issues in the proposed West Byron development.

Previous management plans have included recommendations to install hydraulic controls / investigate decoupling of the upper catchment of Belongil Creek from the estuary to limit the interaction of drain and swamp water with the estuary. The *Belongil Estuary Study and Management Plan* (Parker and Pont, 2001) discusses such actions. The *Belongil Creek Entrance Opening Strategy* (Alluvium, 2019b) included preliminary consideration into the creation of weirs. The Strategy identified considerable uncertainties from this option which would require further investigation into the appropriate locations and type of water control structures required. Alluvium (2019b) noted that any further investigations into decoupling the estuary should be undertaken under the NSW Coastal Management Framework.

Tallow Creek

The Review of Environmental Factors and associated Environmental Management Plan and Opening Strategy for Tallow Creek (BMT WBM, 2015c; BMT WBM, 2015b) discuss water quality in the estuary and include water quality monitoring actions to be undertaken by Council. Water quality

within Tallow Creek is now monitored at five sites in the estuary under a number of circumstances, as directed by the Plan (BMT WBM, 2015b). The *Arakwal National Park Management Plan* (NPWS, 2007) has a commentary on poor water quality historically within Tallow Creek, that is linked to discharge of effluent from the South Byron STP (now closed) and the use of the adjacent areas as a night soil disposal site.

The South Byron STP operated from 1972 to 2005. It was decommissioned in 2005 once the Byron Bay STP commenced operations and its structures demolished in 2017, although the two tertiary treatment ponds (constructed in the 1960s and 70s (Cavvanba, 2012)) currently remain. Prior to its decommissioning the STP discharged approximately 60% of its tertiary treated effluent directly into Tallow Creek (SCU, 2005). Prior to operating as an STP the site hosted night cart operations from 1909. In March 2019, Council commenced remediation works at the site (excluding the two tertiary treatment ponds), including excavating and capping soils and contaminated material in a consolidated buffer zone, to make it safe for potential future redevelopment and use. The remediation project is expected to be finished in 2021.

Investigations of the former tertiary treatment ponds indicate minor exceedances of several heavy metals above marine and freshwater ecological criteria and of biological contaminants (faecal coliforms (below secondary contact guidelines), viruses and helminths) within surface waters of the ponds, otherwise described as of relatively neutral pH, fresh, poorly oxygenated and moderately reducing (Cavvanbah, 2012).

A biosolids/sediment layer up to 0.9m thick at the base of the ponds was found to contain elevated concentrations of several heavy metals above sediment quality guidelines as well as petroleum hydrocarbons (TPHs) C15-C28 (Cavvanba, 2012). The absence of a suitable lining below the biosolids layer raises the likelihood that the tertiary ponds are in connection with groundwater (Cavvanba, 2012). The possible connection of the ponds with groundwater and hence impacts on the adjacent estuary and its biota requires further investigation.

Council actively monitors flora, fauna and water quality in accordance with monitoring requirements of the *Environmental Management Plan and Opening Strategy for Tallow Creek* (BMT WBM, 2015c). A series of eight monitoring reports to date document monitoring from April 2016 to March 2020 (AWC, 2016b; AWC, 2017a; AWC, 2017b; AWC, 2018b; AWC, 2018c; AWC, 2019a; AWC, 2020a; AWC, 2020b).

These reports have been summarised in the *Tallow Creek Entrance Management Reporting – Review of Monitoring Program and Data Collected from Stage 1 (April 2016) to Stage 9 (October 2020)* report (AWC, 2021). During this monitoring period the estuary naturally opened a number of times, although it is speculated that the ‘natural’ opening event in November 2017 occurred as a result of members of the public artificially opening the estuary mouth. On this occasion the opening resulted in a fish kill, caused by very low levels of dissolved oxygen (DO) (AWC, 2018b).



Figure 3-3 Tallow Creek fish kill event in June 2019 (Source: ABC News <https://www.abc.net.au/news/2019-06-19/thousands-of-fish-killed-after-council-opens-lagoon-in-byron-bay/11223734>)

Tallow Creek was artificially opened by Council on 14 June 2019, resulting in a significant fish kill event due to low levels of DO (shown in **Figure 3-3**). The mouth had been closed to the ocean for approximately eight months with water levels above the 1.8 mAHD trigger for approximately 15 weeks prior to opening. The opening was conducted once the 2.2 mAHD trigger was reached and aimed to coincide with rainfall. The water quality was poor, including very low levels of DO recorded at depth in the main channel and in the upper catchment. Once artificially opened, the creek water level dropped from 2.2 mAHD to 0.4 mAHD in approximately 3 hours, resulting in the anoxic water from the upper catchment draining into the main channel. The existing set of conditions that forced the opening and the fish kill (long dry period, extended high water, berm height) are not catered for in the Management Plan. This was also the first opening completed by Council in 14 years.

Subsequent to the fish kill event in June 2019, an interim position was endorsed by consent authorities stating that mechanical opening of the Tallow Creek mouth is not supported (AWC, 2020a). In March 2020 Council consolidated the water quality parameters to be sampled to reduce costs, given artificial opening is currently not supported (AWC, 2020b).

Water quality in the upper Tallow Creek catchment is routinely poor, with nearly all parameters outside of the trigger values described in the Management Plan. Low DO concentrations are routinely observed at depth in the upper catchment with surface layers only marginally better. Nutrient levels are elevated throughout the estuary and above trigger values.

The current major source of contaminants into Tallow Creek is stormwater runoff from urban areas in the catchment and the constructed lake at Baywood Chase, which is a significant source of enterococci and cyanobacteria to Tallow Creek (AWC, 2020b).

The constructed lake at Baywood Chase in Suffolk Park was built in 1990 in conjunction with the development of surrounding housing and infrastructure. The lake was installed to provide stormwater retention for the surrounding areas and to treat first flush flows. The lake is in poor condition with a number of issues effecting water quality (e.g. limited aquatic vegetation, algal blooms, sediment accumulation and a source of bird faecal matter) and is a source of poor water quality into Tallow Creek. An investigation into the issues and options for improving management and rehabilitation of the lake was undertaken in 2018 with the addition of recycled water being the primary recommended strategy. The current feasibility of proposed options outlined in the management plan (including options other than recycled water use) should be reviewed as part of Stage 3 of the CMP.

Council undertakes monthly surface water monitoring at the outlet of the Baywood Chase constructed lake. Council has recently collaborated with Southern Cross University (SCU) and DPIE to install a multi-depth water quality logger in the lower reaches of Tallow Creek. The research project is multifaceted supporting a number of students projects and is assisting in providing information on DO and stratification that occurs in Tallow Creek. It will also inform the development of a real-time hydrologic model to assist in decision making – such as when is the best time to open the estuary (if required) to reduce low DO events and the possibility of fish kills. It is evident that further work on water quality issues at Tallow Creek will be required to improve our understanding of this estuary and such actions are expected to be a priority issue for the CMP and an important component of Stages 2 to 4.

Ti Tree Lake (also known as Taylors Lake)

The *Ti Tree Lake Aboriginal Area Plan of Management* (NPWS, 2020a) notes that the extent and history of the park's drainage system and its impacts on biodiversity have not been fully investigated. There is some evidence of drainage lines commencing at the Broken Head Quarry and close to a sediment dam in the Quarry, which would result in sediment flows into the park, which can smother vegetation and change the type of vegetation occurring. Three stormwater drains connecting the adjacent residential area to the park occur on the park's northern boundary. Runoff from these urban areas likely has elevated nutrient levels and pollutants (NPWS, 2020a).

3.5.3 Ecology

As detailed in the *Byron Shire Biodiversity Conservation Strategy 2020 to 2030* (BSC, 2020a), Byron Shire is located at the heart of the wet subtropical bioregion, one of the most biodiverse regions in Australia, which straddles the NSW-Queensland border. The Strategy identifies invasive species, land use and habitat fragmentation, climate change, and fire as key threats to biodiversity in Byron Shire. Council's Biodiversity Action Plan (within the Strategy) includes over 90 actions to improve biodiversity conservation in the Shire. Some of the actions relevant to this CMP Scoping Study, that relate to coastal planning, funding and grants and increasing community awareness, include:

- 1.8 – Support development of Byron Shire Climate Change Adaptation Plan and integration of biodiversity conservation actions into the Biodiversity Conservation Strategy
- 1.30 – Continue development of CMPs for the Shire's coastline and estuaries, ensuring CMPs are consistent with the intent of the Biodiversity Conservation Strategy
- 1.33 – Incorporate relevant elements of the Biodiversity Conservation Strategy (e.g. relating to coastal wetlands, littoral rainforest) into Council's CMPs, to increase potential for funding support through the State Government Coastal and Estuary Grants Program
- 2.11 – Inform the community of impacts of dumping green waste/rubbish in bushland, and promote use of green waste bins

- 2.13 – Seek opportunities to work with tourism operators to build capacity in environmental awareness
- 2.17 – In consultation with BOBBAC (Arakwal), increase inclusion of known Bundjalung language for place, plants and animals in Council biodiversity documents and outputs.

Note that a comprehensive review of all actions in Council's Biodiversity Conservation Strategy, along with actions proposed in other local, regional and state level strategies and plans (**Section 3.2.1**) will need to be undertaken at a later stage to ensure management actions identified in the CMP are complimentary and not duplicated.

The national park areas within the study area have extensive listings and descriptions of their respective habitats. For example, the *Ti Tree Lake Aboriginal Area Plan of Management* (NPWS, 2020a) details the native plants and animals present within the park, which includes littoral rainforest, coastal swamp forest, coastal dune dry sclerophyll forest, coastal heath swamps and wallum sand heaths. The park therefore contains EECs (which align with and contain several TECs) and the diverse vegetation communities and habitats of the park support a wide range of native animals, likely to include threatened species (NPWS, 2020).

3.5.3.1 Habitats

The study area contains a range of habitats, from ancient old growth rainforests to tall Eucalyptus forests, rocky outcrops, heaths, sedgelands, freshwater swamps, mangroves and saltmarshes (BSC, 2020). Plant Community Types in the Shire include those that align with the Endangered Ecological Communities (EECs) of Freshwater Wetlands on Coastal Floodplains, Coastal Saltmarsh, Swamp Sclerophyll Forest on Coastal Floodplains, and Swamp Oak Floodplain Forest in Northern NSW, which are regularly associated with floodplains, swamps and water courses and reliant on estuarine processes in coastal areas (**Map G003**). Coastal development and management works that include altered hydrological regime including dredging, tidal barriers, drainage and flood mitigation works, entrance works and altered inundation conditions, ground water alteration, and changes in surface water flows through drains, levees and flood gates have been identified as potential threats to these EECs. In addition, coastal areas also include the Byron Bay Dwarf Graminoid Clay Heath, Coastal Cypress Forest, Lowland Rainforest and Littoral rainforest EECs (DPIE, 2020).

Mapping by NSW DPI, identified all waters of the CBMP, Belongil and Tallow Creeks, Ti Tree (Taylors) Lake, and the Cibus Margil freshwater wetland in the Arakwal National Park to be Key Fish Habitat (**Figure 3-4**). These habitats are considered important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species.

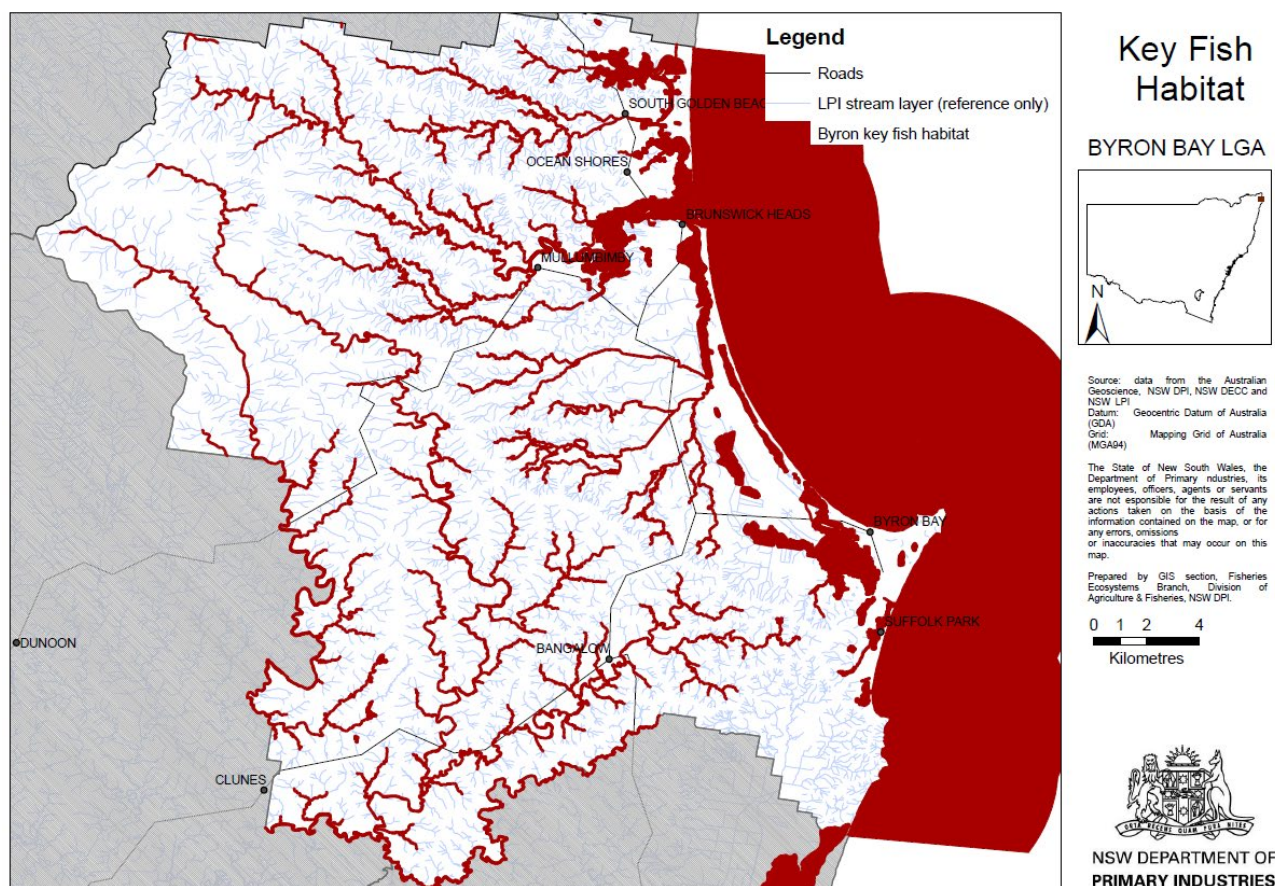


Figure 3-4 Key Fish Habitat (Source: DPI, 2020c)

3.5.3.2 Fauna

Coastal forests and fringing estuarine vegetation provide important habitat for fauna, including numerous threatened species. The *Byron Flora and Fauna Study 1999* (BSC, 1999) found the Shire to include significant populations of threatened Koalas and Bats, as well as various threatened amphibians, reptiles, birds and mammals. The Shire also contains 2,000 ha of koala habitat and 16 flying fox camps, some of which are managed under the *Byron Shire Flying-fox Camp Management Plan 2018-2023*, including two camps in Byron Bay township and the Beech Camp at Suffolk Park within the current study area. There is also an extensive system of national parks, nature reserves and conservation areas within the study area, which provide important refugia for native plants and animals, many of which are listed as threatened species or of conservation significance. Within the Byron Shire there are over 600 native animals, including 160 threatened animal species, and over 1,500 native plants, including 145 threatened plants species (BSC, 2020a).

3.5.3.3 Birds

Byron Bird Buddies have recorded over 300 bird species in Byron Shire of which 48 are threatened species. At least four threatened bird species nest on the Shire's beaches and rocky headlands:

- The vulnerable Sooty Oystercatcher
- Endangered Pied Oystercatcher
- Endangered Little Tern
- Critically endangered Beach Stone-curlew.

Byron Bird Buddies work closely with NPWS and other stakeholders (e.g. Elements Resort) to protect and closely monitor these very exposed and extremely vulnerable species in the nesting season (BSC, 2020a). In addition, numerous other birds including many protected and marine species such as the Red Capped Plover may also nest on the shoreline and beaches through Byron Shire. The coastal and estuarine waters also provide local foraging grounds for many passing migratory species, marine birds during movements towards the mainland shore, wading shorebirds and raptors that forage over vast areas of coastal and inland areas.

The Shire's rainforests, wetlands and estuaries are also an important winter-feeding resource for migratory birds and bats from Australia and beyond. A total of 27 different migratory shorebirds have been recorded using the Shire's estuaries, including Tallow Creek, Belongil Creek and the West Byron Wetlands. These saltwater wetlands are home to the critically endangered Eastern Curlew and endangered Little Tern and are a vital stop-over for migratory birds (BSC, 2020a). Many of these migratory birds are identified as being of conservation concern and are protected under migratory agreements (**Section 3.3**).

3.5.3.4 Marine and Estuarine Species

Marine life in the CBMP (which spans all of the marine areas of the study area) includes many species of marine mammals, fish, seabirds, marine plants and invertebrates such as sponges, corals and anemones. In addition, various aquatic and marine birds including threatened and migratory species may utilise wetland, floodplain, estuarine and coastal areas. This includes the BBIWMR constructed wetlands to manage treated effluent.

Estuarine waters of Tallow and Belongil Creek also provide important breeding habitat for fish, crabs and prawns, as well as important juvenile fish habitat. The majority of habitat for fish and marine species in Tallow Creek, Belongil Creek and coastal areas (up to to the High-Water Mark) are under the jurisdiction of the CBMP.

The shorelines, which include coastal dunes, sandy beaches and rocky headlands also provide important roosting and foraging habitat for shorebirds, while several threatened species are known to breed along the Shire's shoreline. Sandy beaches, especially along remote stretches, may also be used for nesting by both the threatened Loggerhead and Green Turtles. Beaches in northern NSW are becoming increasingly recognised as critical habitat for these marine turtle species.

Coastal waters include benthic reefs that include critical habitat for the Critically Endangered Grey Nurse Shark at Julian Rocks (adjacent to the CMP study area), as well habitat for other threatened and protected fish species. Julian Rocks is also recognised as a critical habitat site for the Grey Nurse Shark. The pelagic waters are also considered to support a diverse assemblage of fish, sharks and rays as a result of the warm waters from the north joining with cooler waters from the south. Various threatened and migratory sharks, and marine mammals may also travel through the Marine Park, including Humpback whales on their annual migration, making the area an important site for long-term monitoring of whale populations (DPI, 2020b).

3.5.3.5 ICOLLS

Tallow Creek

Tallow Creek is considered an ICOLL and regularly experiences rapid changes in environmental conditions, including water level, water quality and salinity changes. Major current ecological pressures within the Tallow Creek catchment include urban development associated with Suffolk Park and stormwater runoff associated with golf course and some agricultural land use (i.e. fertilisers, pesticides, organic matter i.e. cut grass).

Salinity in the estuary is very dynamic and strongly driven by rainfall and opening of the entrance. Although, the presence of freshwater macroinvertebrates indicates in most part salinity is low and tidal fluctuations are absent. In comparison with Belongil Creek, Tallow Creek has also been found to support a higher diversity of aquatic fauna including fish (Alluvium, 2019c).

Aquatic macrophytes such as seagrasses have not been mapped to occur in the lake and were not seen during a student study in 2013. However, the Arakwal National Park Plan of Management (NPWS, 2007) does report that seagrass was observed historically in the Creek. Fringing vegetation around the Creek also recorded a mixture of exotic and native plants (McDonald, 2013). Vegetation mapping shows several EECs to occur within the Tallow Creek catchment, including fringing the creek line. The catchment has also been found to include a high diversity of flora and fauna, which include many threatened species (BSC, 1999).

As noted by Alluvium (2019c), the larger water level fluctuations, reduced frequency of opening and reduced marine intrusion has resulted in Tallow Creek maintaining a greater ecological diversity when compared to the adjacent Belongil Creek. A comparative study by Hadwen *et al.* (2006) of Tallow Creek and Belongil Creek found that Tallow Creek had:

- Overall greater species diversity compared to Belongil Creek
- Numerous freshwater macroinvertebrates which were not found in Belongil Creek highlighting the low salinity and absence of tidal fluctuations in the system
- Freshwater bugs, polychaete worms, bivalve molluscs, greasyback prawns and false spider crabs
- Significantly more diversity in fish species compared to Belongil Creek.

Belongil Creek

Agricultural development, drainage works, urbanisation and mechanical opening of the estuary have drastically changed the ecological condition of Belongil Creek estuary and catchment. Nevertheless, the catchment supports a range of vegetation communities of high conservation value (many are protected as EECs under the *Biodiversity Conservation Act 2016*), including mangroves, saltmarsh, broad-leaved paperbark swamps and swamp oak forest, with fringing rainforest patches providing habitat for threatened plant species including the white laceflower and stinking Cryptocarya.

Mapping associated with the CM SEPP (**Map G004**) highlights significant areas of Coastal Wetlands and remnant pockets of Littoral Rainforest near the estuary entrance. Alluvium (2019a) identified erosion of the northern bank of the estuary threatening littoral rainforest and erosion of the northern bank of the estuary adjacent to Elements Resort.

Approximately one third of the Belongil Creek catchment area is considered to be wetland. Vegetation mapping indicates these wetlands include numerous EECs (**Map G003**), many of which are associated with wetlands. Land clearing in the catchment has resulted in fragmentation and loss of connectivity between ecological communities and regular openings of Belongil Creek to the ocean have altered the ICOLL ecological community. Approximately 20% of the catchment is used for nature conservation, including Cumbebin Swamp Nature Reserve and part of Tyagarah Nature Reserve (Alluvium, 2019a).

As previously mentioned, Belongil Creek and the adjacent section of Belongil Beach provide important habitat for migratory and resident shorebird species. Belongil Spit at the creek mouth is a historically significant nesting site for the endangered little tern and beach stone-curlew, and for the pied oystercatcher and red-capped plover. Although mudflats and sandflats within the Belongil Creek system are not extensive by the standards of most coastal waterways, they are of significance due to the relative lack of similar habitats in the local area and support a relatively high diversity of bird species over the course of a year (Alluvium, 2019a). The *Belongil Estuary Seabird*

and *Shorebird Management Plan* (Byron Bird Buddies, 2007) guides actions by Byron Bird Buddies and NPWS to protect shorebirds during nesting season. Council entrance opening activities are guided by the *Belongil Creek Entrance Opening Strategy* (Alluvium, 2019b) which aims to limit the risk of loss to shorebird habitat at the Belongil Spit.

The estuary supports a wide range of commercially and recreationally important fisheries species (including oysters, mud crabs, prawns, and fish), although neither commercial nor recreational fishing is permitted in the estuary. The estuary is also considered to be an important nursery habitat for juvenile fish (Alluvium, 2019a).

Belongil Creek is a Crown waterway with land below the mean high water mark (MHW) being Crown land. Crown land includes the seabed and subsoil to three nautical miles from the coastline of NSW that is within the limits of the coastal water of the state. There is also a DPIE - Crown Lands licence to artificially open Belongil Creek (Licence No 453621).

3.5.3.6 Threats and Risks

Historically, the greatest threat to biodiversity in the Shire has been the large-scale removal of vegetation and draining of low-lying areas for development, timber extraction and agriculture. This has changed local hydrology, impacted on water quality in estuaries and left a fragmented scattering of remnant ecosystems, many of which are compromised by weed species. Clearing has broken the linkages that allowed fauna movements and gene flow in the region, resulting in reduced ecosystem function and resilience. Clearing of riparian corridors also increases the risk of soil erosion, water pollution, sedimentation and degradation of ecosystems downstream (BSC, 2020a).

Historically, sandmining has also impacted coastal processes and the ecology of Tallow Beach through disturbance, loss of the original ecological species and their replacement with other species.

The outcomes of the Agency Workshop in October 2020 and the Aboriginal Representative Site Inspections were also used to inform ecological and other threats to the study area. These are discussed in further detail in **Section 4.3.2**.

3.6 Social and Cultural Context

3.6.1 Population and Demographics

Population data and demographics for Byron Shire is discussed in detail in BMT (2020). Key information is provided below:

- The major populated localities within the study area comprise Byron Bay and Suffolk Park
- The estimated resident population of the Byron Shire was 35,773 as of 30 June 2020 (.id, 2021)
- The future population of the LGA is projected to be 37,950 by 2036 according to the *North Coast Regional Plan 2036* (DPE, 2017). However, population growth in the shire was estimated at 2% between 2019 and 2020 (.id, 2021). If this rate were to remain consistent to 2036, the population would increase to approximately 49,000; far exceeding the DPE projection
- The *North Coast Regional Plan 2036* (DPE, 2017) indicates 'Investigate opportunities for additional employment land at West Byron Bay' and 'Deliver housing at West Byron' in the plan

- A snapshot of demographic data for the Byron Shire is reproduced in **Table 3-4** from the *Our Byron Our Future Our Community Strategic Plan 2028* (BSC, 2018d), which indicates:
 - The (resident) demographic of the Byron Shire is generally older than the NSW average and there are less couples with children
 - 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 NSW
 - There is generally a lower level of ethnicity (indicated by a non-English speaking background).

It should be noted that the demographic data presented above is pre-COVID-19, at which time Byron Shire was experiencing the highest rate of housing stress in regional NSW at 16.6% (.id, 2019).

Table 3-4 Snapshot of Byron Shire demographic data (Source: BSC, 2018d)

Parameter	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%
Bachelor or higher degree	24%	14%	23%	22%
Vocational	19%	24%	18%	19%
Unemployment	6.6%	6.62%	6.3%	6.9%

Parameter	Byron Shire 2016	Regional NSW	NSW	Australia
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%

3.6.2 Tourism and Visitation

Tourism and visitation data for Byron Shire is discussed in detail in BMT (2020). Key information is provided below:

- Tourism and hospitality related services are considered as the LGA's largest employer and of a scale similar to larger tourism focused cities; 27% of local jobs are in the tourism and hospitality industry and 16% of visitors stay in hosted accommodation. These activities provide Byron Shire residents with employment income (BSC, 2020c)
- Total visitation to the LGA has dramatically increased by nearly 50% over the period of 2014 to 2018 which is around four times the visitation rates across NSW as a whole
- There has also been a massive increase in day trippers to the LGA which has increased by 74% over the period 2008 to 2018
- Over the period of 2018/2019 the LGA was estimated to have had 2.21 million visitors. This was the highest on record at the time and set a new record for 'visitor nights' of 5.5 million (BSC, 2020c)
- 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
- 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 (**Section 3.4**).

It is recognised that much of this tourist activity is focussed on Byron Bay town itself (within the study area) and the beaches to the north of Cape Byron, which are not part of the study area. As part of Stage 2 of the CMP it will be important to separate tourist impacts across the various Stage 1 Scoping Study areas so that there is a better understanding of areas of concentration and likely development pressures in locations such as in the vicinity of Broken Head, Suffolk Park, the national parks of the Tallow Beach area and the resorts on the northern side of Belongil Creek.

3.6.3 Recreational Context

The study area is utilised for passive recreation i.e. swimming, surfing, dog walking, bush walking, etc and active recreation i.e. recreational boating and fishing and motorised watercraft.

There are no formal boat ramps in the study area. Boats and motorised watercraft can utilise the open coast waters of the study area. Note that motorised personal watercraft (including jet skis) and hovercraft for commercial or non-commercial purposes are prohibited within CBMP, unless use is by a regulatory authority, for safety purposes (e.g. by surf lifesaving clubs) or for an organised permitted event (i.e. training).

Belongil Creek and Tallow Creek estuaries are notably 'Special Purpose Zones' where fishing is not permitted except by permit or by Native Title Right owners. However, beach fishing is popular at locations such as off Tallow Beach.

Certain types of commercial fishing are also permissible off Tallow Beach/Suffolk Park Beach/Broken Head Beach and Seven Mile Beach and within the General Use oceanic waters off these beaches as indicated on the CBMP Zoning Map (DPI, 2020a).

Beach access with four-wheel drive is permitted on Seven Mile Beach (by permit only) immediately to the south of the study area (i.e. from the boundary with Ballina Shire Council south to the Lake Ainsworth Sport and Recreation Facility) (Ballina Shire Council, 2020). At Broken Head, motorised vehicle access is prohibited except for the purpose of launching boats in the vicinity of the access ramp. There is no dedicated vessel trailer parking area in Broken Head carpark. Vehicles and trailers must vacate the beach and park at a suitable location in accordance with local road rules (S. Court (NPWS), pers. comm, 19 April 2021).

3.6.4 Cultural Context

The Bundjalung of Byron Bay Arakwal People are the recognised Aboriginal Traditional Custodians of the study area and have lived in the coastal landscape around the Byron Bay area for at least 22,000 years. It should be noted that 22,000 years ago the current Byron Bay coastal area would have been an upland plain approximately 120m above sea level. Hence while there may well have been Aboriginal occupation of the land which currently forms the coastal zone of Byron Shire it is more likely the Aboriginal coastal dwellers 22,000 years ago were 10 to 20km further east, indicating the historical adaptability of the Aboriginal culture/communities to sea level rise. Within the Bundjalung Nation exist a number of recognised tribes, including the Arakwal Bumberlin People who occupied Arakwal Country, from south of the Brunswick River, extend west to Mullumbimby, Bangalow and Newrybar and to the south of Broken Head (Arakwal, 2019).

The study area also resides within the Tweed Byron Local Aboriginal Land Council (LALC) and the Jali 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 have 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.

In April 2019, Native Title Application NC2001/008 covering much of the study area was determined, with the outcome that native title continues in parts of the determination area, including near Tallow Beach and Belongil Creek estuary waterway (**Section 5.1.1**). The determination is supported by an ILUA that was registered in May 2020.

In addition, several ILUAs 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 (ILUA 1), registered in 2001, recognises the Arakwal People as the Traditional Owners of the Arakwal National Park. ILUA 1 led to the formation of Arakwal National Park, the first time a national park had been created under an ILUA in Australia (**Section 5.1.1**). The park is jointly managed by the Arakwal People and the NPWS. Subsequent ILUAs have strengthened ILUA 1.

Two subsequent ILUAs were registered in 2008. These ILUAs build on the ILUA 1 and cover nature reserves in Byron Bay plus additions to Arakwal National Park (ILUA 2), and the Ti Tree Lake Aboriginal Area (ILUA 3).

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 (ILUA 1).

There are a variety of culturally significant areas located in the study area. Some of the sites are listed on the Aboriginal Heritage Information Management Service (AHIMS) site, as shown on **Map G006**, which was searched on 20 October 2020. These culturally significant objects, resources and areas are at risk of loss due to coastal processes. They are also at risk of damage from people who are not aware of their presence/significance (i.e. by trampling) and by deliberate damage (i.e. vandalism).

The Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) have a site on Country to build a cultural centre which will be a key meeting place for Arakwal Bumberlin people. It is adjacent to the National Parks and Marine National Park headquarters. As well as a meeting and gathering place, the intent of the cultural centre is to hold workshops and activities there, as well as present cultural displays including art, music, dance, and publications and products for viewing and purchase.

3.7 Economic Context

Economic information for Byron Shire is discussed in detail in BMT (2020). There is a strong connection/link between social, cultural and economic values of the Shire to the coastal zone. The coast is a key driver of tourism, commerce and property having evolved together over previous years. Key information is provided in the following sections.

3.7.1 Tourism as a Key Driver of the Local Byron Economy

- The economy of the Byron Shire is supported by a strong tourism market
- Byron Shire is a recognised international destination
- The surf, beaches and waterways along with aspect (i.e. views, landmarks and whale watching) etc. were identified amongst the top destination drivers for the Shire (BSC, 2014a), supporting the overall demand for tourism in the Shire, involving industries such as surf schools, diving companies, fishing charters, dolphin and whale watching tours, etc
- The importance of the coastal zone (i.e. study area containing the near shore waters, beaches and foreshores and estuaries) when considered as a destination driver is able to be clearly linked to tourism
- The value of beaches was investigated in the WRL (2016) *Coastal Hazard Management Study – Byron Bay Embayment*, which estimated the economic value of beach-related tourism expenditure in Byron Shire at over \$93 million per year. This was based on 2016 tourism data, with actual tourist numbers increasing significantly since 2016 (prior to the COVID-19 pandemic)
- Over the period of 2018/2019 the LGA was estimated to have had 2.21 million visitors. This was the highest on record at the time and set a new record for 'visitor nights' of 5.5 million (Destination Byron, 2020).

3.7.2 Employment Profile

- In 2018/2019 the largest employment industry type in the Byron Shire is Accommodation and Food Services (i.e. supporting tourism), followed by Retail Trade, Health Care and Social Assistance, then Education and Training (.id, 2020b)
- There 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 from FY13 to FY18
- 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.

3.7.3 Economic Indicators

- Byron Shire's Gross Regional Product (GRP) of \$1.84 billion accounts for 0.3% of the NSW Gross State Product (.id, 2020a)
- 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
- 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.

3.7.4 COVID-19

In terms of the COVID-19 pandemic, while Byron Shire has been adversely impacted (gross regional product forecasts down by at least 3% relative to pre-COVID-19 performance) it has performed relatively well in comparison to the rest of NSW (a 4% decline in productivity). Impacts due to COVID-19 have been partially ameliorated due to increased domestic tourism and growth in working from home employment arrangements and “tree-change / sea-change” lifestyle choices. The median to long term impacts of COVID-19 on the regional economy are poorly understood at this stage. However, preliminary data suggests a return to pre-COVID-19 economic structure is likely to gradually occur over the next five years. In terms of the CMP, it is unlikely that COVID-19 will materially affect the need for the CMP or its proposed solutions and benefits.

3.8 Future Context

3.8.1 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 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 tailored individual approaches to climate change mitigation and adaptation. Mitigation is primarily directed towards immediate action on minimising Council's carbon footprint through the recently adopted Net Zero Emissions Action Plan for Council Operations 2025 and promotion of

renewable energy sources. Council has recently completed an internal Climate Change Risk Assessment which forms the basis for developing Council's Climate Adaptation Plan (for completion mid-2021).

As discussed in **Section 3.5.1** and the Coastal Processes Report in **Appendix E**, the potential impacts on the sediment budget due to changes in the climate will need to be understood for sound coastal management. Various studies have assessed climatic change and its impacts on sediment transport along the east coast of Australia, including Goodwin *et al.* (2016) and suggest a poleward shift of the tropics. Possible implications are a reduction in northward longshore transport and efficiency in headland sand bypassing at Cape Byron and Broken Head, along with changes in the wave energy.

Recent studies investigated the present-day shelf sand deposits and the contemporary sand budget response to future wave climate changes (Ribo *et al.*, 2020). This is relevant when assessing the future coastal hazards at Byron when considering potential changes to the rate of onshore sand supply to Tallow Beach, which climatic changes may also impact.

3.8.1.1 Sea Level Rise, Temperature and Rainfall

The 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.

Council's *Climate Change Strategic Planning Policy No 14/006* (2014b) has accepted sea level rise parameters of 0.17 to 0.38 m by 2065, and 0.26 to 0.82 m by 2100, which are used for strategic, infrastructure and operational planning. However, this Policy is based on global projections in sea level rise from the IPCC (2013) Summary Report for Policymakers, as well as DECCW's *NSW Sea Level Rise Policy Statement* (2009), both of which are now outdated.

Council's current parameters are generally consistent with the sea level rise provisions of 0.4 m by 2050 and 0.9 m by 2100 adopted within the *Byron Shire Coastline Hazards Assessment Update* (BMT WBM, 2013). The policy does note that if there is more current scientific analysis at a regional level, then the more current parameters shall be applied.

The latest advice from IPCC (2019) on sea level rise calls for increases to the allowances in previous documents. The latest global sea level rise (above 1986 to 2005 baseline) projections for the 'likely' scenario are 0.43 m for RCP2.6 and 0.84 m for RCP8.5 by 2100 (see **Figure 3-5**). Hence, the adopted values in Council's Climate Change Strategic Planning Policy need to be reviewed when considering sea level rise impacts on the study area as part of later stages of the CMP.

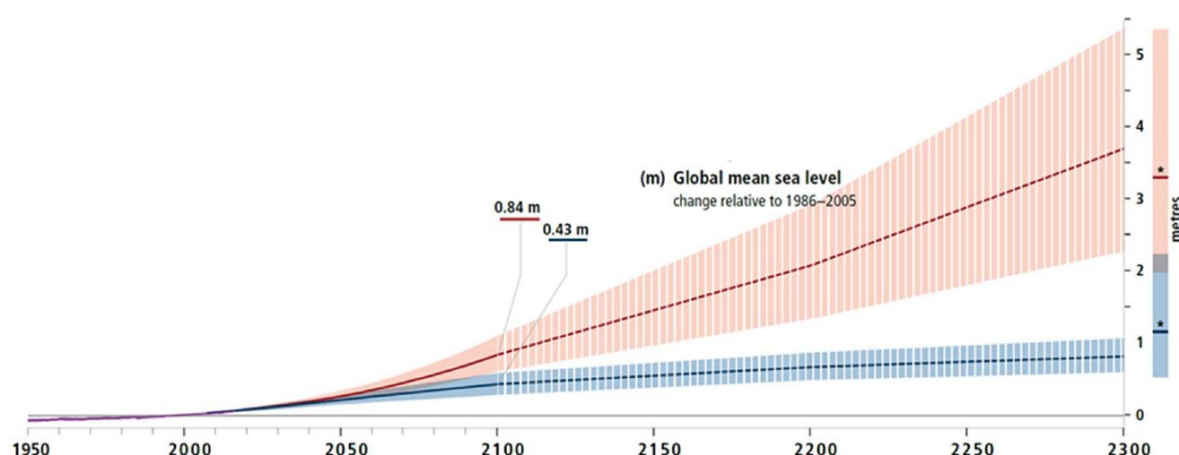


Figure 3-5 Global sea level rise projections above 1986 to 2005 baseline: (blue) low (RCP2.6) and (red) high (RCP8.5) greenhouse gas emission scenarios (Source: IPCC, 2019)

The number of hot days and warm nights per year and the length of heatwaves are also predicted to increase based on the same RCP scenarios (CoastAdapt, 2017), as are sea surface temperatures (IPCC, 2019). The number of very wet days and number of dry months per year are also expected to increase based on the same RCP scenarios (CoastAdapt, 2017).

Given the low lying nature of much of the developed, and projected to be developed, land in the vicinity of Belongil and Tallow Creeks, and given that these areas are already prone to flooding, any increase in sea levels and/or storm induced ocean levels at the entrances to these waterways is likely to have significant implications for the development. This potentially includes the existing industrial estate at West Byron. Stage 2 of the CMP should investigate the coastal inundation of these areas, including under various climate change scenarios. Future flood studies should also look at joint probability of these elevated ocean levels and catchment rainfall driven flood events.

Sea level rise will have impacts on the coastal processes of the study area. However, until coastal processes are clarified with further sediment transport analysis (**Section 3.5.1**), the findings of BMT WBM (2013) may not provide a complete understanding of the potential future conditions.

3.8.1.2 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 (BMT, 2020).

Indirect impacts on water quality as a result of climate change may occur as a result of increased shoreline erosion from sea level rise and associated ASS issues.

3.8.2 Population Growth

DPIE prepares population projections for the state, regions and all local government areas in NSW. The 2019 NSW population projections are the government’s common planning assumptions until

they are updated in 2022. Based on the 2019 projections the population of the Shire is projected to be 37,550 as at 2036 and 37,950 as at 2041 at an annual increase of 0.51% (NSW Government, 2021).

The Byron Shire Residential Strategy (BSC, 2020d) projects the expected housing to be delivered between 2016 – 2036 by town and village with associated likely demographic change. It notes the North Coast Regional Plan 2036 (NCRP) as adopted in 2017 identified based on population growth at a projected 37950 residents by 2036, Byron Shire should plan to deliver a minimum of 3,150 dwellings across the Shire over the next 20 years. The Strategy apportions the majority of housing (approximately 85%) to be delivered in urban areas. An additional 10% contingency has been allocated in urban areas to provide housing stock used as short term rental accommodation recognised by the NSW government to be at very high levels in Byron Shire. The Strategy has completed analysis of possible dwellings within a 2036 timeframe, which considered development on existing residential land, new release lands and infill development. 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 densities and styles (such as medium density, affordable or innovative housing, etc.) and evolving community needs for housing over time.

The current supply of residential zoned land is insufficient to meet these future housing needs. New release areas are required to supply approximately 28% of future dwellings needs.

Within the study areas urban areas, this dwelling demand by 2036 equates to the following as shown in **Figure 3-6**:

- Byron Bay and Sunrise urban areas: 913 dwellings as either infill or in vacant areas approved for residential development (including allowance for 650 additional dwellings at West Byron), and 33 dwellings in investigation areas with a potential additional 2288 people, i.e. population increase of 31% (noting that these population projections are not precise predictions)
- Suffolk Park urban area: 95 dwellings as infill with a potential additional 209 people, i.e. population increase on 3%.

Referring to the Strategy, the projected (pre-Covid) age profile of residents in 2036 compared to 2016 (refer **Figure 3-7**) shows a minor decrease in percentage change in most age categories other than for older residents with an expected 7% increase in residents aged 65-84 by 2036.

More recent NSW government DPIE 2019 population projections provided in LGA factsheets (DPIE, 2019) indicate that by 2041, in the order of 35% of the population is expected to be 60 years of age or older.

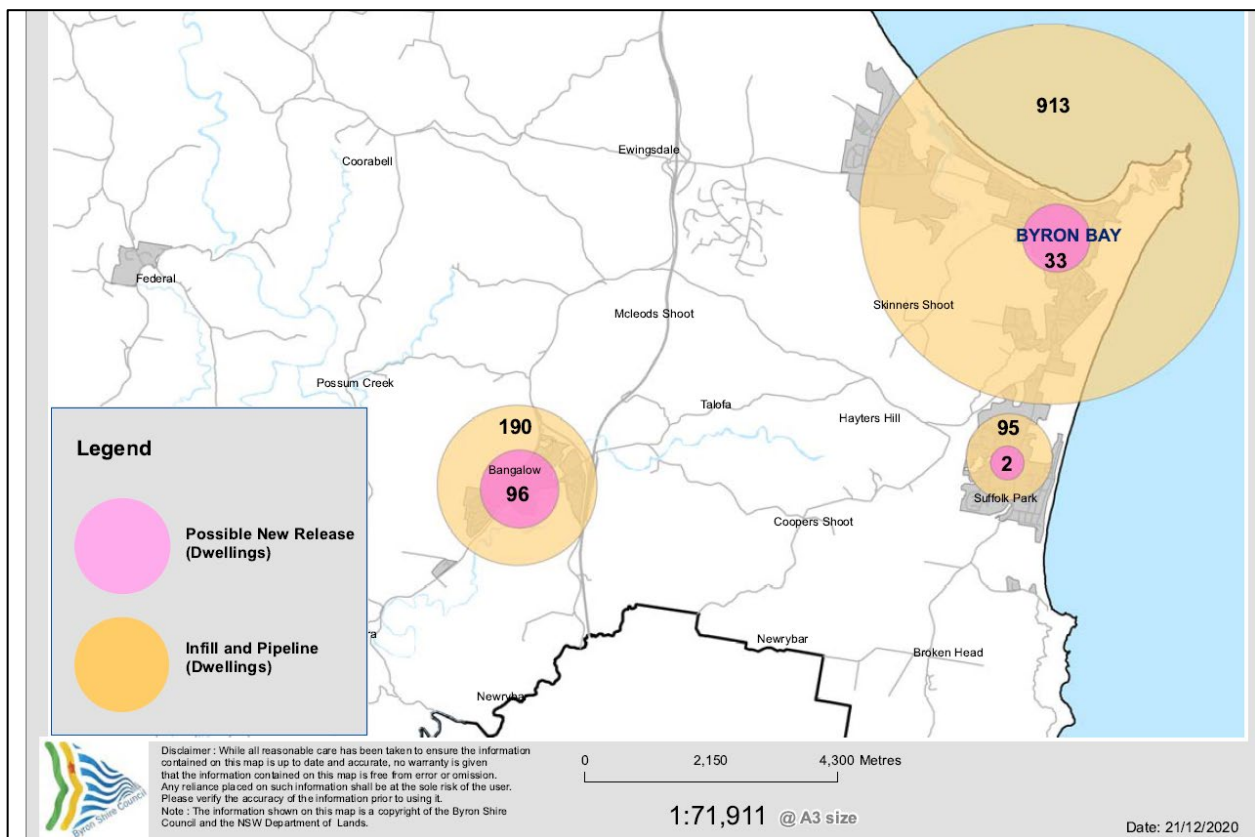


Figure 3-6 Urban housing supply distribution in the study area by 2036 (adapted from BSC, 2020d)

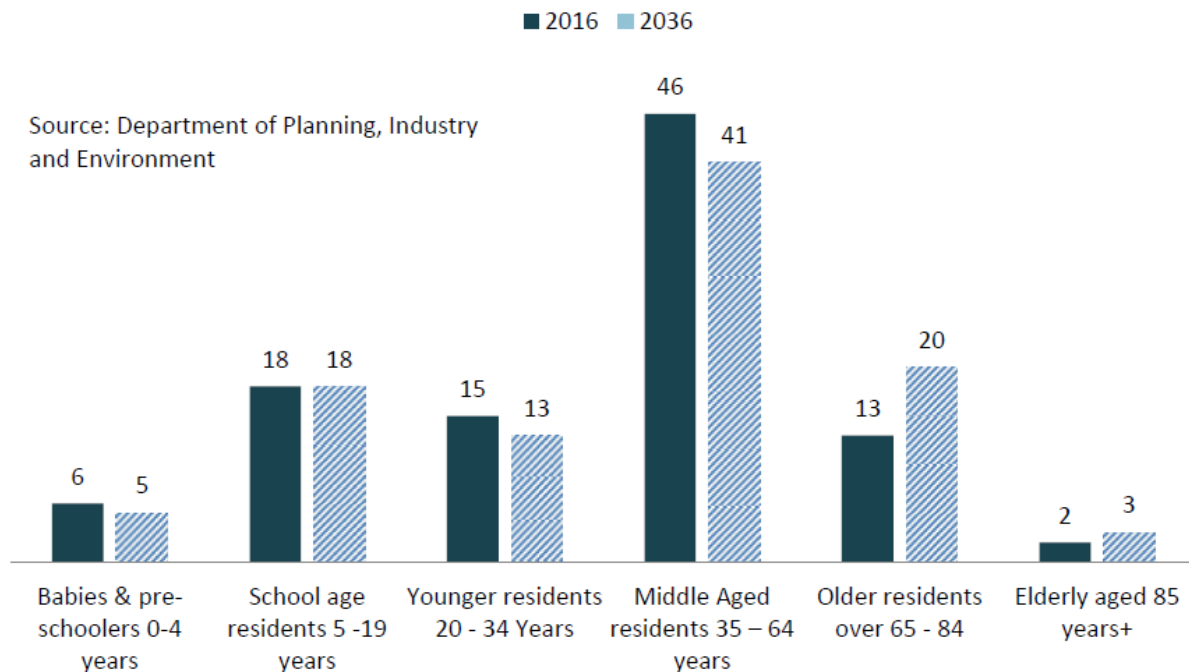


Figure 3-7 Projected percentile change in life-stage profiles for Byron Shire residents between 2016 and 2036 (Source: BSC, 2020d)

4 Scope of the CMP

This chapter identifies the key management issues for the study area and identifies and maps the spatial extent of coastal management areas that are included in the CMP.

Each council has different experience, issues, challenges and opportunities in coastal management. The scope of a CMP may be specific to local circumstances, the community and coastal environment and may depend on a range of other factors.

This scoping study provides a review of the four coastal management areas mapped in the CM SEPP within the study area. Management issues for each management area are identified across a range of planning timeframes, and consider the vulnerabilities and risks associated with a range of future scenarios, likelihoods and consequences. This scoping study also provides recommendations regarding the geographic scope of the CMP for Stages 2 to 4.

4.1 Coastal Management Areas

The coastal zone, as defined by the CM Act, means the area of land comprised of the four coastal management areas as intended to be mapped in the CM SEPP. It is noted that to date only three of the four have been mapped in the CM SEPP with the Coastal Vulnerability Area being the outlier. However, all four coastal management areas have been included in the scope of the CMP, as shown in **Map G004**, being:

- Coastal Wetlands and Littoral Rainforests – these are of particular relevance given the estuaries within the study area. Specific information relating to coastal wetlands and littoral rainforests within the study area can be found in **Section 3.5.3**
- Coastal Vulnerability Area – the study area has a range of vulnerabilities. Specific information relating to coastal vulnerability can be found in **Section 3.5**. It is noted that as there is presently no mapping for the Coastal Vulnerability Area within the CM SEPP, part of preparing a CMP will include consideration as to the need for, method of and the proposed timing associated with mapping a Coastal Vulnerability Area
- Coastal Use Area – the study area has a range of existing uses and a series of planned future uses. The extent of the use area requires further consideration as part of the CMP process
- Coastal Environment Area – the environment area might be considered to be the extent of the catchments contributing to the estuaries within the study area. Although these coastal management areas do not include the broader catchments of each estuary, these catchments have been included in the study area, based on the threats from the catchments on estuary values. The extent of the environment area requires further consideration as part of the CMP process.

Ultimately, a key purpose of the CMP is to provide direction on:

- Whether an update is required to the mapping that accompanies the CM SEPP in its current form
- The need for, methodology, determination, and timing of adoption of a Coastal Vulnerability Area map (the mapping in its current form is shown in **Map G004**).

Council plans to commence a Coastal Hazard Assessment in May 2021, scheduled for completion by the end of 2021. This study was recommended by BMT (2020); study number S2.03 and would be used in developing any Coastal Vulnerability Area map.

Discrepancies have been identified between Council's mapping of Littoral Rainforest and Coastal Wetlands and the CM SEPP mapping. These discrepancies should be quantified as part of Stage 2 of the CMP and if required a planning proposal may be submitted as an outcome of the CMP to update the SEPP mapping. Alternatively, Council can adjust its own mapping to match the SEPP mapping without the need for a planning proposal.

4.2 Geographic Scope

The coastal zone is made up of a combination of the four coastal management areas discussed in **Section 4.1**. The area covered by a CMP may include all or any part of the coastal zone but may also cover areas outside of the mapped coastal zone (e.g. wider estuarine catchments), where the management of an external area has a significant impact on issues within the coastal zone. This helps to ensure that actions are integrated and undertaken at an appropriate scale to address the issues.

The conclusion of this Scoping Study is that a CMP (or series of CMPs) should be developed for the full study area considered in this Scoping Study (**Section 1.2** and **Map G001**); including the open beaches, foreshores (extending inland to the predicted maximum year 2100 coastal hazard) and coastal waters (extending three nautical miles offshore) from the local government boundary at Seven Mile Beach in the south, to Cape Byron in the north. The study area also includes the catchment of Belongil Creek, Tallow Creek and Ti Tree (Taylors) Lake estuaries. This conclusion is based on the outcome of the preliminary business case (see **Section 8**).

Following the completion of this Scoping Study, Byron Shire Council will have two Scoping Studies (Rhelm, 2021 and BMT, 2020) that cover the northern and southern portions of the Shire's coastal zone, as well as the catchments draining to three key estuaries (Belongil Creek, Tallow Creek and Ti Tree Lake). Both Scoping Studies have recommended that Stages 2 to 5 of the CMP be continued for the full extent of the study areas assessed at Stage 1 to date.

Depending on Council's available resources, and DPIE funding availability, Council has several options with how it proceeds into Stages 2 to 5 with regards to the geographic extent of the individual CMPs, as follows:

- 1) Retain existing Study Areas for which Scoping Studies have been/ are proposed to be undertaken:
 - Northern Shire CMP: geographic scope as per BMT (2020), i.e. coastline from Cape Byron to South Golden Beach excluding the Brunswick River estuary
 - Southern Shire and Belongil Estuary CMP: geographic scope as per this Scoping Study
 - Brunswick River estuary (Scoping Study proposed as a future priority)
- 2) Combined CMP for the entire coastal zone of the Shire
- 3) An Open Coast CMP and a Catchments and Estuaries CMP, as follows:
 - Open Coast CMP: geographic scope to include the open coastal zone and tidal entrances of estuaries for the entire Shire (i.e. the northern and southern study areas) in a single CMP
 - Catchments and Estuaries CMP: geographic scope to include Belongil Creek, Tallow Creek, Ti Tree (Taylors) Lake and Brunswick River estuaries, waterways and catchments. This could be undertaken in a single CMP or series of individual CMPs for each estuary or a combination thereof (e.g. an ICOLL CMP and Brunswick River estuary CMP).

Council is likely to proceed with several key Stage 2 assessments before confirming the preferred approach.

4.3 Key Management Issues Considering Values and Threats

Key management issues within the study area have been identified as an outcome of the literature review provided in **Section 3**, consideration of the *New South Wales Marine Estate Threat and Risk Assessment Report* (TARA) (BMT WBM, 2017), stakeholder engagement that resulted in the Cape Byron to Golden Beach CMP Scoping Study (BMT, 2020) and stakeholder engagement activities undertaken for the current study area to date.

As noted by BMT (2020), in order to undertake the first pass risk assessment, the values of the coastal zone and threatening processes or issues affecting the coastal zone and its values require definition. Understanding the values of the coastal zone in terms of environmental, social, cultural 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.

4.3.1 Values of the Study Area

The values of the study area are expansive. Values relate to aboriginal cultural heritage assets, the physical assets of the coastal zone itself (e.g. the natural character and scenic beauty of the Byron coastal zone), the recreational and leisure activities that are highly prized by the community (residents and visitors), the way community interacts with the coastline and estuaries, and the economic benefits of the coastline/estuaries and the flow on effects through the Shire and further afield (BMT, 2020).

A classic “triple-bottom line” approach was used by BMT (2020) to define the environmental, economic and social values of the Byron coastal zone and these are directly applicable to the current study area. The development of these values is discussed in detail in **Section 3.4**.

The eleven priority values of the study area are shown in **Figure 4-1**. These values were developed building on the values developed by BMT (2020) for the northern coastal zone of the Shire (Cape Byron to South Golden Beach) using the TARA (BMT WBM, 2017) and modified through the literature review and consultation with stakeholders and the community specific to the study area. Some of the comments received from the community during the online survey regarding community values are shown in **Figure 4-2**. The list of values remains similar to BMT (2020) for consistency between the two Scoping Studies however the wording and prioritisation of some of the values differs slightly based on updated community and stakeholder feedback (e.g. Aboriginal cultural heritage and use was increased in priority). One additional economic value for agricultural, industrial and urban lands was also added to capture the economic benefit of these low-lying lands that are currently or may be threatened into the future by, for example, tidal inundation.

Note that there is significant overlap of values across categories, for example, to Aboriginal people the natural environment is inseparable from their culture. Biodiversity to Aboriginal people is their stories, their social bonds, their food and medicines, their knowledge and their totems (BSC, 2020a). Similarly, good water quality (Value 3) supports many of the other values, including Values 1, 2, 9 and 10.

An assessment of the vulnerability (including sensitivity and tolerance) of environmental, social/cultural and economic values as shown in **Figure 4-1** to coastal risks is included in the risk assessment described in **Section 7.2** via consideration of risk at 20, 50 and 100 year timeframes.

Based on information compiled to date, pressures (stressors) in the study area, as concurred by BMT (2020), include:

- Trend of increasing visitation, including population and tourism growth to the area
- Trend of increasing demand for coastal development opportunities, leading to coastal development pressures
- Trends associated with climate change and sea level rise.

Many, if not all, of the key values of the study area are vulnerable to these stressors to some degree.

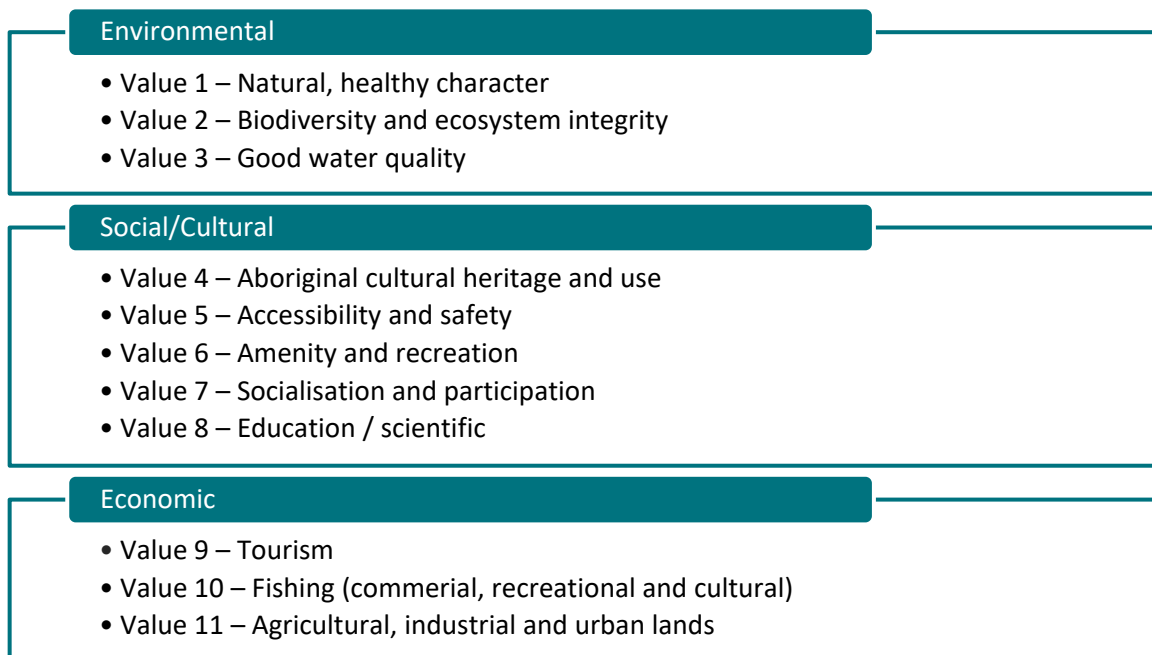


Figure 4-1 Priority values of the study area

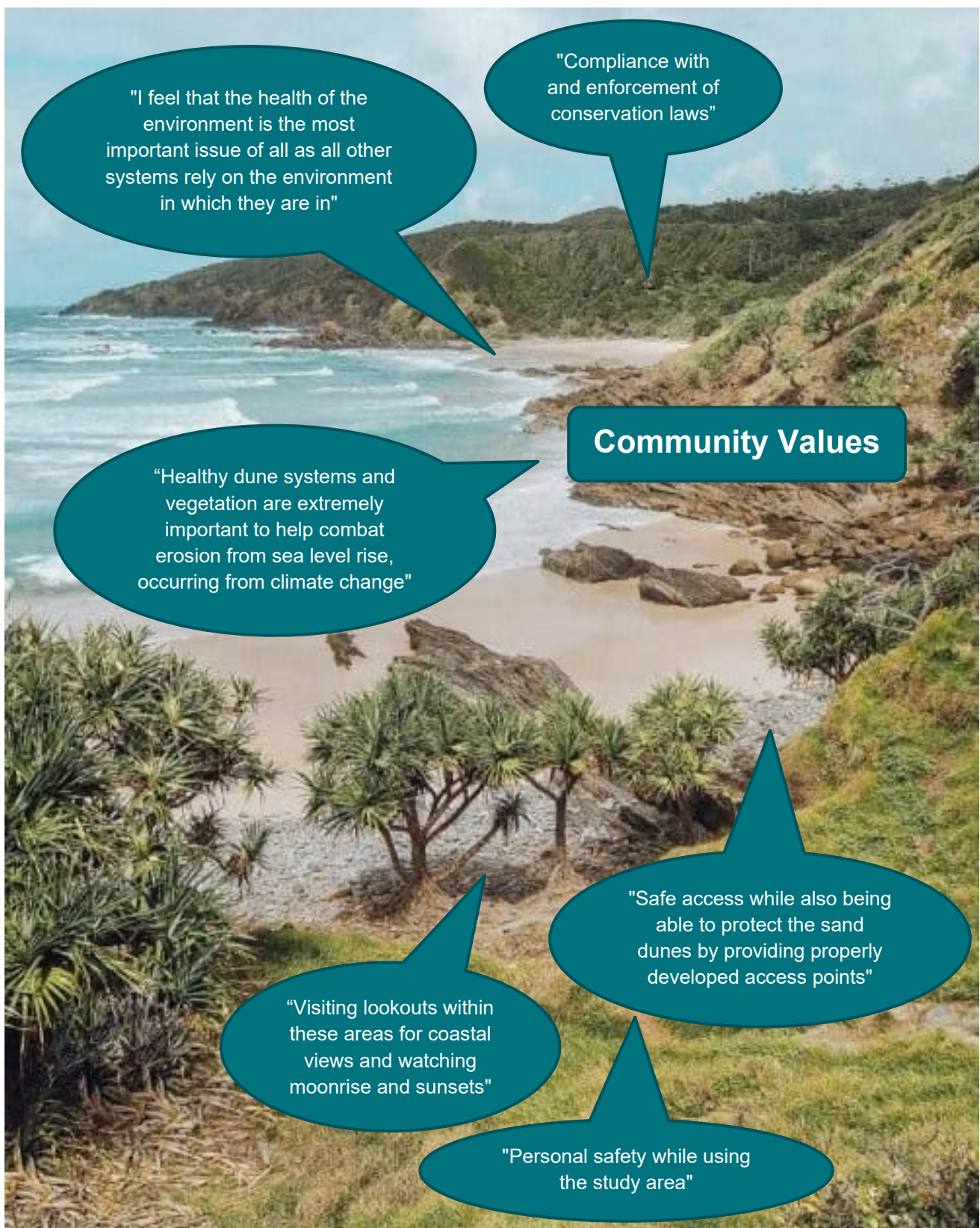


Figure 4-2 Community thoughts and ideas on the values of the study area (Quotes source: Appendix B Community Survey Results, Questions 1 and 2, Image source: <https://jonnymelon.com/broken-head-byron-bay/>)

4.3.2 Threats to the Study Area

A substantial list of potential issues (threats) from the same sources as used for the values (i.e. BMT (2020), TARA, CM Act, community and stakeholder feedback, etc.) was developed and then refined through the course of developing this CMP Scoping Study to 24 priority threats, under four themes, as shown in **Figure 4-3**. These threats have incorporated stakeholder feedback received at the first pass risk assessment workshop and community feedback received during the community survey from December 2020 to February 2021 (summarised below).

The BMT (2020) Scoping Study contained 18 threats. Six additional threats have been added for this Scoping Study and some threats have been re-worded for the current study to be more inclusive (i.e. to include the estuaries), but the general theme of each threat and the numbering system has remained consistent with BMT (2020) for consistency between the two Scoping Studies. The numbering system for the threats in no way denotes a priority order.

The Coastal Hazard threats generally align with the definition of ‘coastal hazard’ in the CM Act. Tidal inundation has been added in as Threat 3b in this Scoping Study, in order to include Belongil Creek, Tallow Creek and Ti Tree (Taylors) Lake estuaries in the scope. Similarly, erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters has been added in as Threat 3c. Consideration has also been given to the six issues identified in the *Byron Shire Biodiversity Conservation Strategy 2020 to 2030* (BSC, 2020a).

Many of the other identified threats have been derived from the statewide TARA, with particular note given to Table 5-2 in the TARA, the ranked priority threats for the North region, which includes the Byron Shire. **Table 4-1** shows the top five priority threats to environmental assets and to social, cultural and economic benefits for the North region as identified in the TARA and indicates how these have been captured in the threats developed specifically for the study area in this CMP (**Figure 4-3**).

The lack of Aboriginal involvement in decision-making has been identified as a major threat to culture state-wide in the TARA and Marine Estate Management Strategy (MEMA, 2018) and was reiterated during community engagement for this scoping study (see Threat 19 in **Figure 4-3**). The need for Aboriginal cultural knowledge and expertise to be incorporated into the ongoing management of Land and Sea Country is recognised by government (MEMA, 2018). Adequate engagement is required with Traditional Owners of the study area to ensure the Aboriginal cultural heritage and use within the area is maintained, knowledge of it is shared (in a sensitive manner) and to ensure the community/visitors to the area are aware of the cultural values of the study area.

In interpreting the outcomes of the community consultation undertaken for this Scoping Study (particularly Questions 3 to 6), the highest priority threats as perceived by the community were able to be determined as shown in **Table 4-2**. Some of the comments received from the community during the online survey regarding management threats are shown in **Figure 4-4**.






Climate change and associated sea level rise, as well as population and tourism growth and coastal development pressure are all stressors that will exacerbate the impacts from the identified management issues into the future.

The 24 priority management issues (threats) of the current study area have been identified as listed in **Figure 4-3**, informed by the work undertaken by BMT (2020). A first pass risk assessment was undertaken for these management issues, which is documented in **Section 7**.

Table 4-1 TARA highest priority threats for NSW North Region and their incorporation in this CMP

TARA Ranked Priority Threats for the North Region (BMT WBM, 2017)	Captured in this CMP Scoping Study (refer Figure 4-3)
Threats to Environmental Assets	
<i>Estuary entrance modifications</i>	Threat 4b has been added in this Scoping Study to include entrance modifications, to capture interventions in the natural opening regimes of Tallow and Belongil Creek ICOLLs
<i>Clearing riparian and adjacent habitat including wetland drainage (in estuaries)</i>	Incorporated in Threat 8
<i>Agricultural diffuse source runoff (in estuaries)</i>	Threat 14b
<i>Climate Change (20yrs)</i>	Incorporated in Threat 2. Also considered as part of all the Coastal Hazards threats as the impacts of these hazards will be exacerbated in the future with climate change and sea level rise
<i>Urban stormwater discharge (in estuaries)</i>	Threat 14a
Threats to Social, Cultural and Economic Benefits	
<i>Water pollution on environmental values - urban stormwater discharge</i>	Threat 14a
<i>Water pollution on environmental values - Agricultural diffuse source runoff</i>	Threat 14b
<i>Water pollution on environmental values - litter, solid waste, marine debris and microplastics</i>	Incorporated in Threat 14c, which has been expanded to include litter/solid waste pollution of beach sand as well as other habitat areas (such as nature reserves), based on feedback from the community survey
<i>Inadequate social and economic information</i>	Incorporated in Threat 17
<i>Lack of compliance with regulations (by users) or lack of compliance effort (by agencies)</i>	Threat 16, noting that 'effort' is not considered the problem but rather resourcing is, as there are not enough officers (due to insufficient funding) to undertake action. This management issue was well recognised and much discussed in feedback from the community survey, consistently tied to overuse and overcrowding of natural areas within the study area and a perceived lack of facilities available for the volume of visitors to the study area

Table 4-2 Highest priority threats as determined through community consultation

Icon	Threat	Details Indicated by Respondents
	Lack of compliance with regulations	<ul style="list-style-type: none"> Illegal activities consistently mentioned included bush parties (doofs), dogs in areas they shouldn't be, dog waste not being collected, littering and dumping of large waste items, illegal camping, illegal campfires, illegal four wheel driving on the beaches and dunes, human waste on the dunes and in the bush, drug dealing and assaults Impacts from illegal activities include damage to bush and dune vegetation, wildlife disturbance and wildlife deaths, risks to public safety Additional facilities such as public toilets, parking, bins, etc are required to cater for the visitor volumes More funding and support is required for Council in order for Council to more effectively manage the area and enforce regulations Better education of visitors and the community is required, which could be done through improved and multi-lingual signage at all beach and national park/nature reserve entry points
	Litter	<ul style="list-style-type: none"> Litter impacts the amenity and health of marine and aquatic ecosystems There are a lack of rubbish bins near beach entrances Excess litter is related to large numbers of visitors without adequate facilities for them (overuse and overcrowding of the study area)
	Urban development on the coast and estuaries	<ul style="list-style-type: none"> Over development, over use and over crowding are key issues Prevention of future urban development in inundation/coastal hazard zones and environmentally sensitive areas is required
	Impacts on vegetation	<ul style="list-style-type: none"> Damage has occurred to vegetation as campers collect firewood and trample vegetation for views and vehicle space (illegal parking) Without adequate access and signage people trample through the dunes, damaging dune vegetation
	Poor water quality in the estuaries	<ul style="list-style-type: none"> Better management of sewage and stormwater is required to improve estuary water quality Concerns were raised that the existing sewerage treatment plant discharging into Belongil Creek estuary is near capacity and cannot cater for future developments

Coastal Hazards

- Threat 1 – Beach erosion
- Threat 2 – Shoreline recession
- Threat 3a – Coastal inundation
- Threat 3b – Tidal inundation
- Threat 3c – Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters
- Threat 4a – Coastal watercourse entrance variability
- Threat 4b – Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs)
- Threat 5 – Dune slope instability
- Threat 6 – Coastal cliff instability

Recreational Activities

- Threat 7 – Conflict over resource access and use
- Threat 8 – Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)
- Threat 9 – Poorly located, poorly maintained and/or inappropriate access and supporting facilities
- Threat 10 – Anti-social behaviour and unsafe practices
- Threat 11 – Passive recreational use (swimming, surfing, dog walking, bush walking, etc.)
- Threat 12 – Active recreational use (recreational boating and fishing, motorised watercraft, drones, four wheel driving, etc.) and commercial fishing

Coastal Development

- Threat 13 – Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)
- Threat 14a – Water pollution from urban stormwater and treated effluent discharge
- Threat 14b – Water pollution from agricultural diffuse source runoff
- Threat 14c – Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics
- Threat 15 – Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLs

Engagement and Governance and Compliance

- Threat 16 – Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)
- Threat 17 – Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment
- Threat 18 – Insufficient or inappropriate governance and management of the coastal environment
- Threat 19 – Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment

Figure 4-3 List of management issues/threats to the study area

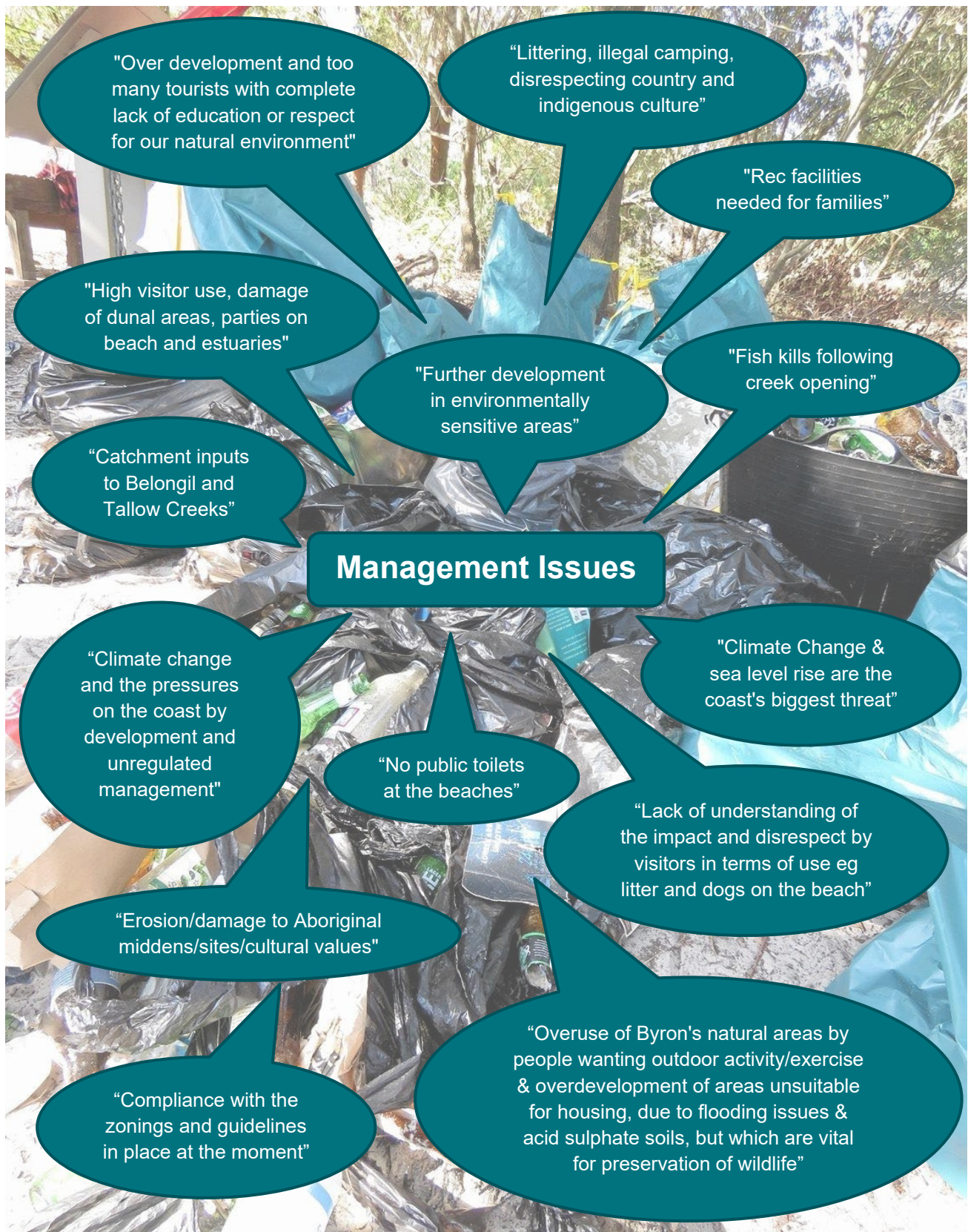


Figure 4-4 Community thoughts and ideas on the threats of the study area (Quotes source: Appendix B Community Survey Results, Questions 3 and 4, Image source: <https://www.byronnews.com.au/news/gallery-for-doofs-sake-make-them-stop/3158304/>)

5 Current Coastal Management Arrangements

This chapter describes the current coastal management arrangements and reviews their effectiveness. This includes an overview of land tenure and associated responsibilities for that land, and Council's existing coastal management framework (both the policies and organisational structure). This review also provides an audit of implementation of coastal management actions, any barriers to implementation and any learnings to date.

5.1 Existing Land Tenure and Land Governance Arrangements

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

Maps G005 (1 to 3) illustrate the current land tenure arrangements and governance context for the study area. The mapping has not been updated as part of this study and may contain some inaccuracies. It can be seen from this figure that the study area is comprised of a mixture of land tenure and land management arrangements; private freehold land (not specifically labelled on Map G005), Council public land (community and operational land), Crown (unreserved), Crown land that is reserved or dedicated (called Crown Reserves and Crown Dedications), state conservation areas / national parks / nature reserves / Aboriginal Areas, marine park, road reserve, and railway lands.

Council manages the following key foreshore Crown Land Reserves within the study area:

- Unnamed reserve at western end of Belongil residences – Lot 37 Sec 3 DP 1623
- Suffolk Park Reserve – Lot 1102 DP 1253895
- A foreshore reserve at Seven Mile Beach – Lot 145 DP 726458.

There are a number of other urban Crown Reserves Council manages within the Belongil Creek catchment such as Butler Street Reserve, Marvel Hall Reserve and Byron Bay Kindergarten Reserve along with some small areas of devolved land adjacent to roads and utilities.

Most of the beach areas of the study area, below mean high water mark (MHWM) that are not within national parks or nature reserves are located within the CBMP and is unreserved Crown land owned by DPIE – Crown Lands. Waters within the CBMP are managed by DPI and unreserved Crown Land within the CBMP is managed by DPIE – Crown Lands. Most beach areas within the study area, above MHWM that are not within national parks or nature reserves, are reserved or dedicated Crown Land owned by DPIE – Crown Lands with some but not all managed by Council. Recent changes to the *Crown Land Management Act 2016* require Council to develop Plans of Management under the *Local Government Act 1993* for those Crown Reserves and Crown Dedications that are managed by Council that are classified as 'community land'.

Belongil Catchment Drainage Board (BCDB) is involved in the management of the upper Belongil catchment drains. The BCDB is a corporation recognised under the Water Management Act 2000. The roles and responsibilities of the board needs to be further investigation along with how they align with Council's responsibilities for catchment and estuary management and the provision of key services.

Figure 5-1 provides a summary of the land tenure and governance arrangements with **Figure 5-2** providing the corresponding owners and stakeholders.

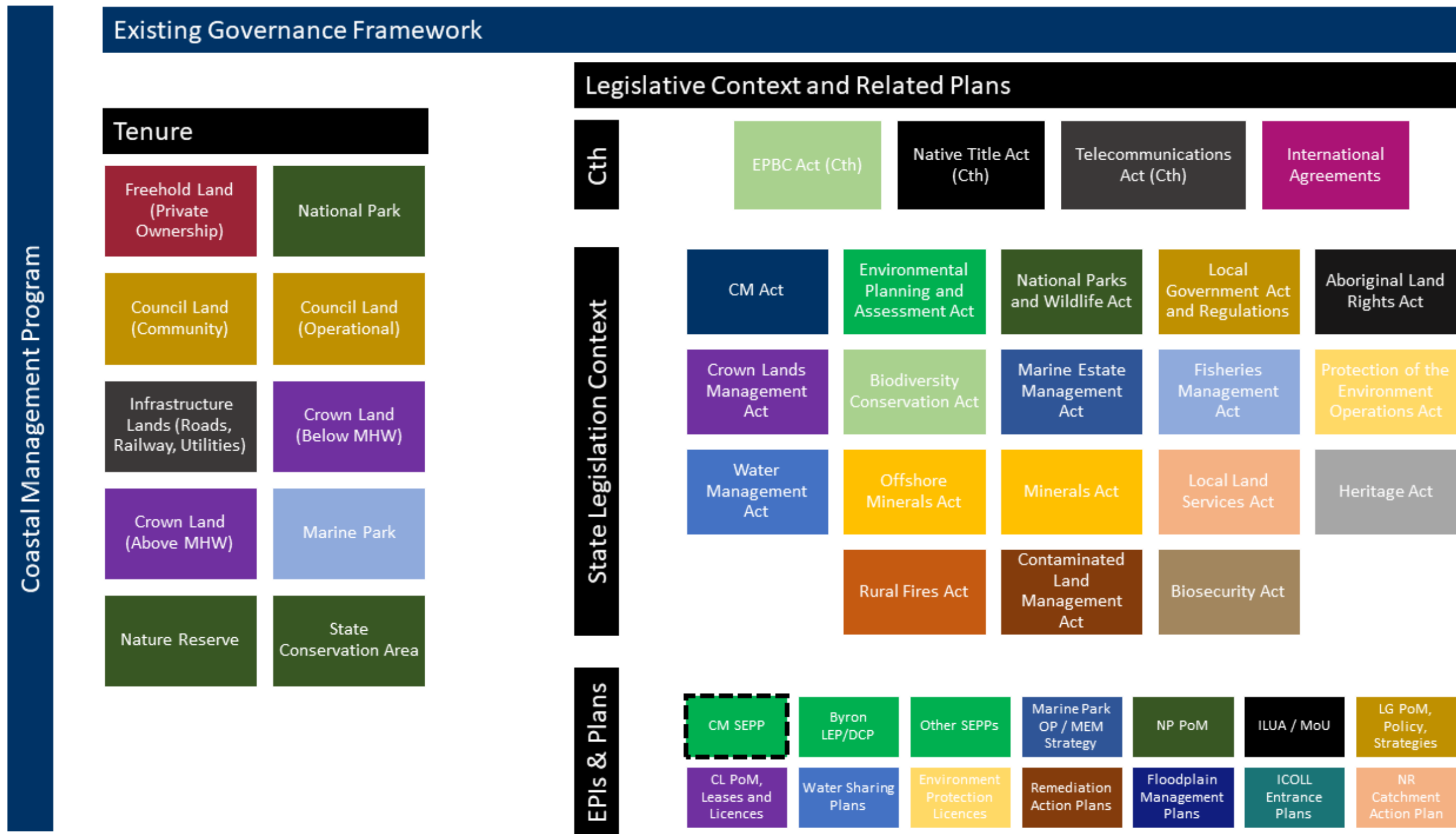


Figure 5-1 Existing governance framework

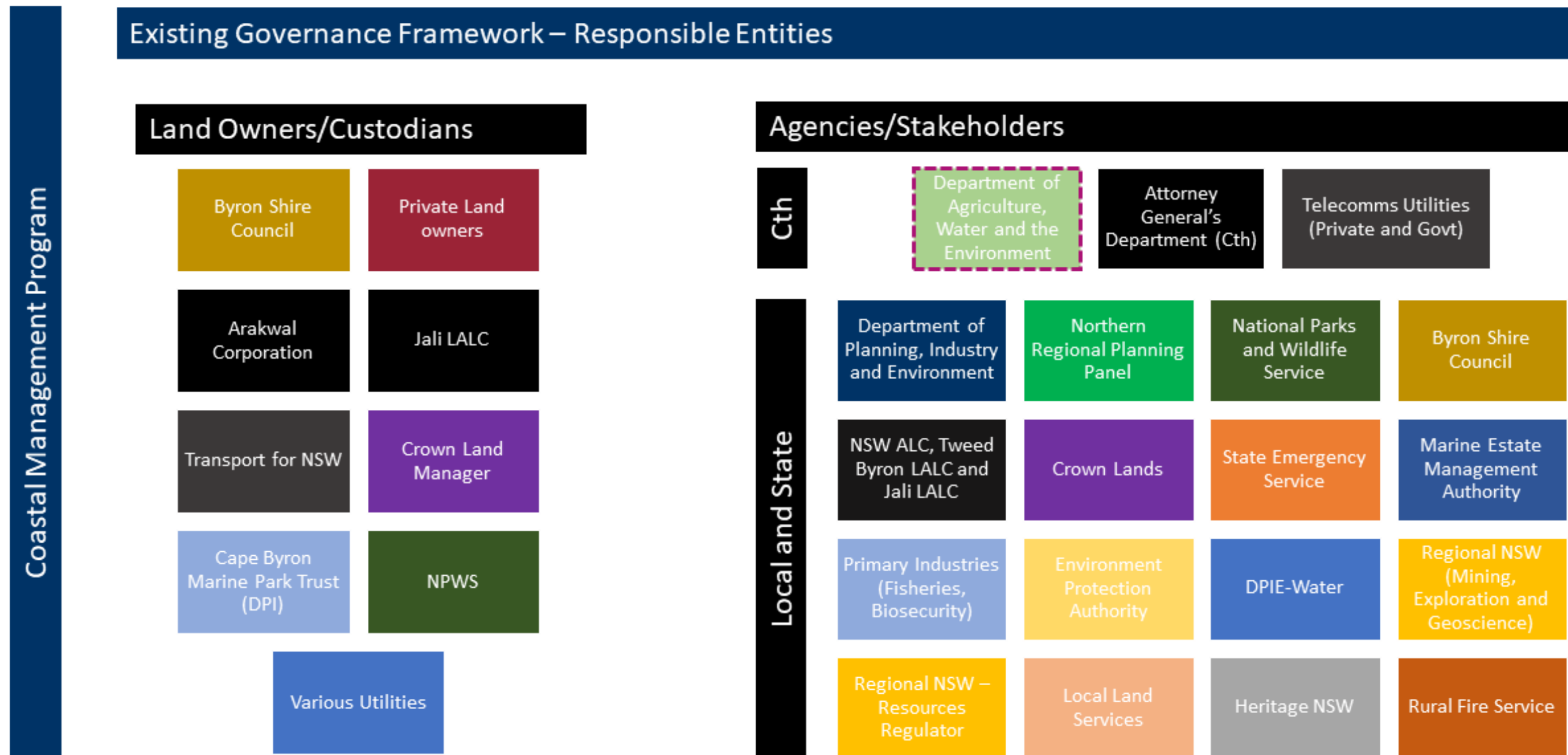


Figure 5-2 Existing governance framework – responsible entities

5.1.1 Native Title and Aboriginal Land Governance

The Commonwealth *Native Title Act 1993* is key legislation relevant to the study area, that governs use and development of land in which Native Title Rights and Interests continue. Native Title recognises the rights and interests of the Traditional Owners of Country.

A Native Title determination applies to the majority of the study area with Native Title rights and interests continuing on some Crown Land within the study area. Native Title rights do not apply to freehold lands.

That determination recognises that the Bundjalung People have ongoing rights and interests in lands, seas and waters deriving from their use of the lands. The rights and interests 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.

Arakwal National Park was created under an Indigenous Land Use Agreement (ILUA) as part of resolving the native title claim. The ILUA recognises the rights and interests of the Traditional Owners of Country. The National Park extends to the mean low water mark (DEC, 2007).

The Cape Byron State Conservation Area is also jointly managed with the Arakwal People as members of the Cape Byron Trust.

5.1.2 Non-Aboriginal Land Governance and Agencies

Council is responsible for preparing and maintaining the CMP with shared responsibilities with some agencies and stakeholders. 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 if they are a core service of the agency.

State and local government share strategic and statutory planning responsibilities for land in the study area. The 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, a national park and a State Conservation Area.

Council will also need to work with MEMA including DPI Fisheries in relation to the NSW Marine Estate, specifically the CBMP. MEMA's role is to ensure that policies and programs (such as the *NSW Marine Estate Management Strategy (2018-2028)* (MEMA, 2018)) address priority issues for the marine estate as identified in the TARA (BMT WBM, 2017), are well coordinated, efficient, evidence-based and result in positive outcomes. CBMP is managed by DPI Fisheries.

Other state agencies such as the Natural Resources Access Regulator (NRAR), Rural Fire Service (RFS), Environment Protection Authority (EPA) and TfNSW also play a role in planning, management and compliance in the study area.

Crown land areas are regulated under the *Crown Land Management Act 2016* by DPIE – Crown Lands. Unreserved Crown Land is managed by DPIE – Crown Lands. Reserved and dedicated Crown land is managed by the entity appointed by DPIE – Crown Lands to manage the Crown Reserve or Dedication. Entities appointed to manage Crown Reserves or Dedications can and do change over time. Where Council is appointed to manage a Crown Reserve or Crown Dedication, management of that land is governed by both the *Crown Land Management Act 2016* and *Local Government Act 1993*. Council is required to prepare Plans of Management under the *Local*

Government Act 1993 for Crown Reserves and Dedications it manages that are classified as 'community land'.

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

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 IPR Framework, which is established in the *Local Government Act 1993*) and state agencies (through written agreement).

5.1.3 Adjacent Council Areas

Tweed Shire Council and Ballina Shire Council share coastal sediment compartments with Byron Shire (**Map G002**) and have an inter-related role in coastal management. With respect to the Cape Byron to Richmond River sediment compartment, Ballina Shire Council is an important partner in coastal management due to longshore littoral drift of sand across the southern Byron Shire border associated with Seven Mile Beach and it is critical the compartment is managed in a holistic manner as actions by Ballina Shire Council (and other government agencies) may affect that sediment flow. Similarly, there is a need for Byron Shire to consider any impacts its actions may have on littoral drifting sand moving north into the Tweed Shire LGA. The CMP should look into this as part of Stage 2 to 4 and consultation between the councils will be required for this purpose. Ballina Shire Council and Byron Shire Council also share the responsibility for management of recreational use of Seven Mile Beach.

5.2 Existing Management Arrangements

5.2.1 Council Coastal Planning 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 Environmental Plan 1988 (BLEP 1988) and Development Control Plan No 1 (DCP 1988) which included a section known as 'Part J' that relates to development on coastal lands. The planning instruments were developed in recognition of the long-term erosion trend of the Byron-Hastings coastal embayment as identified in PWD (1978). This marked the beginning of Council's development control on coastal lands in accordance with a 'policy of relocation' as described as one of the management options in the PWD (1978) study.

The 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, does not offer the same approach to the management of coastal hazards. Specifically, there are presently no dedicated coastal land use zones in the SI LEP. Rather there are coastal consideration clauses. There are impediments to the logical translation of Council's established planning controls in place for over 20 years into the current BLEP 2014. Hence, urban coastal lands are a deferred matter in BLEP 2014 and the provisions of BLEP 1988 remain currently in force on relevantly affected land. A key outcome of the CMP will be to assist with resolving this issue in the context of the provisions of the Coastal SEPP.

The BLEP 1988 contains two zones applying to land that is likely to be influenced by coastal processes:

- 7(f1) Coastal lands
- 7(f2) Urban Coastal Lands.

Broadly, the coastal zones follow the alignment of Planning Precincts 1 and 2 in 'Part J' of BDCP 2010. The Part J Planning Precincts are based on the findings of PWD (1978).

The BLEP 1988 and BDCP 2010 land use planning framework sought, amongst other things, to preclude the construction of hard engineered coastal protection works on lands zoned coastal under the BLEP 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. These amendments have since been removed and the CM SEPP activated in April 2018.

It is noted that the existing coastal erosion hazard predictions at Tallow Beach (BMT WBM, 2013) suggest that the immediate risk to coastal assets is low as a result of the limited foreshore development between Broken Head and Cape Byron and the setbacks of the existing development within that area.

Council's existing coastal planning framework requires review as to its adequacy in managing current and future risks to the coastal zone, in ensuring preservation of coastal values, and its alignment with State Government Agency frameworks and planning controls.

Coastal vulnerability area mapping is a fundamental outcome of the CMP process with the intention of activating the relevant provisions in the CM SEPP once the mapping is agreed upon. Identification and adoption of areas subject to coastal hazards using evidence-based approaches is therefore required and will be expected to remove confusion over coastal management in Byron.

5.2.2 Internal Council arrangements

Coastal planning and development of CMPs is undertaken by the Environmental and Economic Planning (EEP) team within the Sustainable Environment and Economy (SEE) Directorate.

Services provided by the EEP team include:

- Strategic land use planning, including rural and urban land strategies, DCPs and LEPs
- Coastal and estuary policy and planning
- Natural environment and biodiversity policy and planning
- Sustainability: renewable energy, emissions reduction, climate adaptation, and sustainable living.

Council relies heavily on State Government funding to resource the development of CMPs as there are financial limitations associated with having a small rate paying base. However, the funding only covers the costs associated with supporting documents and technical studies, and not Council's internal costs for resourcing officers to develop CMPs. Over the preceding years, Council has only ever had one full time Coastal Officer (within the EEP team) to manage the entirety of Byron's coastlines and estuaries, and focus has been generally on the Belongil Creek and Belongil Spit

(open coast) area and Brunswick Estuary (out of study area). There are now two staff members working in this space, which is assisting in the progress of developing CMPs.

The funding of coastal management actions has been severely limited due to the lack of a certified coastal plan for the coastal zone, notwithstanding four attempts to develop CZMPs under the previous *Coastal Protection Act 1979*. Having no certified plan has resulted in management activities being undertaken on more of a reactive rather than planned basis.

Council's Open Spaces team are responsible for on-ground infrastructure and maintenance such as inspections of beach access ways and coastal infrastructure on a regular basis. However, it is more reactive rather than coordinated (e.g. not based on an annual program). On-going funding each year is not sufficient to adequately address the pressure and impact on beach accessways or infrastructure due to the popularity of Byron's coastal zone. Funding is generally spent in response to access management during and after storms when funding is available but limited. The present budget allocated to fund maintenance and infrastructure installation is inadequate as many of the access ways require upgrading to provide disability access.

Within the Open Spaces team sits the Parks and Gardens and Bush Regeneration team who actively manage coastal parks and reserves and work with Dune Care Groups to maintain coastal vegetation. In addition, the Waste and Resource Recovery team within Open Spaces actively manage litter and waste in coastal parks and reserves and on the beaches.

The Compliance team undertake regular ranger patrols (illegal camping, dogs, parties, etc.) though resources are also limited. The team primarily responds to complaints and monitors known 'hot spots' on Council owned or managed land.

The coordination of roles and resources within Council and the interrelation of coastal management actions between teams is administered by Council's Executive Team, which consists of the General Manager and Directors.

5.2.3 Coastal Emergency Management Arrangements

Council has prepared a long-term management strategy for managing coastal hazards which outlines the emergency actions it intends to undertake in the event of a beach erosion emergency. This plan is called the Draft Byron Shire Coastline Emergency Action Sub Plan (EASP) and forms Part E of the Draft CZMP BBE (BSC, 2016). The EASP notes 'The Intended Emergency Actions in this EASP will apply to the Byron Shire coastline', despite the draft title of the document.

Under the Draft EASP Council, during coastal hazard events, may work with emergency service providers such as the State Emergency Service (SES) in the event of a declared beach erosion emergency or an emergency caused by severe weather.

The Draft EASP was prepared in response to a Direction issued by the former Minister for Environment and Heritage under Section 55B of the (former) *Coastal Protection Act 1979*. As such the EASP needs to be updated to reflect changes to coastal management legislation, which will be undertaken as part of preparing a CMP for the shire (Stages 2 to 4 of the CMP process).

Figure 4.4 in the Draft EASP shows beach accesses for the Suffolk Park management area, however the figure does not show the remainder of Tallow Beach nor northern Seven Mile Beach within the Byron LGA. Beach accesses in these areas should be shown (corresponding with the management area as shown in Figure 1-1 in the EASP), such that they are documented and are included in Council's monitoring program (monitor and assess beach accesses as documented in Tables 4.1 and 4.2 of the EASP).

The EASP is intended to be reviewed at least annually or following each Emergency and will likely remain in draft format until the CMP is progressed.

5.2.4 Interrelationship between Catchment, Floodplain and Coastal Management

Two of Byron Shire's four major floodplains are located within the study area: Tallow Creek Floodplain and Belongil Creek Floodplain. In recent decades, catchment management has typically been undertaken separately to coastal zone management.

Several management plans have been prepared which are relevant to catchment and floodplain management in the Belongil and Tallow Creek catchments (refer Section 5.3.4), many of which are driven by infrastructure and services management, primarily drainage, stormwater and flood management including the entrance opening strategies for flood mitigation purposes. However, the most recent whole-of-catchment management plan was prepared by Parker and Pont in 2001. No whole-of-catchment management plan has been prepared for the Tallow Creek catchment.

More recently, coastal zone and coastal catchment practitioners have taken the stance that best practice management of the coastal zone benefits from a connected catchment-to-coast approach. This is particularly relevant for ICOLLs which are more susceptible to catchment inputs during their "closed" state.

During their review of the *Belongil Creek Catchment Issues Study* (Alluvium, 2019a) which set out a recommended approach to developing a catchment management plan, DPIE strongly advised that Council prepare a CMP for Belongil and Tallow Creek ICOLLs rather than developing separate Catchment Management Plans/Programs. In February 2020, Council resolved to pursue the coastal management framework for both Belongil and Tallow Creek ICOLLs (i.e. develop a CMP Scoping Study for the estuaries; i.e. this Study). A CMP aims to holistically consider the catchment from an estuary health and use perspective and to bring all stakeholders together in an integrated and strategic manner.

5.3 Implementation of Management Actions

A variety of coastal and catchment management actions have been undertaken over time by Council, public authorities and private landowners in response to management issues. A review of relevant strategies is provided in the following sections based on past update and reviews of plans and interviews with relevant Council staff.

The following key can be used to differentiate the status of management actions:

Table 5-1 Key to status of management strategies and actions

Key	Description
Incomplete/ Not commenced	Action has not commenced
Partially complete	Part or components of the action have been completed
In progress/ Ongoing	Action is currently being implemented
Complete	All components of the action have been completed
Unknown/ Superseded/ Redundant	Either information was unavailable, the action has been made redundant, or it has been superseded by a more current action

5.3.1 Coastal Zone Management Plans

Council has previously prepared several coastal zone management plans under the former *Coastal Protection Act, 1979* to manage the coastal zone within the study area and has worked with public authorities and the community to implement actions. The intent of the CMP is to build on what has already occurred, while considering the objectives and requirements of the CM Act.

Section 3 discusses the studies prepared under the provisions of the former *Coastal Protection Act 1979*, including the following former CZMPs, none of which were ever formally gazetted:

- *Draft Coastal Zone Management Plan for Byron Shire Coastline* (BSC, 2010)
- *Draft Coastal Zone Management Plan for the Byron Bay Embayment* (BSC, 2016)
- *Draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment* (BSC, 2018c)
- *Draft Coastal Zone Management Plan for the Brunswick Estuary* (BSC, 2018b).

The current study area is incorporated into the BSC (2010) Draft CZMP, referred to in the Draft CZMP as the Byron Bay and the Suffolk Park management areas, although it is noted that the CZMP covers the estuaries in this area, but not their entire catchments in the management areas.

For the most part, the Belongil Creek estuary is outside the CZMP planning area of the BSC (2016) Draft CZMP for the Byron Bay Embayment, however 9 actions were found to relate to the estuary. Eight of these correspond closely to or update the wording of management actions provided in the BSC (2010) Draft CZMP, with one exception. Management Action 1.1.7 states: *Ensure implementation of and compliance with the North Byron Beach Resort Estuarine and Dunal Management Plan (Wetland Care Australia, 2015)*, a high priority action for the North Beach (now called Elements Resort) resort owners, referring to a document developed since the BSC (2010) Draft CZMP.

These CZMPs were either not certified by the Minister for various reasons, such as not considered to meet the requirements for certification, or rendered redundant due to legislative change. As noted in Council's meeting minutes from 22 November 2018: *Council to date, has been at the forefront of adaptive planning which takes into consideration the risk of coastal hazards and unknown sea level rise, however with 10 years of making coastal plans, Council has been unable to achieve Ministerial certification of any Coastal Zone Management Plan (CZMP) under the former Coastal Protection Act 1979 (CP Act) for any part of the coastline. Without a certified CZMP, an endorsed plan to guide the management of the coastline and associated funding is restricted.*

Although never certified, an audit was undertaken on the actions presented in the BSC (2010) and BSC (2016) Draft CZMP, to recognise the previous work that went into developing these actions and to determine which actions, if any, may still be relevant to be carried forward into the CMP. A summary of the status of strategy/action implementation is provided in Table 5.2 with a full review of the BSC (2010) Draft CZMP provided in Appendix F. It was found that with none of the CZMPs having been certified there have been no actions to implement, however Council has concurrently been taking interim management actions that it can lawfully do and fund while there is no coastal plan in place, some of which have been similar to actions in previous draft CZMPs.

Analysis of coastal emergency response or impacts where a storm event has occurred during the implementation phase could not be undertaken, as there is no certified CZMP in the implementation phase.

Table 5-2 Summary of status of management strategies and actions for CZMPs

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
Draft Coastal Zone Management Plan for Byron Shire Coastline (BSC, 2010)	Contains 113 distinct management actions relating to flora and fauna management, water quality, bush fire, natural processes, structures, emergency action planning, landscape and beach amenity, indigenous cultural heritage, non indigenous cultural heritage, conservation, NRM, commercial activity, development controls, voluntary purchase, public facilities and recreation, access, communications, education, monitoring and research.	Various (primarily BSC)	<p>Plan not certified.</p> <p>Individual actions similar to the draft CZMP have been undertaken on an ad hoc project basis and where these align to the 113 actions recommended in the CZMP the status is as follows (full review in Appendix F):</p> <ul style="list-style-type: none"> • 12 have been complete • 44 are in progress/ ongoing • 12 are partially complete • 23 are not commenced/ incomplete • 14 unknown • 5 superseded • 1 redundant • 2 are not applicable (e.g. outside of study area). <p>The following six key strategies have historically been implemented by Council on the coastline of the Shire (BMT WBM, 2020):</p> <ol style="list-style-type: none"> 1) Retention and implementation of coastal protection works at Main Beach and Wategos 2) Application of planning and development controls (refer Section 5.2.1) 3) Beach scraping programs at New Brighton 4) Dune vegetation management through local dune care programs

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
			5) Public access management of beach access ways (fencing and access stabilisation works) 6) Public safety management and implementation of the draft Emergency Action Subplan.
Draft Coastal Zone Management Plan for the Byron Bay Embayment (BSC, 2016)	Contains 9 actions relevant to the Belongil Creek Estuary which closely correspond to or update wording of the BSC (2010) draft CZMP for the Shire with one additional action (Action 1.1.7) relating to implementation and compliance of a dune management plan for what is now Elements resort.	Resort owner	Plan not certified. Action 1.1.7 - Unknown

5.3.2 Coastal Protection Works at Belongil Creek

Temporary coastal protection works (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 (now Elements Resort). The works are located wholly within private land. The TCPWs 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. Elements Resort commenced maintenance on the TCPWs in early 2021 as they were undermined in the December 2020 storm event due to erosion and inundation of the foreshore caused by the interaction of oceanic waves and high water in the creek. Works have been delayed due to lack of dry area for machinery to undertake the works, however will commence once water recedes from the location.

A variety of coastal protection works have been constructed adjoining the study area along Belongil Beach, including 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 can be found in the report *Byron Bay Erosion Protection Structures – Risk Assessment* (Worley Parsons, 2013), however the study does not consider any works outside the Main/Belongil Beach area (i.e. Tallow Beach or Seven Mile Beach). Some privately constructed rock protection works at Belongil Beach and Council-constructed (Interim) beach access stabilisation works at Belongil Beach have occurred. However, while Belongil Beach is not included in the current study area of this scoping

study and these works have been discussed by BMT (2020) there is a potential area of interaction between these works and the entrance of Belongil Creek.

5.3.3 Entrance Management of Belongil Creek and Tallow Creek Estuaries

Belongil Creek, Tallow Creek and Ti Tree (Taylors) Lake are classified as ICOLLs. Council has developed and adopted long-term opening strategies to guide entrance management at Belongil Creek and Tallow Creek estuary entrances for the purpose of managing flood risk within those catchments. The status of strategy/action implementation is provided in **Table 5-3**.

The *Belongil Creek Entrance Opening Strategy* (Alluvium, 2019b) appears to be in line with current best practice ICOLL entrance management. However, the *Environmental Management Plan and Opening Strategy for Tallow Creek* (BMT WBM, 2015b) is not adaptable and is outdated. The strategy has been amended by NPWS' interim position (NPWS, 2019b) to minimise risk to fish and other aquatic life. The interim position does not support mechanical opening of the creek at all and only supports scraping of the berm when water levels are high and a rainfall event is occurring. This hands-off approach to entrance management reduces the urgency to review the Tallow Creek opening strategy. However, for completeness both strategies should be reviewed in Stage 3 of the CMP process to ensure they remain consistent with the understanding of coastal processes and to update the Tallow Creek opening strategy in line with best practice. Of note, DPIE has identified that providing additional guidance on the management of ICOLL openings is a short term future priority for DPIE in assisting to deliver CMPs across the state.

Table 5-3 Summary of status of management strategies and actions for entrance opening

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
Belongil Creek Entrance Opening Strategy (Alluvium, 2019b). Adopted (Res # 20-040)			
Section 5 Entrance Opening Strategy	Monitoring and assessment of triggers in relation to artificial openings	BSC	Ongoing
	A decision support framework and recommended approach to opening	BSC	Complete and ongoing – there is a decision support Flow Chart in the adopted Belongil EOS
	Review of EOS and EMP	BSC	Incomplete. Recommended in Stage 3 of CMP
Section 5 Environmental Management Plan (EMP)	Environment management associated with artificial opening (required as part of the Crown Lands licence)	BSC	Ongoing

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
	Additional recommended environmental monitoring beyond the requirements of the Crown Lands licence.	BSC	Incomplete – Council's resources are stretched undertaking the monitoring required as per existing licence conditions
	Construction management during artificial openings	BSC	Ongoing
	Actions for catchment management to be implemented as part of a CMP	BSC	Partially complete
Tallow Creek Entrance Opening Strategy (BMT WBM, 2015b)			
Section 2 EOS process	Provides a series of entrance management processes including monitoring, communications, responsibilities and actions associated with an entrance opening or scraping event	BSC	Ongoing –The EOS is partly superseded and amended by the NPWS 2019 Interim Position
Table 5-1 Construction Management	Provides operational construction management actions for flora and fauna, water quality, coastal and dunal processes, cultural heritage, and beach amenity and use	BSC	Ongoing – partly superseded by NPWS Interim Position
Table 5-2 Operational Environmental Management: Flora and Fauna	Establishment and bi-annual monitoring of permanent vegetation transects	BSC	Ongoing
Table 5-2 Operational Environmental	Water quality testing according to Table 5-2 and Table 5-3, data collated in a singular secure location	BSC	In progress/ Ongoing – partly superseded by NPWS Interim Position (e.g. discontinuation of health

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
Management: Water Quality			<p>parameters associated with mechanical opening)</p> <p>Council undertakes physical monitoring (variety of depths) and monthly nutrient monitoring at 5 sites (in excess of requirements of the EOS). Program being reviewed as part of the permit renewal for berm scraping.</p> <p>In-situ logger subject to vandalism</p>

5.3.4 Catchment and Floodplain Management

There are a substantial number of key plans relating to catchment and floodplain management for the Tallow and Belongil Creek estuaries and their catchments. Floodplain management within the catchments is considered in the CMP process so far as it relates to entrance management of the ICOLLs. The status of strategy/action implementation is provided for Belongil Creek estuary and catchment in **Table 5-4**, Tallow Creek estuary and catchment in **Table 5-5** and National Parks and Nature Reserves in **Table 5-6**.

Plans of management for national parks and nature reserves are statutory documents under the *National Parks and Wildlife Act 1974*. Once adopted, the plan must be carried out and no operations may be undertaken in the park unless in accordance with the plan.

Table 5-4 Summary of status of management strategies and actions for plans in the Belongil Creek estuary and catchment

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
Belongil Estuary Study and Management Plan (Parker and Pont, 2001)	Actions to protect the estuary and to restore degraded areas. A specific review of management actions is provided below and in Appendix F .	BSC	Partially complete Council 2016 review of 155 collated actions from eight plans identified: - 10 complete actions - 30 ongoing actions - 115 actions incomplete or undetermined. Council prioritised 28 outstanding actions summarised as four recommendations: 1) Develop & implement a water quality program in the Belongil catchment: Ongoing - surface water quality monitoring since 2016 associated with Byron Bay STP. 2) Develop a communication plan encompassing the Water, Sewer, Stormwater and Catchment functions: Incomplete as a holistic IWCM style plan (not currently a Council priority) though each directorate undertakes some education based on individual services. 3) Prepare project plan for Butler Street drainage upgrade. Work to coincide with the Byron Bay Bypass project: Not applicable . Butler Street drainage and wetland recommendations fall within the broader Drainage Strategy which now sits under the FRMP (see below for update). Design of Butler street drainage upgrades (including a constructed wetland) is awaiting the outcome of a grant application. 4) Design natural channel drain for Butler Street drain incorporating a wetlands filter system: As above .
Belongil Creek Floodplain Risk Management Plan (FRMP) (BMT WBM (2015); and Belongil Creek Floodplain Risk Management Study and Plan Summary (BMT WBM, 2015d)	Assesses and recommends an integrated range of modification measures to minimise community exposure to flood risks. A specific review of management actions is provided below.	BSC	
Byron Bay Drainage Maintenance Plan 2014-15 (BSC, 2014)	In view of Council's opting to increase drain maintenance funding rather than costly infrastructure upgrades (resolution # 10-863), the plan outlines additional stormwater maintenance works (~\$50K).	BSC	
Byron Bay Drainage Strategy (SMEC, 2010) (draft report)	Pump stations, levees, upgrades to underground drainage and a wetland/basin to improve water quality and help mitigate flooding impacts. Estimated minimal cost for implementing strategy = \$9M. Strategy has been absorbed into the Belongil Creek FRMP.	BSC	
Restoration Strategy Belongil - Cumbebin Wetland Complex Final Report (Australian Wetlands and Wetland Care Australia, 2005)	A management framework to address the natural resource management problems resulting from landuse activities including list of priority works, strategy for resourcing changes in landuse, emphasis on community consultation.	BSC	
Plan of Management - Cumbebin Swamp Nature Reserve (NPWS, 2012)	All operations within the reserve to be in accordance with the PoM. Reserve jointly managed by BOBBAC and NPWS. Council is the authority for an easement through the reserve connecting Butler Street drain with the Belongil Creek.	NPWS	
Byron Shire Council Urban Stormwater Management Plan (First review 2010) (BSC/PPK, 2000)	Includes upgrading of Byron Bay stormwater discharge system including a wetland treatment system for Butler St drain (a high priority from the Belongil Estuary MP).	BSC	
Belongil Creek Floodplain Risk Management Plan (BMT WBM, 2015)	Provides nine "modification measures" at a total cost of ~\$11M aimed at reducing flood risk within the Belongil catchment. The nine measures fall under three broad categories (listed with their priority for implementation): 1) Flood Modification Measures including Preferred Byron Bay Drainage Strategy (Immediate); Drainage Infrastructure Maintenance Program (High); and Belongil Creek Entrance Strategy (High) . 2) Property Modification Measures including Voluntary House Raising Scheme (Medium); and Development Control Measures (Immediate). 3) Response Modification Measures including Community Flood Awareness (Immediate); Flood Information (gauges) (High); Flood Information Interpretation (Immediate); and Emergency response (Immediate).	BSC, BoM, SES and private property owners	Partially complete 1) Flood Modification Measures: - Byron Bay Drainage Strategy – In progress . Design and concept planning proposed (dependent on grant funding). Aligns with Byron Bay master Plan (on hold until drainage upgrades are complete). - Drainage infrastructure maintenance program - Complete - Belongil Creek EOS and EMP (adopted 2020): Complete 2) Property Modification Measures: - Voluntary house raising: Not commenced . - Development control measure: Complete . Will be updated with pending FRMP update. 3) Response Modification Measures – Ongoing . Water level, rainfall sensors and signage installed. Byron Shire Flood System and Emergency management dashboard launched.

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
			Plan due for review including update of the <i>Belongil Creek Flood Study</i> (SMEC, 2009) (seeking funding) and update of the flood modelling (awaiting funding application outcome) proposed or 2021/22 and 22/23.
Capacity Assessment of the Belongil Creek Drainage System: Development of a preferred STP effluent flow path (BMT WBM and AWC, 2017)	Recommended retaining existing release point and developing an additional release point into the Industrial Estate drain + development of a detailed Environmental Monitoring Program. Several short term actions also recommended including small structural changes/ inspection and cleaning.	BSC	In progress Council has invested \$1.5M towards this drainage upgrade.
Belongil Creek Catchment Issues Study (Alluvium, 2019a)	Contains a recommended framework and actions to manage the catchment issues including: - development of a catchment management plan or CMP. - stakeholder and community engagement plan and working group; - identification of catchment values. - assessment of existing and future condition. - development of strategic intent for waterways. - development of actions to achieve objectives. - preparation of a business case. - recommended monitoring and evaluation.	BSC	In progress Recommended framework incorporated into current CMP process. Actions completed as part of this Scoping Study include development of a stakeholder and community engagement strategy and identification of catchment values. Remaining actions are in progress to be completed within the CMP.
Updated Assessment of the Byron Bay STP Treated Effluent flows on the Belongil Catchment (AWC, 2020c)	Several recommendations including: - Design modification to constrain effluent flows to Upper Union Drain. - Installation of autologging camera to log conditions at estuary mouth. - Continuation of and recommendations for surface and groundwater level monitoring. - Replacement of monitoring logger units. - Review and refinement of WQ monitoring program including collection of baseline data prior to additional flows.	BSC	Incomplete Council has obtained cameras to monitor condition of the entrance.
	- Development of locally specific WQ objectives/trigger values.	BSC	In progress Council has commenced working with DPIE to develop locally specific WQO's for the Belongil and Tallow Creek estuaries.

Table 5-5 Summary of status of management strategies and actions for plans in the Tallow Creek estuary and catchment

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update (SKM, 2015) (an update of SKM's 2009 report)	<p>The plan recommends 24 actions grouped under 5 'tasks' to manage flood risk comprising:</p> <ol style="list-style-type: none"> 1) Planning Controls 2) Emergency Response Planning 3) Stormwater System Upgrades 4) Sandbar Management 5) GIS/IT <p>Note that in 2015, Jacobs updated the modelled scenarios and mapping in accordance with Councils adopted Climate Change Strategic Planning Policy.</p>	BSC and SES	<p>Planning controls: Complete</p> <p>Emergency Response Planning: Ongoing (as per Belongil FMP).</p> <p>Stormwater System Upgrade: Not commenced</p> <p>Sandbar Management Actions are either Ongoing (delivered through EOS) or Complete:</p> <ol style="list-style-type: none"> a. Implement interim management plan through water level and quality monitoring – Complete b. Develop data collection program for variables such as sand bar and lake stored level, to support development of long-term management plan – Ongoing c. Inspect the sand bar and record its level every year prior to the onset of the rainfall season – Superseded by amended EOS (Alluvium, 2019b) and NPWS Interim Position (noting that Council does monitor the level of the sand bar when water levels reach a certain height). d. Monitor the level of the opening during the rainfall season and undertake maintenance earthworks to restore the level as per the accepted Interim Sandbar Management Strategy – Ongoing as per amended EOS and NPWS Interim Position. <p>Aspects of the FRMP require review and update prior to review of the Tallow Creek EOS.</p>
Tallow Creek Fish Kill Investigation ICAM (Alluvium, 2019)	<p>This investigation adopted the Incident Cause Analysis Method (ICAM) for investigating causes and making recommendations. Five recommendations were made including:</p> <p>R1 – Revise EOS and EMP under a broader CMP for Tallow Creek and include stakeholder consultation.</p> <p>R2 - Form an interim Steering Committee with key stakeholders to negotiate management actions until EOS is revised and finalised.</p> <p>R3 - Key public agencies to obtain legal advice on organisation responsibilities with entrance management and flood risk.</p> <p>R4 – Develop a joint MOU between key public agencies and Arakwal to outline roles and responsibilities.</p> <p>R5 – Recommendations to revise future licences and permits.</p>	BSC, key government agencies and BOBBAC (Arakwal)	<p>Partially complete</p> <p>Superseded by NPWS Interim position with NPWS as the consent authority and regulator, and BSC as the permit holder.</p>
Baywood Chase Lake Management Plan (AWC, 2018a)	<p>Contains strategies to enhance the health and condition of the lake, reduce the likelihood of algal blooms, enhance aesthetics and local biodiversity. Actions drafted for native plant regeneration, sediments, water flow and quality. The preferred rehabilitation strategy comprises the construction of a large wetland adjacent to the lake and the use of recycled water.</p>	BSC	<p>Incomplete. Additional studies were undertaken with regards to feasibility of using recycled water. Plan has not been implemented due to concerns regarding the hydraulic connectivity of the lake with Tallow Creek estuary. Further consideration of this plan is required.</p>

Table 5-6 Summary of status of management strategies and actions for national parks and nature reserves

ID#	Summary of Management Strategies/Actions	Responsibility	Implementation Status
Arakwal National Plan Plan of Management (NPWS, 2007)	Each PoM contains a suite of management responses relating to natural resource management (e.g. geology, drainage, stormwater, pest and fire management etc.), cultural renewal, Story of Country, recreation and visitor use, knowledge sharing, and research and monitoring.	Joint management under the Arakwal National Park Management Committee	Actions are Ongoing/In progress
Broken Head Nature Reserve Plan of Management (NPWS, 2020)	As above.	NPWS	Adopted in 2019. Actions are Ongoing/In progress
Cape Byron Headland Reserve Plan of Management (Wildsite Ecological Services, 2002)	As above.	NPWS	Adopted in 2002. The Cape Byron SCA is under the care, control and management of the Cape Byron Trust which has completed, commenced or has as Ongoing over 90% of the 169 actions listed in the plan.
Cumbebin Swamp Nature Reserve Plan of Management (NWS, 2012)	As above	NPWS	Currently no set plans to review the PoM. Status of current strategies – Unknown
Tyagarah Nature Reserve Plan of Management (NPWS, 2020)	As above	NPWS	Adopted in 2020. Actions are Ongoing/In progress
Ti Tree (Taylors) Lake Aboriginal Area Plan of Management (NPWS, 2020)	<p>As above. This PoM relates specifically to Ti Tree Lake Aboriginal Area located in the northern section of the Aboriginal Place.</p> <p>Regarding the broader Aboriginal Place which incorporates the Aboriginal Area, the lake and the entrance, there is no legislative requirement to have a PoM. However a draft preliminary PoM was prepared in 2006 and reviewed in 2015 as is in consultation with the various land managers and owners for the Aboriginal Place (Jali LALC, BOBBAC (Arakwal), NPWS and Council). Mapping within the draft PoM is now out of date. During engagement activities undertaken for this Scoping Study, Jali LALC have expressed a strong desire to be involved in all management decisions and on-ground actions for areas under ownership of the LALC.</p>	NPWS	PoM for Aboriginal Area adopted in 2020. Status – Ongoing/In progress .

5.3.5 Dune Vegetation Management

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. Council has committed to increasing partnership with traditional owners in management of vegetation/fauna. In addition to working with traditional owners, a variety of dune vegetation volunteer land care groups are active within the study area working along with Council's bush regeneration team playing an on-going and active role in revegetating and stabilising some areas of dunal system. Much of the dune system within the study area is within national park and nature reserves and therefore protected.

Through collaboration with traditional owners, volunteers and Council's bush regeneration team there is sufficient capacity to manage the Council-managed parts of the dune system within the study area (i.e. along the entire length of Alcorn St and the foreshore at Seven Mile Beach). At present the coastal dunes at Suffolk Park have mostly been rehabilitated, with natural regeneration now taking place, some direct seeding planned and regular (i.e. quarterly) weeding currently taking place for maintenance.

5.3.6 Public Access Management of Inclusive Beach Access Ways

Council plays an active role in public access management, providing inclusive, 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 coastal zone, impacts from erosion events and the need to have inclusive accessways that are adaptable to changing circumstances such as erosion events. In general, there is insufficient funding and what funding is available is spent on a reactive basis in response to access management during and after storms.

Through the investigations into coastal management options in Stage 3 of the CMP, it would be useful to better understand the costs and benefits around beach access (e.g. does lack of safe beach access to eroded beaches like occurred in early 2021 effect beach visitation/tourism, either at the time of repeat visitors).

5.3.7 Other Management Strategies

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

- 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 within the study area (Suffolk Park Beach and cosy corner at Tallow 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 with a presently inadequate budget as discussed in **Section 5.2.2**
- Waste Management – regular collections from formalised collection points in public spaces.

There is an extensive list of management strategies within the various National Park Plans of Management. Many of these relate to cultural and ecological aspects of the management of the relevant areas. Reference should be made to each Plan for further details (refer to **Section 3.2.1**).

5.3.8 Barriers to Action Implementation and Lessons Learned

As identified above, there is a large proportion of coastal and catchment management actions that not been implemented, are in various stages of completion, or for which the status is unknown. Although, of note during the perpetual cycle of planning, Council has concurrently been taking interim management actions that it can lawfully do and fund while there is no coastal plan in place, some of which have been similar to actions in previous draft CZMPs.

Through the audit process, key barriers to implementation of remaining strategies and actions were identified as follows:

- As none of the previously prepared CZMPs have ever been certified, availability of and access to funding for action implementation, and tracking/monitoring has been limited to date
- It is difficult for Council to generate revenue through rates, levies, user fees or grants sufficient to meet funding for action implementation
- Council's resourcing and budget capacity is limited for ongoing monitoring and maintenance (e.g. surface water quality monitoring, WSUD infrastructure maintenance, beach accessway maintenance) and there is limited to no budget available for increasing monitoring or for carrying out pre-emptive maintenance and replacement of non-critical infrastructure
- Over the preceding years Council has prepared a number of coastal plans, however no coastal management plan has been approved or certified by the Minister (notwithstanding several attempts). Without certification implementation of recommended actions has not been undertaken. Legislative change has rendered Councils' coastal management planning process at times redundant, also coastal hazard management development control has also been the subject to litigation before the Courts ((refer Section 3.5.2 of BMT, 2020). Council and the community that want to see on-ground implementation of actions have likely been frustrated in the coastal management process which may have potentially led to mistrust by the community in Council's ability to develop a certifiable plan. Development and certification of this CMP will assist in addressing this 'perpetual planning cycle/State policy change' barrier and should improve access to funding for action implementation
- A review of the planning process has been proposed as a Stage 2 study in the Forward Plan (see **Section 9.3**), with an associated Stage 3 study
- The LGA, as a coastal shire, has complex and contentious planning issues, compounded by diverse community views on those issues, which mean that reaching community consensus is not possible and this adds significant challenges
- Limited Council staff resources for developing and implementing plans along with a range of other responsibilities, together with staff changes resulting in loss of corporate knowledge and project continuity
- Complex management issues that require input cross-Directorate collaboration and resources for holistic management responses in coastal and estuary areas
- There is now an expectation across NSW that catchment management (previously under Catchment Action Plans (CAPs)) is included in CMPs, but catchment management does not require a certified plan, whereas coastal management does and there appears to be limited guidance with regards to catchment management requirements
- There is also a knowledge/best practice management guidance gap in several spaces, particularly:
 - ICOLL management
 - Catchment management and catchment-to-coast connection (i.e. since the Catchment Management Authority and CAP process dissolved)
 - WSUD engineering standards adopted by Council.

Learnings from the implementation process are limited, given the lack of implementation of coastal management actions. The key learnings include:

- The difficulty in achieving certification for previously prepared CZMPs, despite much time, cost and effort being expended in preparation of these CZMPs
- The frustration felt by Council, the local community and various State Government agencies from being locked in a perpetual planning cycle due to changing coastal legislation
- The lack of coastal management action implementation, even where urgent action is required, due to lack of a certified plan and therefore funding to implement high cost actions.

Key recommendations from the review of plan implementation are as follows:

- Many of the management strategies and actions are still relevant and should be carefully considered in later stages of CMP development
- Management action should be flexible to allow those with implementation responsibilities to access emerging funding opportunities and to adapt to shifting Council and community direction and priorities
- Opportunities for Citizen Science and management by volunteer groups should be explored both as a means of sharing the capacity for environmental management as well as a means of expanding the community's emotional connection and therefore behaviour change towards the environment
- Synergies with research organisations should continue to be explored to fill data gaps for Stage 2
- Use of community expectations through key management groups/advisory committees to get relevant priority projects to Council.

6 Roles and Responsibilities

This chapter identifies stakeholders with interests in the preparation and implementation of the CMP. It details how the scope of the CMP relates to the roles and responsibilities of adjoining councils and public authorities, when information and feedback is expected to be required from other councils and public authorities as well as issues to be addressed in the CMP where councils will seek a collaborative approach.

6.1 Existing Roles and Responsibilities

Information on roles and responsibilities is documented in other chapters of this scoping study as follows:

- **Section 5.1** provides details on the many organisations from the Federal, State, Regional to Local level that are involved in governing the coastal zone and waters of the study area. **Figure 5-1** provides a summary of the land tenure and governance arrangements with **Figure 5-2** providing the corresponding owners and stakeholders
- **Section 5.1.3** provides details on the adjoining councils; Tweed and Ballina Shire Council, both of whom are important partners in coastal management due to longshore littoral drift of sand along the coastline, considering sediment compartment boundaries.

6.2 Proposed CMP Governance Structure

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 (BMT, 2020).

As identified by BMT (2020), 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*.

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. Stakeholders with interests in the preparation and implementation of this CMP are shown in the agencies/stakeholder panel of **Figure 5-2**.

Potential governance and management arrangements for the CMP are outlined in **Table 6-1** and align with those presented by BMT (2020), with a few additions such as BOBBAC (Arakwal) and the Jali LALC. Obligations of local councils and other public authorities for implementation of and regard to the CMP are defined in Division 4 (22 and 23), respectively of the CM Act.

Table 6-1 Potential CMP governance and management

Entity	Responsibility
Byron Shire Council	Lead agency for development, coordination and implementation of CMP.
State Agencies/Land Managers Department of Planning, Industry and Environment (DPIE) – Environment, Energy and Science DPIE – Water DPIE – Crown Lands DPI – Fisheries (incorporating Marine Parks) National Parks and Wildlife Services (within DPIE) NSW Environment Protection Authority Transport for NSW – Road, Rail, Maritime, and Maritime Infrastructure Delivery Office (MIDO) Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) RNTBC Jali LALC <i>A high level Working Group or Task Force (coordinated by DPIE) of Director level/Senior staff from the various agencies may assist in achieving buy-in to the CMP. This group may advise Ministers during the development of the CMP to ensure adequate cross-collaboration of agencies.</i>	DPIE – Project partner and funding provider; Oversight of development through conditions of funding; Review final draft documents and provide comments in line with coastal management framework requirements to assist in submission for certification to the Minister. All – Collaborate to prepare, provide input and feedback on, and review draft CMP documents. If actions are to be carried out by a public authority, the public authority will either endorse the action or if not endorsed, will request amendments to the action. All – Collaboration/carrying out of actions as endorsed and defined in final CMP document.
Coastal Advisory Committee Byron Shire Council Agencies (above who have direct land ownership and management responsibilities in the CMP study area) Regional Bodies (Local Land Services (LLS), Regional Development Australia (RDA) Northern Rivers, Tweed Byron LALC, etc) RFS, SES and NSW Police (emergency management) (particularly for implementation of the EASP, potentially through Council's Incident Management System Local Emergency Management Committee) 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 Section 355 of the <i>Local Government Act 1993</i>)

6.3 Community and Stakeholder Engagement Strategy

Engaged communities and stakeholders can facilitate the preparation of a representative CMP and enable the planning process to remain flexible and responsive to changing values, hence active engagement is considered critical to the CMP progress. Community and stakeholder support for the actions included in a CMP will also be beneficial during the implementation phase. Implementation of some actions lead by the community or with a significant level of community involvement would also be anticipated for this study area.

A Community and Stakeholder Engagement Strategy has been developed for this CMP Scoping Study and is provided in **Appendix A**. The strategy outlines:

- Which individuals and organisations should be involved in the review, preparation and implementation of the CMP
- How and when they will be offered engagement opportunities
- How their input will be incorporated into the planning process.

During the development of the draft Scoping Study the project team undertook community and stakeholder engagement, which is summarised in **Section 1.4**. An evaluation of the success of these activities is provided in **Appendix A**. **Section 9.2** also discusses the importance of engagement with key stakeholders.

7 Data Gaps and First Pass Risk Assessment

7.1 Knowledge Gaps

Through the detailed literature review of existing studies and management documents for the study area, several knowledge gaps were identified and discussed with stakeholders during the first pass risk assessment process. Identifying these knowledge gaps and where the risk warrants, that these knowledge gaps be filled has assisted with developing the plan for additional studies to be undertaken in Stage 2 (the Forward Plan, as detailed in **Section 9**).

These knowledge gaps are shown in **Table G-5** in **Appendix G**.

7.2 First Pass Risk Assessment

7.2.1 Overview of Process and Methodology

The CM Act requires Council to follow a risk management process when preparing a CMP and identifying where management actions are required. This includes identifying and assessing risks to environmental, social and economic values and benefits and evaluating and selecting management actions to address those risks (OEH, 2018c).

The first pass risk assessment in Stage 1 is a qualitative risk assessment using available information to help inform the scope of the CMP. It is a relatively straightforward way to prioritise the threats to the coastal environment and risks from coastal hazards.

The goal is to identify what values and assets might be at risk and then establish whether the risk is large enough to warrant a more detailed assessment / further assessed in subsequent stages of the CMP (OEH, 2018c). Where detailed assessment / further assessment is vital to inform the preparation of the CMP, these high priority additional studies/investigations should be undertaken in Stage 2. When not vital to inform the preparation of the CMP, they can be undertaken in Stage 5 (see **Section 9.1** for a description of the stages of the CMP process).

An overview of the Stage 1 first pass risk assessment inputs, process and outputs and how these outputs are used in subsequent stages of the CMP process is provided in **Figure 7-1**.

Risk is a function of the likelihood of a hazard or threat occurring and the consequences of the hazard or threat, with the consequences combining the concepts of magnitude, sensitivity and duration (OEH, 2018c).

The Coastal Management Manual (OEH, 2018c) indicates the assessment process should be systematic and demonstrate that both likelihood and consequence have been considered, which involves applying qualitative scales of likelihood and consequence. The qualitative scales of likelihood and consequence, as well as the risk matrix used are discussed and provided in **Appendix G**.

The risk assessment process used here is similar to the process used in BMT (2020). Key differences are:

- Inclusion of the likelihood and consequence used to determine the risk. This can be used as a basis for the detailed risk assessment required in Stage 2 of the CMP process.
- Additional future timeframes have been considered in accordance with the CM Manual.

- A confidence assessment was undertaken for each threat to provide an indication of the robustness of the risk assessment approach before using its outputs to determine possible action.

See **Appendix G** for details on timeframes assessed and confidence scales.



Figure 7-1 Overview of the risk assessment inputs, process and outputs

7.2.2 Data Inputs

As shown in **Figure 7-1**, outcomes of the data and information review were used in the first pass risk assessment to help identify coastal zone 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.

Feedback from the online community survey and stakeholder engagement (such as workshops) was used to help identify and rank coastal zone values and threats, as discussed in **Sections 3.4, 4.3.1 and 4.3.2**.

7.3 Summarised Outcomes of the Risk Assessment

The results of the first pass risk assessment are used in the subsequent sections of this CMP Scoping Study and to inform the Forward Plan (**Section 9**). As part of the assessment process, data gaps were identified and based on the risk and confidence ratings, Stage 2 studies have been recommended where the assessment highlighted that more robust information was required to give a more informed understanding of risk.

The full outcomes of the first pass risk assessment are provided in **Table G-5** in **Appendix G**, with the following information provided for each management issue:

- Management issue description/detail/consequences, including key hotspots
- How the management issue was identified (i.e. data source)
- Values affected by the management issue
- Likelihood, consequence, risk ratings for all timeframes and confidence rating
- Current management arrangements
- Available information/data and studies relating to the issue
- Data gaps
- Recommended studies for Stage 2 and/or Stage 5.

The summarised outcomes of the first pass risk assessment are provided in **Table 7-1**, showing the following information for each management issue:

- Management issue description
- Current and future risk rating for 2020 and 2100 timeframes
- Confidence rating.

Table 7-1 Summarised first pass risk assessment outcomes

Management Issues / Threats		Risk Assessment							
No.	Description	Current Consequence - Rating	Current Likelihood - Rating	Current Risk: 2020	Future (2100) Consequence - Rating	Future (2100) Likelihood - Rating	Future Risk: 2100	Future Risk: 2120 (+ 100 years)	Confidence - Rating
T1	Beach erosion	Moderate	Possible	High	Moderate	Almost certain	High	High	Moderate
T2	Shoreline recession	Moderate	Rare	Medium	Moderate	Possible	High	High	Moderate
T3a	Coastal inundation	Major	Possible	High	Catastrophic	Almost certain	Extreme	Extreme	Moderate
T3b	Tidal inundation	Major	Possible	High	Major	Almost certain	Extreme	Extreme	Moderate
T3c	Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters	Moderate	Possible	High	Major	Almost certain	Extreme	Extreme	Moderate
T4a	Coastal watercourse entrance variability	Minor	Possible	Medium	Moderate	Likely	High	High	Moderate
T4b	Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs)	Moderate	Likely	High	Moderate	Almost certain	High	High	Moderate
T5	Dune slope instability	Moderate	Possible	High	Moderate	Almost certain	High	High	Moderate
T6	Coastal cliff instability	Moderate	Unlikely	Medium	Moderate	Unlikely	Medium	Medium	Low
T7	Conflict over resource access and use	Moderate	Likely	High	Moderate	Almost certain	High	High	Moderate
T8	Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)	Moderate	Possible	High	Moderate	Almost certain	High	High	Moderate
T9	Poorly located, poorly maintained and/or inappropriate access and supporting facilities	Minor	Likely	Medium	Minor	Almost certain	High	High	Moderate
T10	Anti-social behaviour and unsafe practices	Minor	Almost certain	High	Moderate	Almost certain	High	High	Moderate
T11	Passive recreational use (swimming, surfing, dog walking, bush walking, etc.)	Minor	Possible	Medium	Minor	Likely	Medium	Medium	Moderate
T12	Active recreational use (recreational boating and fishing, motorised watercraft, drones, four wheel driving, etc.) and commercial fishing	Minor	Likely	Medium	Moderate	Likely	High	High	Moderate
T13	Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)	Moderate	Likely	High	Major	Almost certain	Extreme	Extreme	Moderate
T14a	Water pollution from urban stormwater and treated effluent discharge	Moderate	Likely	High	Major	Almost certain	Extreme	Extreme	Moderate
T14b	Water pollution from agricultural diffuse source runoff	Moderate	Likely	High	Moderate	Almost certain	High	High	Moderate
T14c	Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics	Minor	Likely	Medium	Minor	Almost certain	High	High	Moderate
T15	Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLs	Moderate	Likely	High	Moderate	Almost certain	High	High	Moderate
T16	Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)	Moderate	Almost certain	High	Moderate	Almost certain	High	High	Moderate
T17	Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment	Moderate	Likely	High	Minor	Almost certain	High	High	Moderate
T18	Insufficient or inappropriate governance and management of the coastal environment	Moderate	Likely	High	Moderate	Almost certain	High	High	Moderate
T19	Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment	Moderate	Likely	High	Moderate	Almost certain	High	High	High

8 Preliminary Business Case

A preliminary business case has been prepared as part of this Scoping Study to gain support and commitment to undertake additional studies and activities required to prepare the CMP and to help streamline future funding submissions. Relevant guidelines include NSW Treasury's *NSW Government Business Case Guidelines (TPP18-06)* and NSW Government's *Benefits Realisation Management Framework (2018)* and the Coastal Management Manual.

The full business base is provided in **Appendix H**.

8.1 Components Required to Develop a CMP

The business case identifies, at a broad scale, the current CMP elements, the current budget of coastal management activities in the study area, through Council, other Government initiatives and other private groups.

Council has undertaken numerous studies in coastal management which will be utilised to allow both time and costs savings. Extensive review of these existing studies has been undertaken to identify key 'knowledge gaps' that may require future studies as further discussed in depth in **Section 7**.

The Coastal Management Manual set out the preparation of a CMP across a five stage process. The CMP Scoping Study completes Stage 1 for the Southern Byron Shire Coastline and Belongil Estuary. A summary of what is involved in subsequent Stages 2 to 5 and the projected steps, timelines and costs for these tasks are shown in the Forward Plan in **Section 9** and **Table 9-2**. These are broadly:

- Stage 2 \$62,000-\$130,000, with timing per Op. Plan 2021-2022
- Stage 3 \$65,000-\$130,000 with timing per Op. Plan 2021-2022
- Stage 4 \$60,000-\$105,000 with timing per Op. Plan 2022-2023

This business case seeks the release of funding to support ongoing CMP development as outlined within the forward plan. As the CMP develops, the business case will be advanced to seek implementation funding as relevant. There are variabilities in the projected costs for each element as there are potentials for cost sharing options with other government bodies, such as adjacent councils for example.

A number of key studies are required to be undertaken to finalise the CMP, with some variability in their costings and possibilities for cost sharing amongst other agencies depending on the study extent. These are identified in the Forward Plan (**Table 9-2**).

8.2 Benefits

8.2.1 Funding Security

Through provision of a certified CMP, Council has a defined and accessible pathway through which funding may be sought to support and supplement the implementation of recommended actions identified within the CMP. Provision of such funds, if awarded, will help break the current cycle of perpetual planning and lack of achieving the approval for implementation phases to commence, helping to overcome the low rate base faced by Council.

Moreover, as ultimate funding for key large scale CMP initiatives is predicated on the demonstration of economic viability (i.e. cost benefit analysis), the CMP process also provides an effective mechanism to ensure that funding is directed towards the highest performing value for money options.

8.2.2 Social Legitimacy

Provision of a certified CMP provides both social and legal support to Council in its for coastal management. Community members may be less inclined to challenge proposed actions in the NSW Land and Environment Court, where the proposed actions have previously been approved under the CM Act. This will serve to help expedite the roll out of mitigation measures and break the current cycle of planning and interim action.

From a legislative perspective, Council is likely to benefit as Section 733 of the *Local Government Act 1993* covers provides statutory exemption from liability for Councils in respect of advice, actions or omissions by local councils done in good faith relating to the likelihood of land being affected by a coastal hazard. Relevant to the indemnities afforded by actions covered by Section 733, actions covered include the making of a CMP and acting substantially in accordance with the principles and mandatory requirements set out in the Manual. Consequently, preparing and implementing a CMP, in accordance with the Manual will be covered by Section 733.

Social acceptance and enhancement of Council reputation is likely to facilitate stakeholder engagement with community members and interest groups within the study area. It is also likely to engender confidence within the community, stakeholders and government bodies that coastal management is being developed through a regulatory compliant statutory framework with funding available in a way that is designed to incorporate community, cultural, societal, economic and environmental elements in the management process. This, in turn, may increase opportunities to attract funding, and will help provide certainty in planning, and investment and decision making by for both Council, State Government and the community.

8.2.3 Holistic Coastal Planning

Council's preceding CZMPs do not present a holistic management program in line with current recommended assessments as outlined within the Manual. There is a need to ensure the standards adopted within coastal planning reflect current best industry practice and information. There are a number of places where Council's existing supporting policies require update. For example, Council's Climate Change Strategic Planning Policy No 14/006 (2014b) utilises sea level rise parameters of 0.17 to 0.38 m by 2065, and 0.26 to 0.82 m by 2100. These levels are based on global projections in sea level rise from the IPCC (2013) Summary Report for Policymakers, as well as DECCW's NSW Sea Level Rise Policy Statement (2009), both of which are now outdated.

It is important that coastal managers have a proper and holistic understanding of the risks and opportunities within the coastal zone and the consequences of specific courses of management action. Accurate and detailed information about risk and consequence is necessary to assist decision makers in generating effective management strategies which identify and prioritise future actions and investment. The current CZMPs are comparatively limited in their breadth of management in terms of the risks considered, with a strong focus upon physical hazard identification and management. In contrast, a CMP adopts a greater breadth in risk analysis, providing a mechanism that can encapsulate the full array of risks to the environment, local economy, community and cultural elements of area. A coastal management program that can identify and incorporate the full suite of issues is more likely to generate an optimal outcome in light of uncertainty than a limited or ad hoc approach.

Similarly, it is recognised that NSW catchment management (previously under catchment action plans) is now anticipated to be completed as part of CMPs and represents an opportunity for this element to be brought into the overarching strategy rather than operated as a separate management plan by Council.

8.2.4 Collaborative Management Opportunities

Development of a CMP will ensure that coastal management in Byron Shire is aligned with the state-wide approach. As such, it will also be aligned with the monitoring, evaluation and improvement of concurrently implemented CMPs and facilitate knowledge sharing between agencies.

The NSW Coastal Management Framework provides flexibility around the scope, structure and governance arrangements of a CMP, providing 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 benefit within the Byron Shire. Implementation will allow access to a clearly defined management and governance framework supported by regulatory bodies and subsequent funding opportunities. Further to this, the CMP integrated process allows access to collaboration with adjacent bodies in terms of undertaking studies and in implementing interventions that may have a larger than LGA impact. For example, the study area is part of a wider sediment compartment that incorporates three LGA regions in the Far North Coast Region (Tweed, Byron and Ballina). In addition to the knowledge sharing opportunity this provides, this may also generate cost sharing opportunities on studies and interventions and access to knowledge sharing network developed as part of the CMP process.

On a more local scale, the preparation of the CMP represents a strategic opportunity to improve engagement with the various land owners, coastal managers and stakeholders, gaining broad community support for the program and their commitment to contribute towards the necessary studies and implementation of management actions as agreed within the final CMP.

8.3 Risks

8.3.1 Risks of Not Preparing a CMP

Council has been managing the associated risks within the study area through the existing (and somewhat limited) planning controls, various ongoing services (e.g. ICOLL entrance management, drainage maintenance, STP compliance monitoring, dune regeneration) and through individual projects on an ad hoc basis as required or as directed. Whilst some of these projects align with recommendations from past management plans (CZMP, estuary management plans or other), implementation of those previous plans has been negligible to date (refer Section 5.3) and minimal reduction in coastal risk or hazard has been achieved within this section of the coast since the preparation of the *Draft Coastal Zone Management Plan for Byron Shire Coastline* (BSC, 2010). The lack of certification of the 2010 CZMP and subsequent attempts at preparing CZMPs, e.g. for the Byron Bay Embayment (refer **Section 5.3.1**) has resulted in a draft CZMP that has:

- Not been able to access significant state funding for its recommendations: Council has sought to implement a prioritised subset of actions that it can lawfully do and fund, some of which have been similar in actions to previous draft CZMPs as best it can with its limited available internal funds and from seeking one-off grants from other bodies as applicable. As a consequence the majority of coastal management actions have been ad hoc and responsive to specific coastal events, as opposed to planned and holistic. Implementation is made harder

by the financial constraints associated with a low rate paying base of Council. In addition, until recently there has only been one coastal officer to prepare coastal management plans, apply for funding and implement coastal management actions.

- **Struggled to obtain community legitimacy:** The lack of formal State Government support has led to community members seeing the draft plans as recommendation from Council that are not necessarily in line with State legislature. As a number of recommendations within the plans relate to or impact upon private property in the foreshore zone, there have been several formal legal challenges on a range of coastal issues.

Since the replacement of the *Coastal Protection Act 1979* in 2016 with the CM Act, it is no longer possible for the CZMP to be Gazetted and for the reasons discussed above, the CZMP does not inform current projects or workplans. The four main risks of not preparing a CMP and continued attempts to undertake coastal management in an uncoordinated, ad hoc and reactionary approach are:

- **Funding:** Continued inability to access funds to support management of the coastal zone. Council is prevented from applying for and thus obtaining funds through the NSW Coastal and Estuary Program in absence of a certified plan. Whilst some actions may be funded in absence of a certified CMP through the NSW Coastal and Estuary Program, all applications are contestable, and the activities only allow minor works. Other funding programs may be suitable for implementation of some actions, however the NSW Coastal and Estuary Program remains the key funding mechanism for coast and estuary management.
- **Implementation:** State Government and Council will need to continue to adopt a reactive approach to coastal management, which due to limitations of available funding will necessarily be piecemeal, limited and ad hoc, and likely be subject to the changing direction of Council and the community:
 - Sections of coast, unable to be addressed will continue to be exposed to forecast hazards and potential damage to, or loss of, property and infrastructure and risks to public safety, as well as associated damage to environmental, cultural, social and economic values.
 - The potential will continue for ad hoc actions taken in one location may adversely affect assets and values in other locations.
 - Council's ability to analyse coastal emergency responses or impacts following events continues to be limited.
- **Legitimacy:** Until there is a certified plan there will be continued lack of social legitimacy for implementation of ad hoc action, and continuing potential for further court actions against State Government and Council, with continuing adverse impacts on resources and risks.
- **Scope:** While the draft 2010 CZMP was developed in accordance with State Guidelines applicable at the time, the draft plan is highly focused upon physical hazard reduction. Current guidance regarding coastal management adopts a broader and more holistic suite of considerations in its identification and prioritisation of the coastal issues and management actions. In the absence of a holistic coastal management program that considers all coastal values and threats to these values, coastal management may not consider a broader range of community, stakeholder economic, climate change, catchment processes and environmental issues and values.
Council's current coastal management scope is limited to maintaining existing coastal services, and ad hoc projects that are often reactionary in nature. This would likely be the ongoing scope of coastal management in the absence of a CMP.

Related to this are a range of secondary risks and costs, including:

- Increased pressure on coastal areas from actions occurring that would not be permitted under a certified comprehensive management plan.

- Increased misalignment between local activities and broader regional actions and NSW policy.
- Uncertainty for community members, property owners and businesses regarding investment within the region. There is a community sentiment that it is trapped within a perpetual planning cycle.
- Inefficiencies and repeat expenditure of Council and State Government funds in response to repeated plans and coastal damages and risks.
- Inability to readily incorporate a collaborative planning approach that recognises a wider scale approach to coastal management, as promoted by the State.

Given the significant issues faced by Council in the development of a certified plan, it is considered unlikely that a do-nothing scenario will lead to any substantive change in this outcome and that Council will continue to struggle to make material improvements in its coastal management. Ultimately, this could result in the realisation of identified hazards and the loss of environmental, social and economic values. Given the economic benefits generated from tourism and environmental values, the long-term costs of a 'do-nothing' approach, may be significant to the region as a whole as well as at a State and national level.

8.3.2 Risks of Preparing a CMP

While the CMP will address the problem statement and support the realisation of the identified benefits, it is acknowledged that its introduction can lead to a number of risks which require management, monitoring and evaluation over its implementation life and the service life of its resultant actions. Key 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 responsibilities – As the lead of the CMP processes, once certified, Council has responsibility to lead its implementation (Division 4 section 22 of the CM Act):
 - 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.
 - In particular, without limiting subsection (1), a local council is to give effect to its CMP 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
 - (b) the preparation of planning proposals and development control plans under the Environmental Planning and Assessment Act 1979.
- Under Part 4 (Section 26) of the CM Act, the NSW Coastal Council may undertake audits of Council's implementation of the CMP. If the NSW Coastal Council is of the opinion that Council is not complying with its CMP to a significant extent, the NSW Coastal Council may make recommendations to the Minister on appropriate remedial actions to be taken, including that the Minister refer the matter to the Minister administering the *Local Government Act 1993* for further consideration.
- Inability to implement of actions – there remains a risk that actions in a certified CMP may not be able to be implemented due to matters beyond Council's control for example legislative change, State Government directions, unavailability of funding or physical changes to the coastal environment etc. Inability to implement actions may lead to the vision and objectives of the CMP becoming unattainable or loss of community confidence in the CMP for example

- Conflict with other resource commitments and demands of Council and agencies – Preparing a CMP may result in conflict within Council and contributing agencies and stakeholders, in terms of competing need for scarce resources (including but not limited to funding and staff). However, the CMP preparation process is required to be thorough, so any potential conflicts will need to be identified, and controls implemented to mitigate associated risks.
- Competition with other councils – while there is significant state funding available, the funding is finite and there may be both real and perceived competition between councils for State Government support. This may also affect community opinions regarding perceived inequality in value pending amount of funding invested/made available.

It is recognised that the limited success of CZMP plan process in the past may represent a project risk to future CMP implementation. Although never certified, an audit was undertaken on the actions of the CZMP (refer **Section 5.3.1** and **Appendix F**), to not only identify what actions may be relevant to be carried forward into the CMP but also identify lessons learnt in implementation (refer **Section 5.3.8**). It was found that whilst approximately half of the actions had been implemented in some form over the past twenty years (either completed, in progress/ongoing or partially complete), the progress on many actions was unknown and records regarding the outcomes for actions that had been implemented against intended indicators were unavailable. The lack of certification of the CZMP is likely the cause of this record keeping issue (i.e. no requirement for a timely review), and whilst this issue would be addressed through implementation of a certified CMP as part of the IP&R process, the issue may still remain should a CMP not be certified.

8.4 Value for Money

Given the acknowledged importance of the coastal area to the Byron Shire and the wider state of NSW as a tourist destination and desired place to live, there is significant incentive to ensure the responsible management of its coastal environment. While the costs of undertaking the CMP process are substantial, there is clear value in proceeding with the CMP process in comparison to the current, highly constrained management options accessible to Council, which puts both current and future environmental, social and economic values of this unique area at risk. Quantification of the magnitude of this relative net present value will be undertaken as the CMP development continues.



9 Forward Plan



This chapter provides a summary of the subsequent stages of the CMP process and a summary of recommended studies, investigations and assessments proposed, which forms the forward plan. The forward plan is the key outcome of this Stage 1 Scoping Study.

9.1 Subsequent Stages of the CMP Process

As stated in the Coastal Management Manual and shown in **Figure 1-3**, preparation of a CMP follows a five stage process. This CMP Scoping Study completes Stage 1. A summary of what is involved in subsequent Stages 2 to 5, as outlined in the Coastal Management Manual (OEH, 2018a), are provided in **Table 9-1**.

Table 9-1 Requirements for subsequent Stages 2 to 5 of the CMP process

Stage	Description in CM Manual (OEH, 2018a)
Stage 2: Determine risks, vulnerabilities and opportunities 	<p>Stage 2 involves undertaking detailed studies that help councils to identify, analyse and evaluate risks, vulnerabilities and opportunities.</p> <p>This includes:</p> <ul style="list-style-type: none"> • Engaging with the community and stakeholders • Refining the understanding of key management issues • Filling knowledge gaps by undertaking technical studies • Identifying threats to coastal values and areas exposed to coastal hazards • Analysing and evaluating current and future risks (detailed risk assessment) • Identifying scenarios for environmental, 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 • Identifying timing and priorities for responses, thresholds and lead times.
Stage 3: Identify and evaluate options 	<p>Stage 3 involves the identification and evaluation of management options.</p> <p>This includes:</p> <ul style="list-style-type: none"> • Identifying and collating information on management options • Evaluating management actions, considering their feasibility, viability and acceptability to stakeholders • Selecting preferred management actions and determining priorities • Engaging public authorities about implications for their assets or responsibilities

Stage	Description in CM Manual (OEH, 2018a)
	<ul style="list-style-type: none"> Evaluating mapping options and implications if a planning proposal is being prepared Identifying pathways and timing of management actions Preparing a business plan for implementation.
Stage 4: Prepare, exhibit, finalise, certify and adopt the CMP 	<p>Stage 4 includes:</p> <ul style="list-style-type: none"> Preparing a draft CMP Exhibiting the draft CMP and any related planning proposal Reviewing and adopting the draft CMP Submitting the draft CMP to the Minister administering the Act, for certification Publishing the certified CMP in the Gazette Making the CMP available to the community. <p>Prior to exhibition, councils may seek advice from DPIE on the draft CMP.</p>
Stage 5: Implement, monitor, evaluate and report 	<p>Stage 5 involves:</p> <ul style="list-style-type: none"> Implementing actions in the published CMP through the Integrated Planning and Reporting (IP&R) framework and land-use planning system Implementing actions in partnership with adjoining councils and public authorities where relevant Implementing an effective monitoring, evaluation and reporting (MER) program Monitoring indicators, trigger points and thresholds Reporting to stakeholders and the community on progress and outcomes through the IP&R framework Reviewing and updating the CMP at least every 10 years. <p>The evaluation of program outcomes will contribute to council's review of its Community Strategic Plan.</p>

Section 6.2 discusses the proposed CMP governance structure. In particular, **Table 6-1** provides a potential CMP governance and management structure that Council could proceed with.

9.2 Engagement with Key Stakeholders

During the development of the draft Scoping Study the project team undertook community and stakeholder engagement as summarised in **Section 1.4**. In particular, the project team liaised with key representatives of relevant agencies to discuss the Scoping Study and seek preliminary feedback and comments on the draft study. Although not required, Council plans to place this scoping study on their website for public comment, welcoming public feedback in the first half of 2021.

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 will be sought on this draft Scoping Study from the relevant state agencies and comments will be considered and incorporated into this Scoping Study.

9.3 Recommended Studies for the Forward Plan

The recommended studies, investigations and assessments for Stages 2 to 4 of the CMP are listed in **Table 9-2** (high priority studies only), as developed through the detailed data and information review, the review of current management arrangements and the first-pass risk assessment.

Table 9-2 provides indicative costs for the studies, a combined cost for undertaking the CMP stages and a timeline for completion of the studies. In relation to the timeline for the forward plan in **Table 9-2** it has been prepared in consideration of the timeline for the IP&R framework managed by the NSW Office of Local Government (**Figure 9-1**).

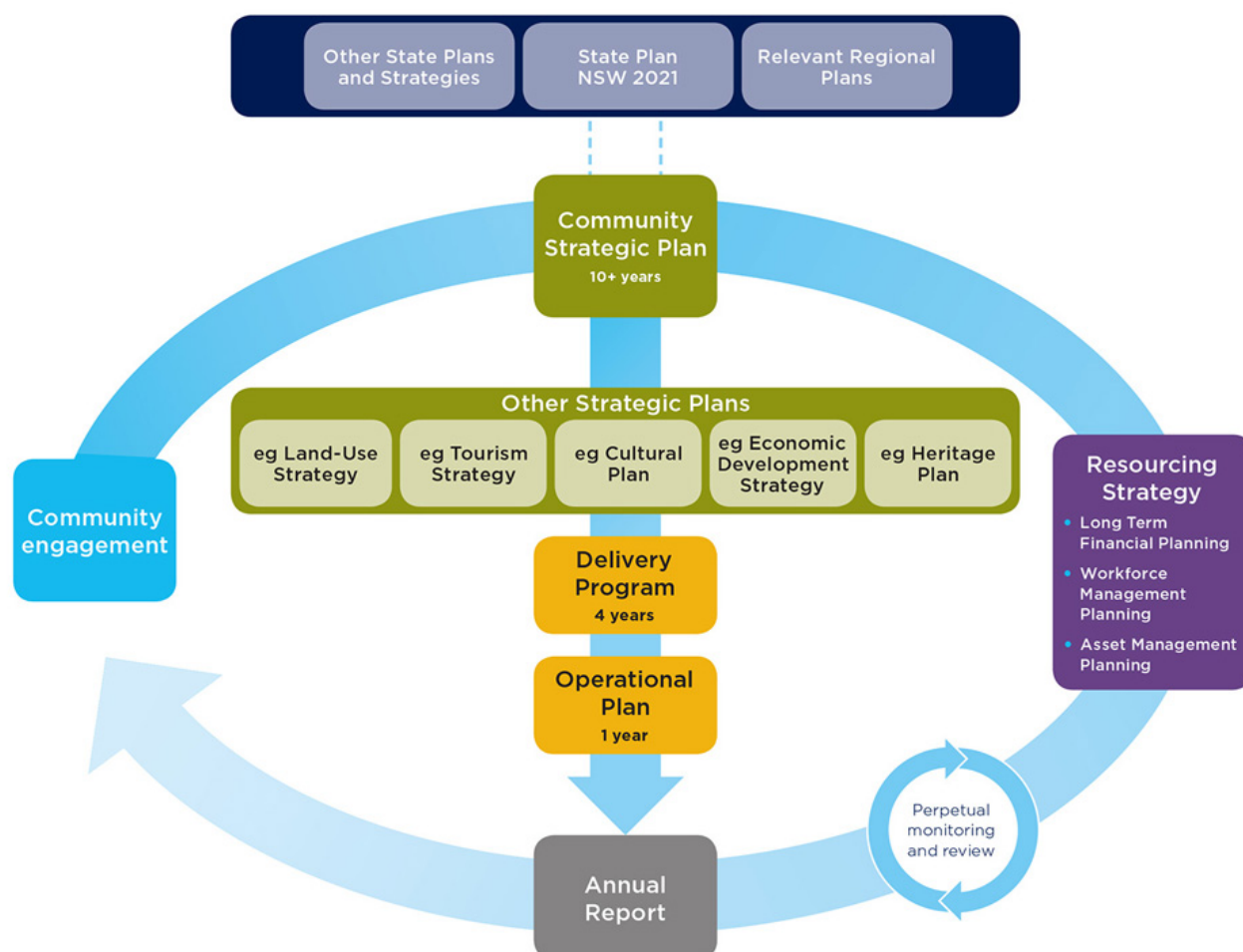


Figure 9-1 Integrated planning and reporting framework (Source: NSW Office of Local Government website: <https://www.olg.nsw.gov.au/councils/integrated-planning-and-reporting/framework/>)

In the IP&R Framework the Delivery Program is where the community's strategic goals are systematically translated into actions. It is a statement of commitment to the community from each

newly elected Council. The Delivery Program is a fixed four-year program as shown in **Figure 9-1**. Council presently has a Community Strategic Plan for 2018-2028 with a Delivery Program for 2017-2021.

The Operational Plan is based on an annual 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.

In **Table 9-2** it should be noted that cost estimates are based on available information, experience, and expert judgement. A range of cost (low to 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).

The costs indicated in **Table 9-2** for Stages 3 and 4 are for undertaking CMP tasks within the current study area only, as opposed to one shire-wide CMP with the exception of the Shire wide coastal hazard assessment review and update (refer action). Note that if the various Stage 1 Scoping Studies were to proceed as one Stage 2 or Stage 3 or Stage 4 study area, indicative costs for each stage across the various scoping studies should not merely be combined for each line item, but rather a revised cost estimate must be obtained for each line item.

Table 9-2 includes recommendations of responsibilities and partnerships for all actions listed. A Lead Agency has been assigned to all Forward Plan actions. This is the agency 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.

The additional studies identified and prioritised through the course of this scoping study are listed with indicative costings in **Table 9-2**. 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.

With regards to the numbering format of studies in **Table 9-2** and **Table 9-3**, studies indicated with a number (01, 02, 03, etc.) have originated from BMT (2020), and can be cross-referenced to Table 4-3 in BMT (2020). Many studies recommended by BMT (2020) were applicable as they were shire-wide assessments. Studies indicated with a letter (A, B, C, etc.) have been developed as part of this Scoping Study.

Preparation of a planning proposal to amend council's LEP to include updated boundaries for any coastal management area has been included in **Table 9-2**, if required, in Stage 4 (S4.02). Therefore, it is integrated within the proposed CMP preparation timeframe, if required. At this stage further studies must be undertaken during Stage 2 to support the coastal vulnerability area and confirm if a planning proposal is required.

Table 9-2 Forward plan (high priority studies)

Item	Recommended Studies / Components	Timing	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
Stage 2: Risks, Vulnerabilities and Opportunities						
S2-1	Coastal Hazard Assessment (2021) – Review and Update (for the entire Byron Shire LGA coastline). <i>A consultant is presently being engaged with the project due to commence in July 2021.</i> <ul style="list-style-type: none"> • Sediment budget and quantified conceptual sand movement model • Probabilistic assessment of beach erosion and shoreline recession • Coastal inundation (dune and seawall wave runup and overtopping) • Tidal inundation • Coastal entrance instability • Cliff instability • Erosion and inundation of foreshores. 	Op. Plan 2021-2022	Project has been funded and is due to commence July 2021.		Council	DPIE - EES NPWS
S2-2	Consider mapping of erosion escarpment as an outcome of Coastal Hazard Assessment (2021).	Op. Plan 2021-2022	\$ 10,000	\$ 20,000	Council	DPIE - EES
S2-3	Audit of Council's coastal planning framework. This would involve identification of all coastal planning controls and processes, and evaluation of the effectiveness of this framework in managing existing and future risk to the coastal zone and ensuring preservation of coastal values. The audit would also consider how Council's coastal planning framework aligns with State Government Agency frameworks and planning controls. This could be undertaken as a desk top assessment only, but would benefit from workshops or other engagement with relevant Council and Agency representatives (e.g. NPWS, Crown Lands). This would inform Stage 3 recommendations for future planning provisions and updates to Council's LEP, DCP and other relevant documents. As part of this study also consider mapping of a coastal vulnerability area for the study 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).	Op. Plan 2021-2022	\$ 10,000	\$ 20,000	Council	DPIE - EES, NPWS, Crown Lands (in principle support) DPI (Marine Parks, Fisheries)
S2-4	Investigate and ground truth discrepancies between Council's mapping of Littoral Rainforest and Coastal Wetlands with the CM SEPP mapping and identify whether a planning proposal to amend the SEPP mapping is required.	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	DPIE - EES (incl NPWS)
S2-5	Identification of water quality pollution sources (e.g. potential sources of bacterial contamination in ICOLLs, acid runoff in the Belongil catchment, consideration of West Byron development, and macro/micro plastics) and composition to inform management strategies developed in Stage 3 of the CMP. It is expected that this assessment would be undertaken largely as a desk top assessment, with some ground truthing. The outcome would include recommendations for detailed water quality monitoring that may be included in CMP options assessed in Stage 3.	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	DPIE - EES
S2-6	Preliminary Aboriginal cultural heritage and values mapping. This would form the preliminary work which would potentially recommend more detailed mapping or known and predicted places of Aboriginal cultural significance, and the connections between these places. This more detailed work would be considered in Stage 3 for inclusion as an action of the CMP. The preliminary work would aim to gather existing known data (e.g. AHIMS sites and other documented resources) and also consider, through engagement with Aboriginal community representatives, landscape characteristics within the context of traditional Aboriginal settlement, resources, pathway, cultural and spiritual practices.	Op. Plan 2021-2022	\$10,000	\$15,000	Council	DPIE - EES BOBBAC
S2-7	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A. The objectives of engagement in Stage 2 will be to communicate the outcomes of the coastal hazard assessment (2021).	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	DPIE - EES
S2-8	Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	BOBBAC LALCs
S2-9	Development of an integrated hydrodynamic and water quality model for Tallow Creek as a decision-making tool for Council's use in managing water levels in Tallow Creek whilst maintaining suitable dissolved oxygen concentrations. Study includes: <ul style="list-style-type: none"> • Sediment oxygen demand studies (completed by Waddy (2019a and b), refer Appendix D) • Multi-depth water quality monitoring • Development of a hydrodynamic model • Development of a coupled hydrodynamic – biogeochemical model. 	Op. Plan 2020-2021	Already funded	Already funded	Council	DPIE – EES

Item	Recommended Studies / Components	Timing	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
S2-10	<p>Review and update Tallow Estuary entrance opening strategy (EOS) and environmental management plan (EMP) including:</p> <ul style="list-style-type: none"> • Ensuring consistency with the understanding of coastal processes (updated in Stage 2, excluding hydraulic modelling of berm scour which could be done as part of future flood studies) • Consideration of findings of the coupled biogeochemical and hydrological model prepared by SCU (refer S2-9) as a decision support tool for Council management of water levels whilst maintaining suitable dissolved oxygen concentrations • Consideration of the risk of nuisance flooding to low lying assets* • Incorporation of cultural knowledge on the processes and management of the estuary and entrance management** • Consideration of inclusion of a clear and adaptable decision support framework for entrance opening for varying scenarios (e.g. of water level, berm height, rainfall, water quality, flood risk and seasonality) • Engagement with key stakeholders • Update the EOS and EMP in line with best practice. <p>* Involves a survey of low lying assets at risk of inundation from several closed entrance water level scenarios. It is noted that the ICOLL opening strategies would undergo further testing and possible updates as part of the Floodplain Risk Management Process (separate to the CMP).</p> <p>** See S2-8 which provides for engagement of Aboriginal cultural knowledge holders.</p>	Op. Plan 2021-2022	\$ 10,000	\$ 30,000	Council	DPIE – EES BOBBAC NPWS
S2-11	<p>Review and update Belongil Estuary opening strategy (including decision support framework) and environmental management plan to ensure consistency with the understanding of coastal processes (updated in Stage 2, excluding hydraulic modelling of berm scour which could be done as part of future flood studies).</p> <p>Further clarification needs to be included, i.e. consideration of:</p> <ul style="list-style-type: none"> • Ocean water levels • Forecast rainfall • Water quality parameters • Best practice management to minimise the risk of fish kills • Effectiveness of berm scraping • The alignment and depth of excavation • Lessons learnt under the current arrangements • Outcomes of engagement with key stakeholders. <p>It is noted that the ICOLL opening strategies would undergo further testing and possible updates as part of the Floodplain Risk Management Process (separate to the CMP).</p>	Op. Plan 2021-2022	\$ 2,000	\$ 5,000	Council	DPIE – EES NPWS
Estimate Stage 2 Subtotal			\$ 62,000	\$ 130,000		

Item	Recommended Studies / Components	Timing	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
Stage 3: Identify and Evaluate Options						
S3-1	Following coastal planning framework audit (S2-3) and the Coastal Hazard Assessment (S2-1): develop draft coastal management planning controls for inclusion in the LEP and DCP and update coastal mapping in the DCP, giving consideration to the CM Act and CM SEPP, which Council could implement when updating their LEP and DCP.	Op. Plan 2021 - 2022	\$ 10,000	\$ 20,000	Council	N/A
S3-2	Identify Potential Management Options and evaluate through Multi-Criteria Analysis (MCA) of Options and determine actions for detailed Cost benefit Analysis. This should include a detailed risk assessment to address the complex issues, potentially high and unacceptable risks, significant uncertainty or complex management choices identified in the first-pass risk assessment (Stage 1). If major projects are recommended that require a full scale Cost Benefit Analysis, then this would need to be undertaken as part of Stage 3 (see additional study in Table 9-3).	Op. Plan 2021 - 2022	\$ 30,000	\$ 60,000	Council	DPIE - EES
S3-3	Preparation of a business plan for the CMP. This will outline the full cost of the program, cost-sharing arrangements, funding and financing mechanisms and scheduling of implementation.	Op. Plan 2021 – 2022	\$ 15,000	\$ 30,000	Council	DPIE - EES
S3-4	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A. The objectives of engagement in Stage 3 will be to gain feedback on management potential management options identified. Engagement activities likely to include website updates, online survey, information drop-in sessions, and direct engagement with key stakeholders. Stage 3 engagement could be combined with Stage 2 engagement.	Op. Plan 2021 - 2022	\$ 5,000	\$ 10,000	Council	DPIE - EES
S3-5	Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.	Op. Plan 2021 - 2022	\$ 5,000	\$ 10,000	Council	BOBBAC LALCs
Estimate Stage 3 Subtotal			\$ 65,000	\$ 130,000		
Stage 4: Prepare, exhibit, finalise, certify and adopt the CMP						
S4-1	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.	Op. Plan 2022 - 2023	\$ 30,000	\$ 40,000	Council	DPIE - EES
S4-2	Planning Proposal (only as required) to adopt the coastal vulnerability mapping (see S2-3) 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 community consultation conducted through the course of the CMP can also be conducted in tandem for the planning proposal.	Op. Plan 2022 - 2023	\$ 10,000	\$ 20,000	Council	DPIE - EES DPIE - Planning & Assessment
S4-3	Finalising the CMP (with Community and Stakeholder public exhibition feedback).	Op. Plan 2022 - 2023	\$ 10,000	\$ 20,000	Council	DPIE - EES
S4-4	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A. The key objective of engagement in Stage 4 will be to gain feedback on draft CMP. Engagement activities likely to include website updates, fact sheets, information drop-in sessions, online and hard copy submissions, and direct engagement with key stakeholders.	Op. Plan 2022 - 2023	\$ 5,000	\$ 15,000	Council	DPIE - EES
S4-5	Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.	Op. Plan 2021 - 2022	\$ 5,000	\$ 10,000	Council	BOBBAC LALCs
Estimate Stage 4 Subtotal			\$ 60,000	\$ 105,000		
Estimate CMP Stages 2 to 4 Total			\$ 187,000	\$ 365,000		

Table 9-3 Additional recommended studies for consideration in the CMP(s)

Item	Additional Recommended Studies / Components	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
Add-1	Review and update Part C of the 2016 BBE CZMP (Community Uses of the Coastal Zone), to ensure compliance with IPR Framework; inclusion of beaches, public reserves, recreation facilities, accessways etc in Council (and other State Agencies) in Asset Management Plans; and consideration of the Byron Shire Open Space and Recreation Needs Assessment and Action Plan J82017 - 2036.	\$20,000	\$30,000	Council	DPIE - Crown Lands (in principle support)
Add-2	Tallow Creek tertiary treatment ponds investigation. The possible connection of the two tertiary treatment ponds with groundwater and surface water and hence impacts on the surface water of the adjacent Tallow Creek estuary and its biota requires further investigation. While it is understood that the tertiary ponds and Tallow Creek are currently not used for primary contact, including wading or swimming, the creek is uncontrolled, and the surface water quality and use of these water bodies for recreation use requires on-going and specialist assessment into the temporal and spatial water quality (Cavvanbah, 2012). This investigation will also include engagement with BOBBAC (Arakwal) regarding the cultural health of Tallow Creek.	\$20,000	\$60,000	Council	NPWS BOBBAC
Add-3	Economic valuation of the coastal zone (i.e. all cultural, natural and built assets, including beaches themselves as well as commercial and business activities i.e. agriculture) 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. 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. This has been included as an "additional study" rather than a core study in Stage 3, as it is not known if this is required at this time.	\$ 80,000	\$150,000	Council	N/A
Add-4	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).	\$30,000	\$60,000	Council	DPIE - EES NPWS DPI - Fisheries
Add-5	Review Byron's shire-wide surface water monitoring program to ensure its adequacy from an environmental health perspective of the catchments. This would involve collation of all relevant surface water quality data shire-wide, and analysis of its fit for purpose. A review of reporting format to the community should be undertaken and improved. Amendments to the surface water quality monitoring program should be made if necessary to ensure capture of relevant data for environmental health, including analysis of event and dry weather flows, collection of baseline data prior to proposed large scale developments, and consideration of inclusion of reference sites. The surface water monitoring program should also be reviewed with a focus to ensure water quality (particularly at Tallow Creek) is suitable to support fish and marine life safe for human consumption, to support safe Aboriginal cultural fishing practices.	\$ 20,000	\$ 40,000	Council	DPIE - EES NPWS
Add-6	Benefit Cost Assessment (BCA) of Options requiring detailed analysis (e.g. required for options >\$1M) (based on estimated 10-15% of capital cost).	\$100,000	\$250,000	Council	DPIE - EES
Add-7	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. This should also include cultural access requirements (for Aboriginal people) and management of general public access to sites of cultural significance. This should be undertaken in consultation with Aboriginal land holders and community representatives.	\$50,000	\$100,000	Council	DPIE - Crown Lands (in principle support)
Add-8	Utilise updated open coast hazard study water levels as inputs to future flood studies to understand the impacts of and the joint probability of coastal and catchment driven flooding events.	Funded under NSW Floodplain Risk Management Grant Scheme		Council	DPIE - EES
Add-9	Develop and package up material from Nathan Galluzo's "Our Special Place Tallow Creek" exhibition into content to support, with permission of knowledge holders, development of management actions and place based engagement for Stages 3 and 4. This aligns with CM objectives c) and k) and with key Threat 19 "...insufficient knowledge sharing regarding cultural heritage and use within the coastal environment". The materials could be used to enhance the emotional connection of the community and visitors with the Tallow Creek environment as a means of increasing the likelihood of long-term behaviour change and environmental protection for the site into the future. DPIE is investigating opportunities for this style of engagement in the coastal zone at other locations. This study may include graphic design, video editing etc and may be possible as a collaborative project and student internship. This should be undertaken in consultation with Aboriginal land holders and community representatives.	\$5,000	\$20,000	Council	NPWS
Estimate of Additional Studies		\$320,000	\$690,000		

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Map Compendium



Map G001

Southern Byron Shire
Coastline and
Belongil Estuary CMP

Study Area

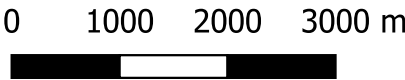
Legend

- Study Area
- Cadastre (Source: Six Maps Clip and Ship)
- LGA Boundaries (Source: Australian Goverment, 2020)
- Major Roads (Source: OpenStreetMap, 2020)
- Catchment Areas

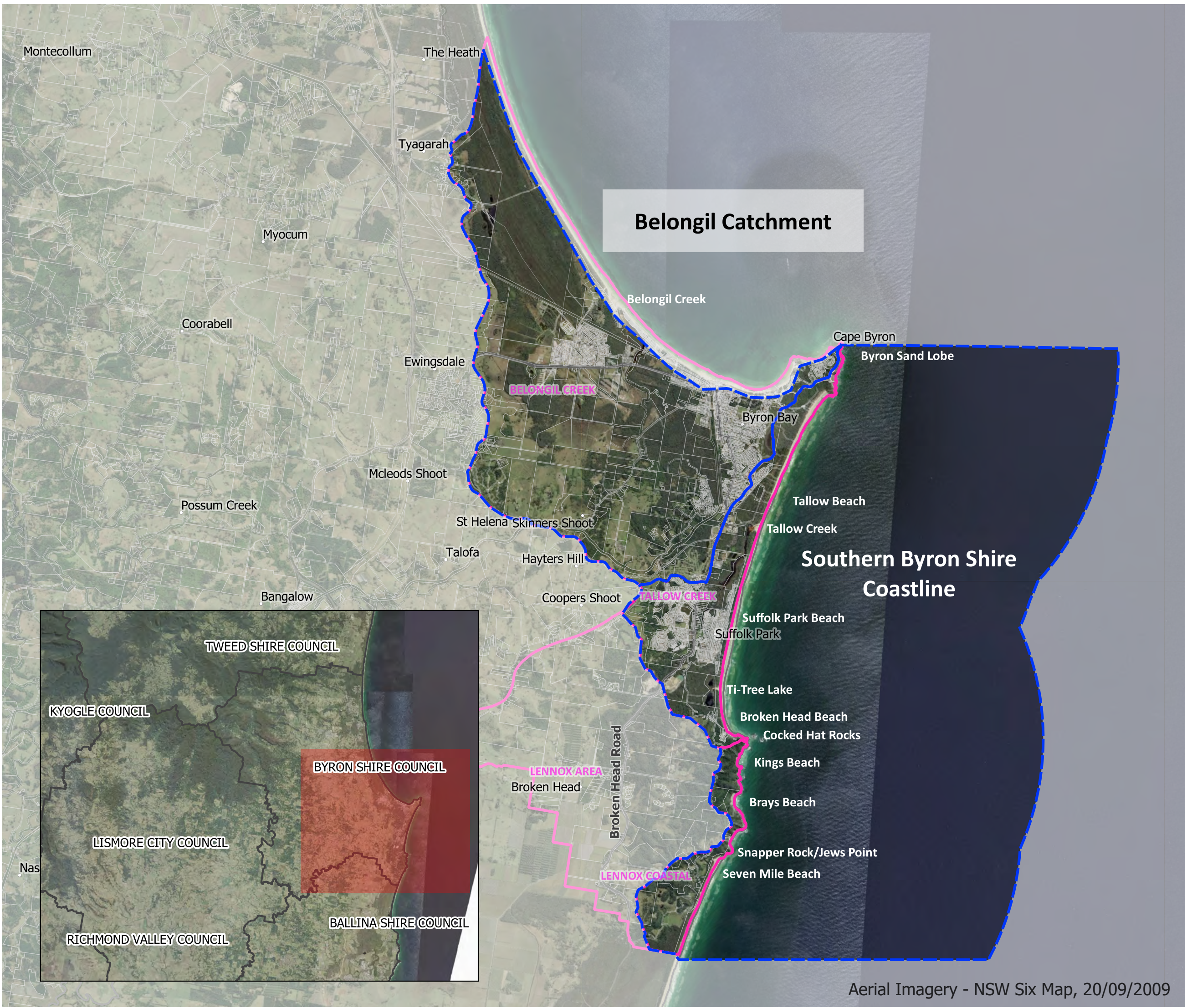
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Date : 05 February 2021
Revision : B
Created by : JS
Coordinate System : MGA 56



Aerial Imagery - NSW Six Map, 20/09/2009



Map G002

**Southern Byron
Coastline and Belongil
Estuary CMP**

**Sediment
Compartments**

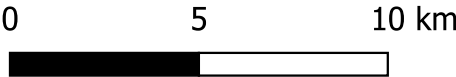
Legend

- Study Area
- LGA Boundaries (Source: Australian Government, 2020)
- Primary Compartment -NSW North Coast (Source: Geoscience, 2015)
- Secondary Compartment (Source: Geoscience, 2015)
- Cape Byron-Richmond River
- Point Danger-Cape Byron

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Background Map - OpenStreetMap



Map G003

Southern Byron
Coastline and Belongil
Estuary CMP

Endangered Ecological
Communities (EECs)
within Study Area

Legend

- Study Area
- LGA Boundaries (Source: Australian Government, 2020)

Endangered Ecological
Communities (EECs)

- Byron Bay Graminoid Heath
- Coastal Cypress Pine
- Freshwater Wetlands on coastal floodplains
- Littoral Rainforest
- Lowland Rainforest
- ?Lowland Rainforest?
- Lowland Rainforest on Floodplain
- Saltmarsh
- Swamp Oak Floodplain Forest
- Swamp sclerophyll forest on coastal floodplains
- ?Swamp sclerophyll forest on coastal floodplains?

0 1000 2000 3000 m

Scale : 1:70000@A3
Date : 05 February 2021
Revision : B
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Coordinate System : MGA 56

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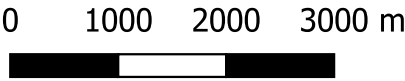
Map G004

**Southern Byron Shire
Coastline and Belongil
Estuary CMP**

**Coastal Management
Areas**

Legend

- Study Area
- LGA Boundaries (Source: Australian Government, 2020)
- SEPP (Source: NSW Government, 2018)**
 - Coastal Environment Area
 - Coastal Use Area
 - Coastal Wetland Area
 - Proximity Area for Coastal Wetland
 - Land Application
 - Littoral Rainforest
 - Proximity Area for Littoral Rainforest



Scale : 1:70000@A3
Date : 05 February 2021
Revision : B
Created by : JS
Coordinate System : MGA 56

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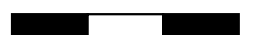
Map G005-1
Southern Byron Shire
Coastline and Belongil
Estuary CMP

Land Status and
Governance
Arrangements in the
Study Area

Legend

-  Study Area
-  LGA Boundaries (Source: Australian Government, 2020)
-  Railway (Source: Six Maps Clip and Ship)
-  Road Reserve (Source: Six Maps Clip and Ship)
-  National Parks/Reserves (Source: Six Maps Clip and Ship)
-  Crown Land
-  Jali LALC
-  NSW Crown Holiday Park Manager T/A Reflections Holiday Park
-  Council Operational Land
-  Council Community Land
-  Byron Shire Council - Crown Land Manager (Source: Crown Land Manager Reserves, 2020)

0 250 500 750 m



Scale : 1:25000@A3
Date : 05 May 2021
Revision : C
Created by : JS
Coordinate System : MGA 56

Tyagarah Nature Reserve

Julian Rocks
Nguthungulli Nature Reserve

Cumbebin Swamp
Nature Reserve

Cape Byron State
Conservation Area

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








Aerial Imagery - NSW Six Map, 20/09/2009



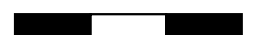
Map G005-2
Southern Byron Shire
Coastline and Belongil
Estuary CMP

Land Status and
Governance
Arrangements in the
Study Area

Legend

-  Study Area
-  LGA Boundaries (Source: Australian Government, 2020)
-  Railway (Source: Six Maps Clip and Ship)
-  Road Reserve (Source: Six Maps Clip and Ship)
-  National Parks/Reserves (Source: Six Maps Clip and Ship)
-  Crown Land
-  Jali LALC
-  NSW Crown Holiday Park Manager T/A Reflections Holiday Park
-  Council Operational Land
-  Council Community Land
-  Byron Shire Council - Crown Land Manager (Source: Crown Land Manager Reserves, 2020)

0 250 500 750 m



Scale : 1:25000@A3
Date : 05 May 2021
Revision : C
Created by : JS
Coordinate System : MGA 56

Tyagarah Nature Reserve

Cumbebin Swamp Nature Reserve

Cape Byron State Conservation Area

Arakwal National Park

Hayters Hill Nature Reserve

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








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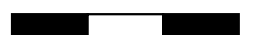
Map G005-3
Southern Byron Shire
Coastline and Belongil
Estuary CMP

Land Status and
Governance
Arrangements in the
Study Area

Legend

-  Study Area
-  LGA Boundaries (Source: Australian Government, 2020)
-  Railway (Source: Six Maps Clip and Ship)
-  Road Reserve (Source: Six Maps Clip and Ship)
-  National Parks/Reserves (Source: Six Maps Clip and Ship)
-  Crown Land
-  Jali LALC
-  NSW Crown Holiday Park Manager T/A Reflections Holiday Park
-  Council Operational Land
-  Council Community Land
-  Byron Shire Council - Crown Land Manager (Source: Crown Land Manager Reserves, 2020)

0 250 500 750 m



Scale : 1:25000@A3
Date : 05 May 2021
Revision : C
Created by : JS
Coordinate System : MGA 56

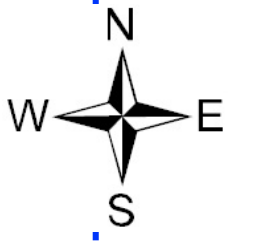
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Aerial Imagery - NSW Six Map, 20/09/2009

Broken Head Nature
Reserve



Map G006

**Southern Byron Coastline
and Belongil Estuary CMP**

**AHIMS Sites within Study
Area**

Confidential



Map G007-1
Southern Byron Shire
Coastline and Belongil
Estuary CMP

Cape Byron Marine Park
Zoning

Legend

- Study Area
- LGA Boundaries (Source: Australian Government, 2020)

Cape Byron Marine Park Zoning
(Source: CAPAD, 2018)

- Habitat Protection Zone
- Habitat Protection Zone (Shore based recreational line fishing only)
- Habitat Protection Zone (No collecting)
- Habitat Protection Zone (Pelagic fishing only)
- Habitat Protection Zone (Seasonal closure)
- Sanctuary Zone
- Special Purpose Zone
- General Use Zone

0 250 500 750 m

Scale : 1:25000@A3
Date : 08 February 2021
Revision : A
Created by : JS
Coordinate System : MGA 56



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Aerial Imagery - NSW Six Map, 20/09/2009



Map G007-2
Southern Byron Shire
Coastline and Belongil
Estuary CMP

Cape Byron Marine Park Zoning

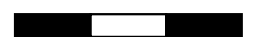
Legend

- Study Area
- LGA Boundaries (Source: Australian Government, 2020)

Cape Byron Marine Park Zoning
(Source: CAPAD, 2018)

- Habitat Protection Zone
- Habitat Protection Zone (Shore based recreational line fishing only)
- Habitat Protection Zone (No collecting)
- Habitat Protection Zone (Pelagic fishing only)
- Habitat Protection Zone (Seasonal closure)
- Sanctuary Zone
- Special Purpose Zone
- General Use Zone

0 250 500 750 m



Scale : 1:25000@A3
Date : 08 February 2021
Revision : A
Created by : JS
Coordinate System : MGA 56



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Aerial Imagery - NSW Six Map, 20/09/2009



Map G007-3
Southern Byron Shire
Coastline and Belongil
Estuary CMP

Cape Byron Marine Park
Zoning

Legend

- Study Area
- LGA Boundaries (Source: Australian Government, 2020)

Cape Byron Marine Park Zoning
(Source: CAPAD, 2018)

- Habitat Protection Zone
- Habitat Protection Zone (Shore based recreational line fishing only)
- Habitat Protection Zone (No collecting)
- Habitat Protection Zone (Pelagic fishing only)
- Habitat Protection Zone (Seasonal closure)
- Sanctuary Zone
- Special Purpose Zone
- General Use Zone

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Scale : 1:25000@A3
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Appendix A

Community and Stakeholder Engagement Strategy

Introduction

Byron Shire Council is preparing a Coastal Management Program (CMP) for the Southern Byron Shire Coastline and Belongil Estuary. The *Coastal Management Act 2016* includes a requirement for Council's to consult with the community and stakeholders before adopting a CMP.

This engagement strategy outlines:

- Introduction
- Approach and principles of engagement
- Study area context
- Preliminary stakeholder analysis identifying the level of engagement required for each stakeholder for each stage of the CMP. Engagement methods for Stage 1 are included. It is expected that engagement methods for Stages 2 to 5 would be developed as those Stages are initiated.
- Monitoring and evaluation.

This engagement strategy provides a staged approach, aligning with the five-stage process for preparing a CMP. 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 and Principles of Engagement

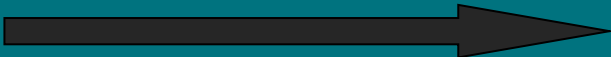
This engagement strategy has been prepared in accordance with the:

- *Coastal Management Act 2016* (CM Act) (specifically Clause 16 Consultation)
- *Our future on the coast – NSW Coastal Management Manual Part B: Stage 1 – Identify the scope of a coastal management program* (OEH, 2018c)
- *Guidelines for Community and Stakeholder Engagement in Coastal Management* (OEH, 2018e) ('the Guidelines')
- *Quality Assurance Standard for Community and Stakeholder Engagement* (IAP2, 2015)
- Byron Shire Council's *Policy: Community Engagement 2018* ('the Policy') (BSC, 2018e)
- Arakwal Memorandum of Understanding 2019-21 Implementation Plan (BSC and BOBBAC, 2019).

The approach and principles for engagement for this project are supported by both the Guidelines and the Policy. These are underpinned by the widely accepted International Association for Public Participation (IAP2) approach to engagement and specifically the IAP2 public participation spectrum, which is shown in Table A-1.

The Guidelines strongly recommend that councils use tools and techniques aligned with the 'involve' and 'collaborate' levels of engagement during the preparation of a CMP. The Guidelines also note that to operate at the 'involve' and 'collaborate' levels councils will need to 'inform' throughout the process.

Table A-1: The IAP2 Public Participation Spectrum (IAP2, 2015)

Increasing Impact on the Decision 					
	Inform	Consult	Involve	Collaborate	Empower
Public Participation Goal	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that 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 identification of the preferred solution.	To place final decision making in the hands of the public.
Promises to the Public	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, 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 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.

The principles for this engagement strategy are outlined in **Table A-2** and include the IAP2 Core Values as well as Council's Principles for Engagement from the Policy.

Table A-2: Principles for engagement

IAP2 Core Values (IAP2, 2015)	Council's Principles for Engagement (BSC, 2018e)
1. Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.	1. Council will improve understanding of communities through engaging with them in new and different ways that reflect community diversity.
2. Public participation includes the promise that the public's contribution will influence the decision.	2. Information is accessible, timely, relevant, balanced and easy to understand.
3. Public participation promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers.	3. Identify and seek contributions, feedback and ideas from people/groups that may have an interest in specific issues.

IAP2 Core Values (IAP2, 2015)	Council's Principles for Engagement (BSC, 2018e)
4. Public participation seeks out and facilitates the participation of those potentially affected by or interested in a decision.	4. Ensure everyone understands the purpose of each engagement and how their contributions will be considered.
5. Public participation seeks input from participants in designing how they participate.	5. Inform people about Council's decisions, how and why they were made and how community input was considered.
6. Public participation provides participants with the information they need to participate in a meaningful way.	6. Regularly review and update Council's engagement techniques to learn and improve.
7. Public participation communicates to participants how their input affected the decision.	

Study Area Context

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 in **Table A-3**, and implications for the community and stakeholder engagement strategy.

Table A-3: Contextual analysis (North to South)

Suburb	Description
Byron Bay	<p>Byron Bay is an iconic coastal town characterised by spectacular beaches and coastline. For such a significant tourist destination, it has maintained a relatively low density urban place with a compact, walkable commercial centre and a predominance of one and two storey development in residential areas with three storeys in the business area (BSC, 2018d).</p> <p>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 (BSC, 2018d).</p> <p>Byron Bay and surrounds or 'Cavanbah' as it is known by the Bundjalung people is an iconic place with unique history as a meeting place, industrial township, significant port, and spiritual centre (BSC, 2020c).</p> <p>The Byron Bay town centre will continue to play a primary role as the tourism, retail and entertainment hub of the Shire. Byron Bay's historical role as a 'meeting place' for all people is a key reason why the town centre is so unique (BSC, 2020c).</p> <p>Byron Bay attracts visitors due to the natural environment, laid-back culture, shopping, eateries and nightlife and its identity as a haven for celebrities who enjoy relative anonymity. Byron Bay is very popular with day trippers, domestic overnight visitors and international visitors (BSC, 2020c).</p>
Suffolk Park	<p>Suffolk Park is a beach-side residential area in close proximity to, and well connected to Byron Bay township through a network of shared pathways and cyclepaths. Suffolk Park has a small town centre, sports fields, a skatepark and an emerging sense of</p>

Suburb	Description
	community. The Suffolk Park community rallied to protect their community gardens (BSC, 2018d). With its proximity to Byron Bay, Suffolk Park is a popular area for short term rental accommodation (BSC, 2020c).
Broken Head	Broken Head consists of a number of larger rural properties generally set back from the coast rather than a condensed township. There are several accommodation facilities, such as Broken Head Holiday Park, located near the intersections of Broken Head Reserve Road and Seven Mile Beach Road. In recent years there has been a substantial increase in popularity of the Broken Head area with visitors, which is expected to continue in the future. Both roads are crowded and busy especially on weekends and holidays. Council is currently developing locality plans for this area to provide local residents with some relief and also make parking easier for visitors.
Byron Arts and Industry Estate and communities (Sunrise, Habitat etc)	What once was an isolated industrial area, well away from the heart of Byron Bay township, the Byron Arts and Industry Estate (BA&IE) has evolved into a lively hub for innovation, industry and creativity (Hip V Hype, 2019) bringing vitality to both the estate and to adjacent residential areas such as Sunrise estate and the newer mixed-use Habitat precinct. These areas are connected to Byron Bay Township by both bike path and solar train.

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.

Preliminary Stakeholder Analysis

Table A-4 outlines the preliminary 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 A-4** 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 A-4: Stakeholder analysis

Type	Organisations	Engagement level by Stage					
		Stage 1	Methods	Stage 2	Stage 3	Stage 4	Stage 5
Government (State and Federal)	Federal and state members of Parliament	-	-	Inform	Inform	Inform	-
Councils	Byron Shire Council (Project Manager)	Empower	Regular project meetings	Empower	Empower	Empower	Empower
	Byron Shire Council (Councillors)	Empower	Councillor briefing following public comment period	Empower	Empower	Empower	Empower
	Byron Shire Council (other Council Staff)	Involve	Workshops: - CMP purpose - Risk Assessment	Involve	Involve	Involve	Collaborate
	Ballina Shire Council	Inform	Letter / email	Inform	Consult	Consult	Consult
	Tweed Shire Council	Inform	Letter / email	Inform	Consult	Consult	Consult
State/ Federal Government Agencies	Department of Planning, Industry and Environment	Collaborate	Regular project meetings	Collaborate	Collaborate	Collaborate	Collaborate
	Department of Planning, Industry and Environment – Crown Lands	Involve	Workshops: - CMP purpose - Risk Assessment - Forward Plan	Involve	Collaborate	Involve	Collaborate
	Department of Primary Industries – Fisheries	Involve	Workshops: - CMP purpose - Risk Assessment - Forward Plan	Involve	Collaborate	Involve	Collaborate
	Department of Primary Industries – Marine Parks	Involve	Workshops: - CMP purpose - Risk Assessment - Forward Plan	Involve	Collaborate	Involve	Collaborate

Type	Organisations	Engagement level by Stage					
		Stage 1	Methods	Stage 2	Stage 3	Stage 4	Stage 5
	National Parks and Wildlife Services	Involve	Workshops: - CMP purpose - Risk Assessment - Forward Plan	Involve	Collaborate	Involve	Collaborate
	Transport for NSW – Road and Rail	Inform	Letter / email	Inform	Involve	Involve	Collaborate
	Transport for NSW – Maritime	Involve	Letter / email	Involve	Collaborate	Involve	Collaborate
	Transport for NSW – Maritime Infrastructure Delivery Office	Involve	Letter / email	Involve	Collaborate	Involve	Collaborate
	NSW Environment Protection Authority	Inform	Letter / email	Consult	Consult	Consult	-
	NSW Police	Inform	Letter / email	Consult	Consult	Consult	-
	NSW SES	Inform	Letter / email	Consult	Consult	Consult	-
	RFS	Inform	Letter / email	Consult	Consult	Consult	-
Advisory Bodies	Coastal and Estuary Catchment Panel	Involve	Workshops: - CMP purpose - Risk Assessment (selected representatives)	Involve	Involve	Involve	Inform
	Biodiversity Advisory Panel	Inform	Letter / email	Consult	Consult	Consult	Inform
Traditional Land Owners	Bundjalung of Byron Bay - Arakwal Corporation	Involve	Onsite meeting Workshops: - CMP purpose - Risk Assessment	Involve	Collaborate	Involve	Collaborate
	Jali Local Aboriginal Land Council	Involve	Onsite meeting	Involve	Collaborate	Involve	Collaborate
	Tweed Byron Local Aboriginal Land Care Council (TBLALC)	Involve	Contact to invite input by phone	Involve	Collaborate	Involve	Collaborate

Type	Organisations	Engagement level by Stage					
		Stage 1	Methods	Stage 2	Stage 3	Stage 4	Stage 5
Community Organisations	NSW Business Chamber – Northern Rivers	Consult	Contact directly to notify about online survey and public comment period	Consult	Consult	Consult	Inform
	Byron Bay Chamber of Commerce	Consult	Contact directly to notify about online survey and public comment period	Consult	Consult	Consult	Inform
	Suffolk Park Land Care	Consult	Contact directly to notify about online survey and public comment period	Consult	Consult	Consult	Inform
	Brunswick Valley Landcare	Consult	Contact directly to notify about online survey and public comment period	Consult	Consult	Consult	Inform
	Other Community Groups - see attached contact list	Consult	Contact directly to notify about online survey and public comment period	Consult	Consult	Consult	Inform
Private Organisations	Commercial operators & local business listed on contact list	Consult	Contact directly to notify about online survey and public comment period	Consult	Consult	Consult	Inform
	Commercial operators and local businesses not listed on contacts	Consult	Online survey (public notifications) Public Comment Period of Draft Scoping Study	Consult	Consult	Consult	Inform

Type	Organisations	Engagement level by Stage					
		Stage 1	Methods	Stage 2	Stage 3	Stage 4	Stage 5
Individuals	Landowners and residents	Consult	Online survey (public notifications) Public Comment Period of Draft Scoping Study	Consult	Consult	Consult	Inform
	Community members (registered)	Consult	Online survey (public notifications) Public Comment Period of Draft Scoping Study	Consult	Consult	Consult	Inform
	Visitors	Consult	Online survey (public notifications) Public Comment Period of Draft Scoping Study	Consult	Consult	Consult	Inform

Monitoring and Evaluation

Evaluation is an integral part of engagement. It provides the opportunity to reflect and review the engagement as it is progressing and enables changes to be made, if necessary, through the engagement (between and within the CMP stages).

The evaluation of Stage 1 engagement presented in Table A-5 provides a review of engagement tasks undertaken for each stakeholder and an evaluation of how well they achieved the desired level of engagement identified in the Stakeholder Matrix (Table A-4).

Table A-5 Engagement Evaluation.

Engagement Activity	Description	Stakeholders Involved	Level of Engagement	Evaluation
Regular Project Meetings	Fortnightly progress meetings	Byron Shire Council (Project Manager)	Empower	Fortnightly meetings were attended by at least Rhelm and Council Project Managers. Several meetings were also attended by other Council, DPIE, Rhelm and Bluecoast staff, as required. The outcomes of these meeting allowed for timely project continuation and resolution of any project issues.
		Department of Planning, Industry and Environment	Collaborate	
Meeting on Country	The project team met with First Nation Representatives on Country to discuss cultural values, management approaches, and issues	Bundjalung of Byron Bay - Arakwal Corporation	Involve	The aim of the meeting was to ensure cultural management practices and values are considered in the CMP and to achieve collaboration between government and traditional land owners. The engagement identified that there is a lot of work needed by all parties involved the achieve this. To this aim, the engagement was considered partly successful in initiating the process. But identified the need for ongoing and significant engagement to be undertaken at all stages of the CMP.
		Jali Local Aboriginal Land Council	Involve	
Workshop: CMP Purpose	Workshop undertaken at Council Offices 28 October: 3 hours, facilitated by Rhelm. The workshop purpose was to establish the purpose, vision and objectives of the CMP and identify coastal zone threats.	Byron Shire Council (Project Manager)	Empower	<ul style="list-style-type: none"> - The workshop was well attended by all agencies listed. - Attendees were Informed of the CMP context and proposed scope through presentation of maps and other information by Rhelm, Council and DPIE. - Attendees were involved in the development of the vision statement and refinement of the objectives through round table discussions - notes were taken by Rhelm and Council. - Attendees were involved in the identification of management issues and threats through 'post it' notes on maps and general discussion.
		Byron Shire Council (other Council Staff)	Involve	
		Department of Planning, Industry and Environment	Collaborate	
		Department of Planning, Industry and Environment – Crown Lands	Involve	
		Department of Primary Industries – Fisheries	Involve	
		Department of Primary Industries – Marine Parks	Involve	
		National Parks and Wildlife Services	Involve	

Engagement Activity	Description	Stakeholders Involved	Level of Engagement	Evaluation
		Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) RNTBC	Involve	Overall the workshop was considered successful and provided the required inputs to the CMP to allow the scoping study to proceed.
		Coastal and Estuary Catchment Panel	Involve	
Online Survey	Online survey of coastal values and issues available for responses 17 December 2020 to 1 February 2021.	All	Consult	<ul style="list-style-type: none"> - 149 survey responses were received, predominantly from residents of Byron Shire and the surrounding LGAs. This was considered to be a representative and good outcome. - The responses were key in understanding the coastal zone threats and preparing the risk assessment.
Workshop: Risk Assessment	Held in February 2021 to provide input to the threats – known hotspots, current management arrangements and data, particularly where this may not have been identified through the data review, and to provide insight into the consequence and likelihood assigned to each threat.	Byron Shire Council (Project Manager)	Empower	<ul style="list-style-type: none"> - Robust discussions provided valuable inputs to the risk assessment. - Crown Land were not able to attend the workshop but were engaged with directly via Teams to get their inputs. <p>Successful engagement that achieved the desired outcomes and level of engagement for each stakeholder.</p>
		Byron Shire Council (other Council Staff)	Involve	
		Department of Planning, Industry and Environment	Collaborate	
		Department of Planning, Industry and Environment – Crown Lands	Involve	
		Department of Primary Industries – Fisheries	Involve	
		Department of Primary Industries – Marine Parks	Involve	
		National Parks and Wildlife Services	Involve	
		Coastal and Estuary Catchment Panel	Involve	
Public Comment Period	May 2021	Community Organisations	Consult	<p>A total of eleven (11) submissions were received, a further 17 registrations of interest were received.</p> <p>The response rate is not particularly high given the population that live in or visit the coastal areas. Future public comment periods may need to seek</p>
		Private Organisations	Consult	
		Individuals	Consult	
		Agencies not directly invited to provide feedback	Inform	

Engagement Activity	Description	Stakeholders Involved	Level of Engagement	Evaluation
				additional avenue to receive community feedback on the CMP.
Agency Review of Draft Scoping Study	May – June 2021	Department of Planning, Industry and Environment	Collaborate	All agencies participated in the online workshops and provided both verbal and written feedback on the draft Scoping Study (including the Forward Plan).
		Department of Planning, Industry and Environment – Crown Lands	Involve	
		Department of Primary Industries – Fisheries	Involve	
		Department of Primary Industries – Marine Parks	Involve	
		National Parks and Wildlife Services	Involve	
Workshop: Forward Plan	May – June 2021	Department of Planning, Industry and Environment	Collaborate	The targeted workshops provided a useful mechanisms to focus on the issues relevant to each agency.
		Department of Planning, Industry and Environment – Crown Lands	Involve	
		Department of Primary Industries – Fisheries	Involve	
		Department of Primary Industries – Marine Parks	Involve	
		National Parks and Wildlife Services	Involve	

Appendix B

Community Survey Results

Overview

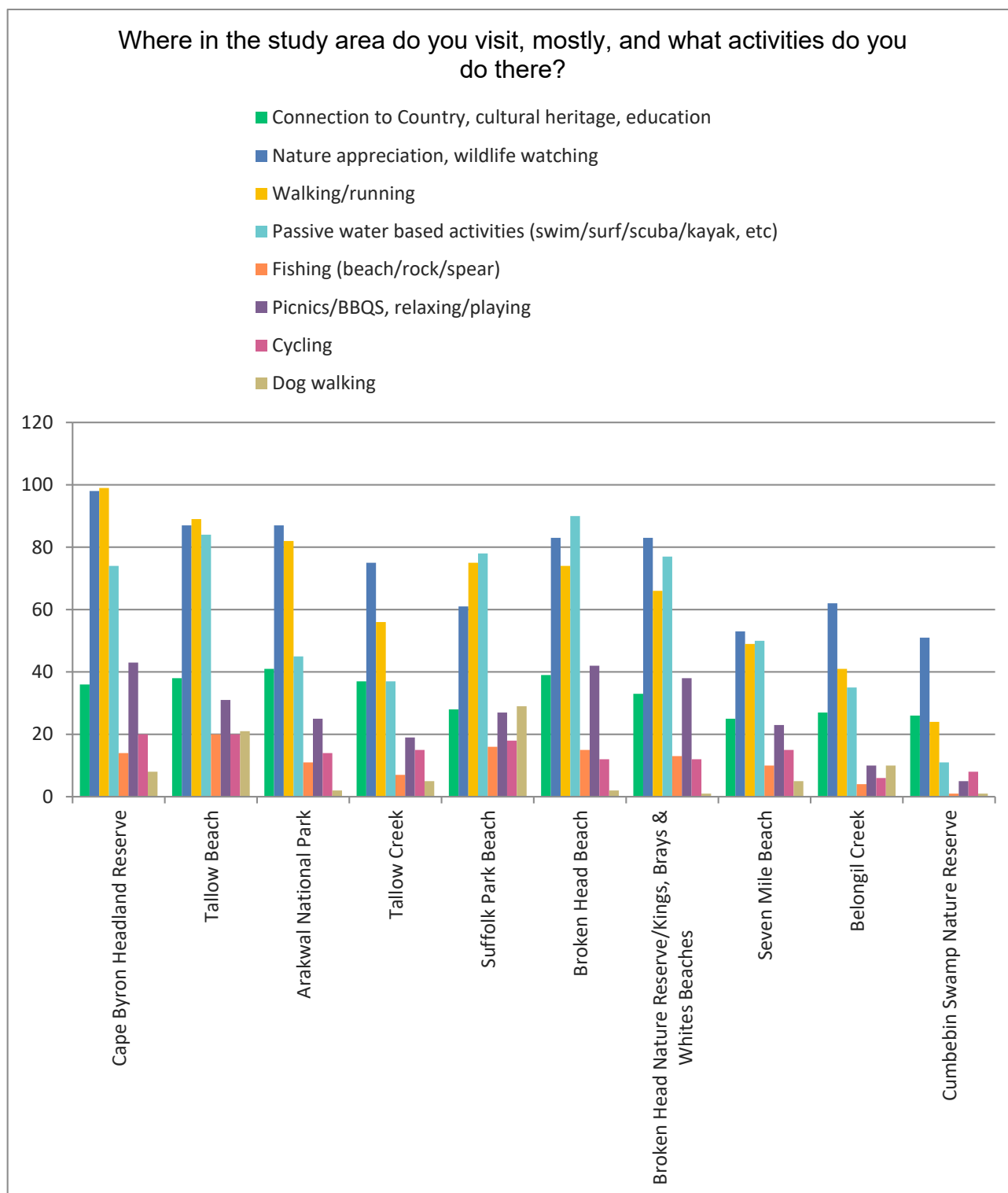
For this Scoping Study, community consultation was undertaken from 17 December 2020 to 1 February 2021, in the form of an online feedback survey hosted on Council's website. The survey was developed with Council and aimed to understand the community's environmental, cultural, recreational and economic values for the study area, and what the community considers are the threats, conflicts and management issues surrounding those values.

Advertising and distribution of the survey was as per the Community and Stakeholder Engagement Strategy in **Appendix A**. Advertising and distribution methods included Council's Have Your Say page, social media, emails to agencies and stakeholders and interested community members, Council attendance at community markets promoting the survey and targeted consultation with Aboriginal organisations (BOBBAC (Arakwal), Tweed Byron LALC and Jali LALC).

The method used for the community survey was a series of prompted questions with the option for providing additional detail where desired. The platform used was SurveyMonkey.

In total, 149 survey responses were received, predominantly from residents of Byron Shire and the surrounding LGAs. Results are presented in this appendix report, generally as a percentage of respondents who answered that question. Any individual identifiers (e.g. contact details) have been removed for anonymity.

Question 1



All 149 respondents answered Question 1. Results are presented as responses received rather than as a percentage of respondents who answered that question to assist interpretation of results.

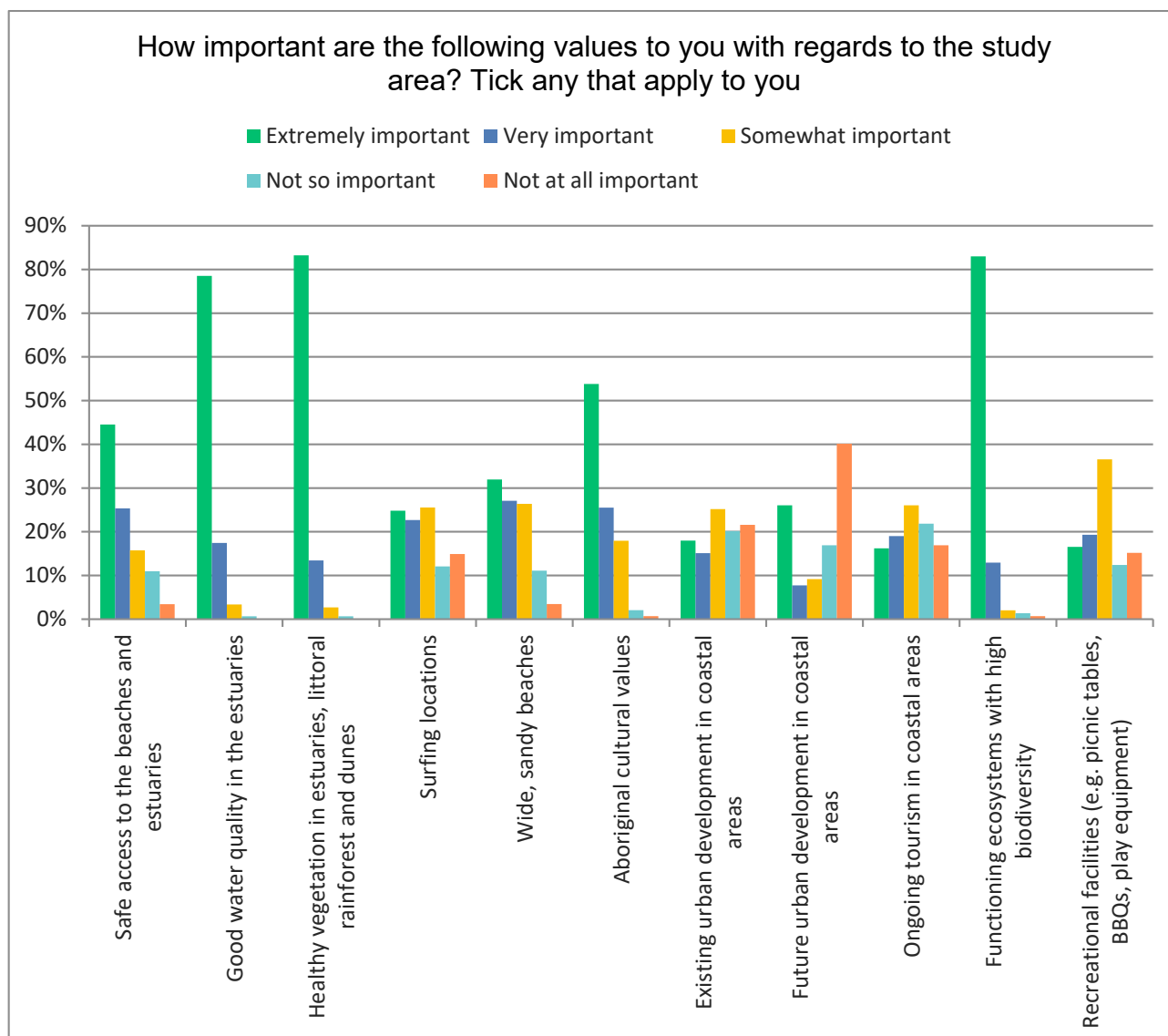
Survey results indicated Cape Byron Headland Reserve and Tallow Beach are equally the most visited locations within the study area, followed by Broken Head Beach and then Arakwal National Park and Suffolk Park Beach.

In terms of the most popular activities at each location, results indicate:

- Cape Byron Headland Reserve is the most popular location for nature appreciation and wildlife watching, walking/running, picnics/BBQS, relaxing/playing and cycling
- Tallow Beach is the most popular location for fishing (beach/rock/spear) and cycling
- Arakwal National Park is the most popular location for connection to Country, cultural heritage and education activities
- Suffolk Park Beach is the most popular location for dog walking
- Broken Head Beach is the most popular location for passive water based activities such as swimming, surfing, scuba diving, kayaking, etc.

In addition, 17 'Other' responses were received to Question 1, the majority of which indicated various types of conservation activities and bird watching are also undertaken within the study area.

Question 2



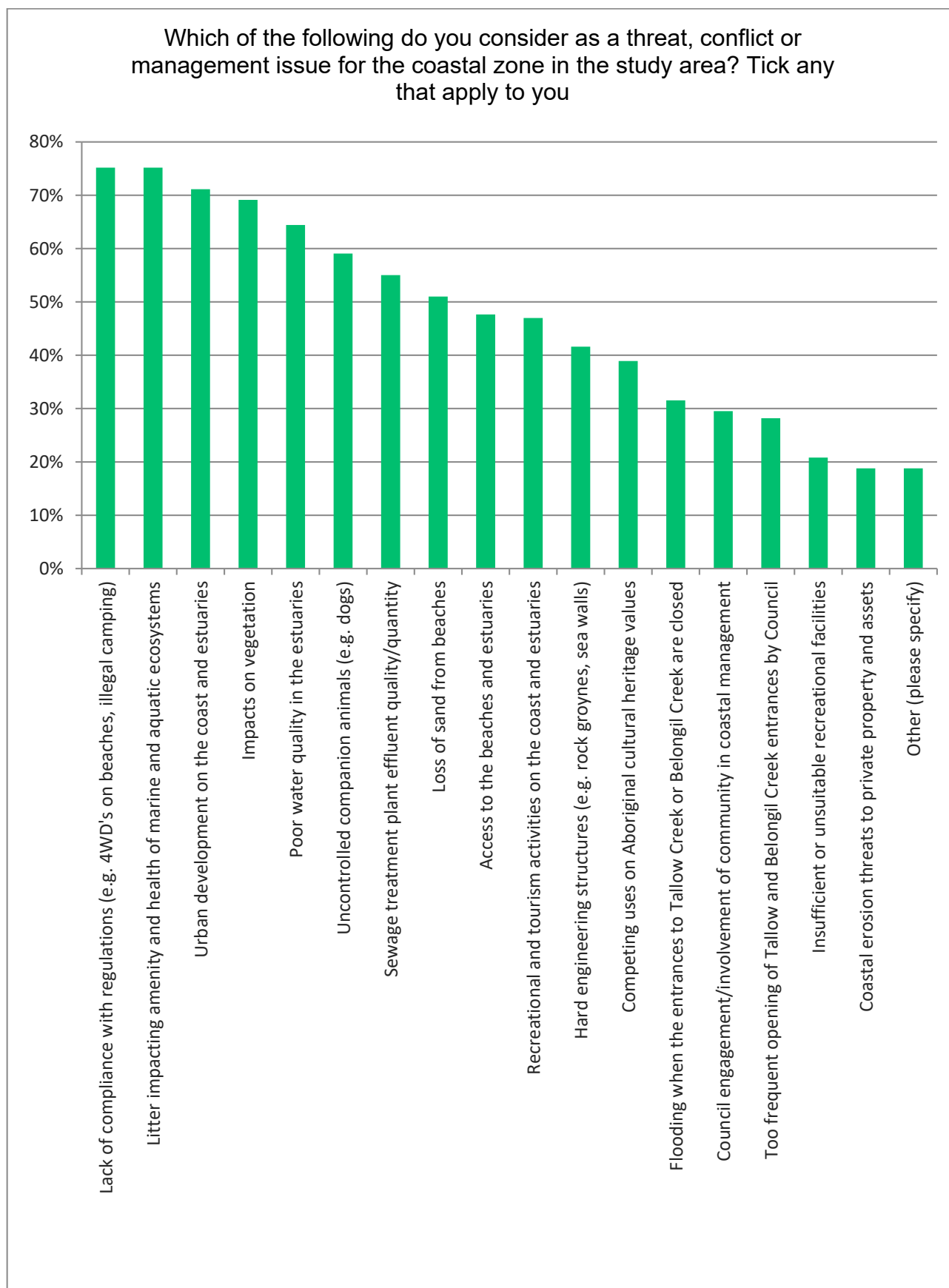
All 149 respondents answered Question 2.

In addition, 27 'Other' responses were received to Question 2. Seven of these 'Other' responses indicated respondents preference for limited or no further development in the coastal area of the study, wanting to confirm having found the wording of the values around existing and particularly future urban development in coastal areas confusing.

The majority of the 'Other' responses were suggestions of management activities that could be undertaken in support of the three most highly regarded values:

- Healthy vegetation in estuaries, littoral rainforest and dunes
- Good water quality in the estuaries
- Functioning ecosystems with high biodiversity.

Question 3



All 149 respondents answered Question 3. The results are presented graphically in order of importance according to survey results. Litter impacting amenity and health of marine and aquatic ecosystems and lack of compliance with regulations (e.g. 4WD's on beaches, illegal camping) were considered to be the equal biggest threats for the study area coastal zone by respondents, closely followed by urban development on the coast and estuaries.

In Question 4, which was an open question rather than a tick box, where respondents were asked in their opinion what the biggest threat was, the theme of urban development on the coast and estuaries featured more strongly, intrinsically linked to issues of overcrowding and overuse, followed by non-compliances, including littering. Hence the highest priority issues as rated by the community were largely the same between Questions 3 and 4, just indicated in a different priority order.

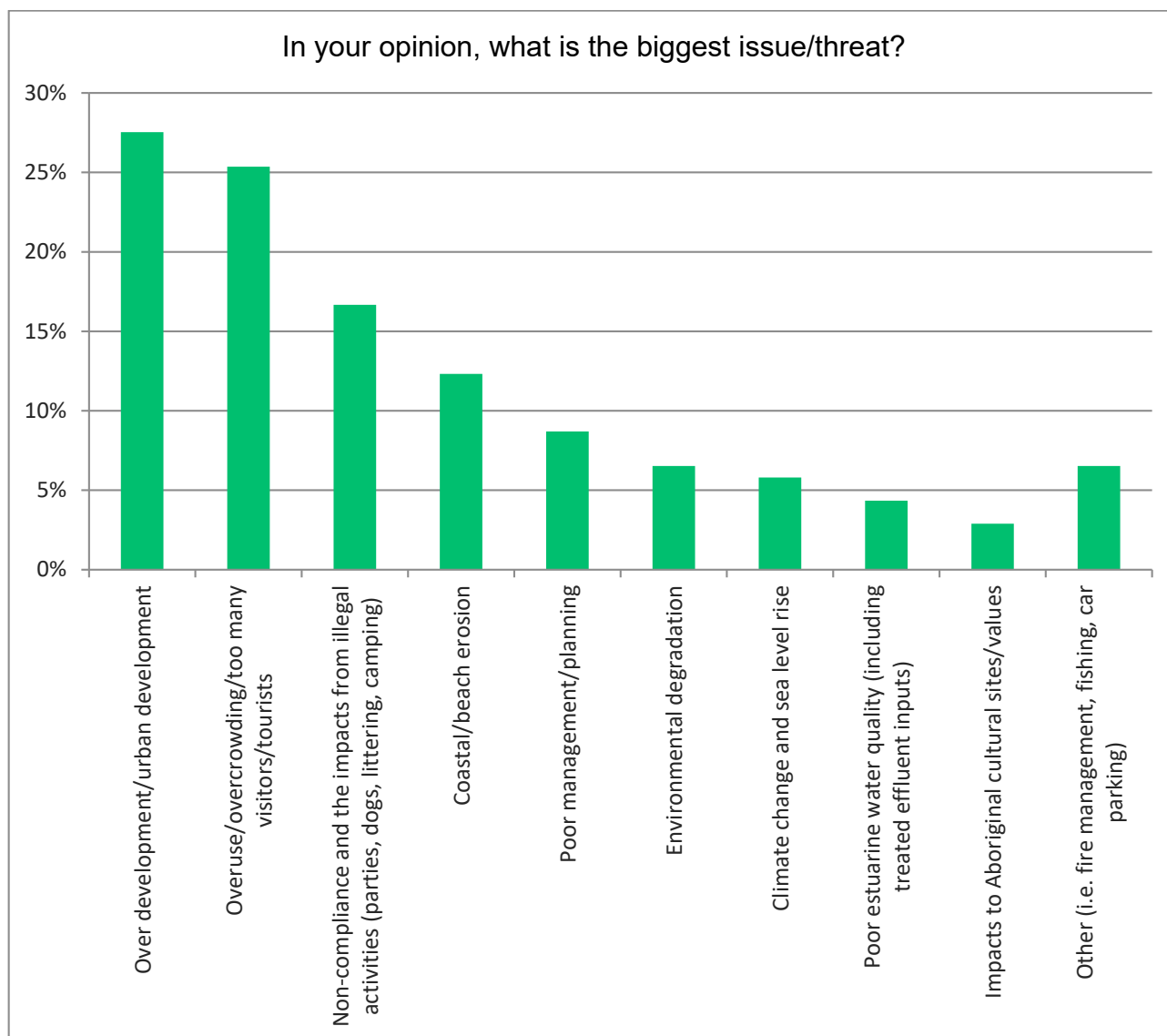
The 28 'Other' responses provided specific examples of non-compliance issues i.e. dumping of household rubbish in Cumbebin Swamp Nature Reserve, as well as specific examples of other management issues believed to be inadequately managed at present, such as:

- Beach parties
- Bushfire management
- Criminal behaviour such as drug dealing and assaults.

Several 'Other' responses also indicated people considered the following to be significant management issues:

- Lack of education
- Climate change and sea level rise impacts.

Question 4



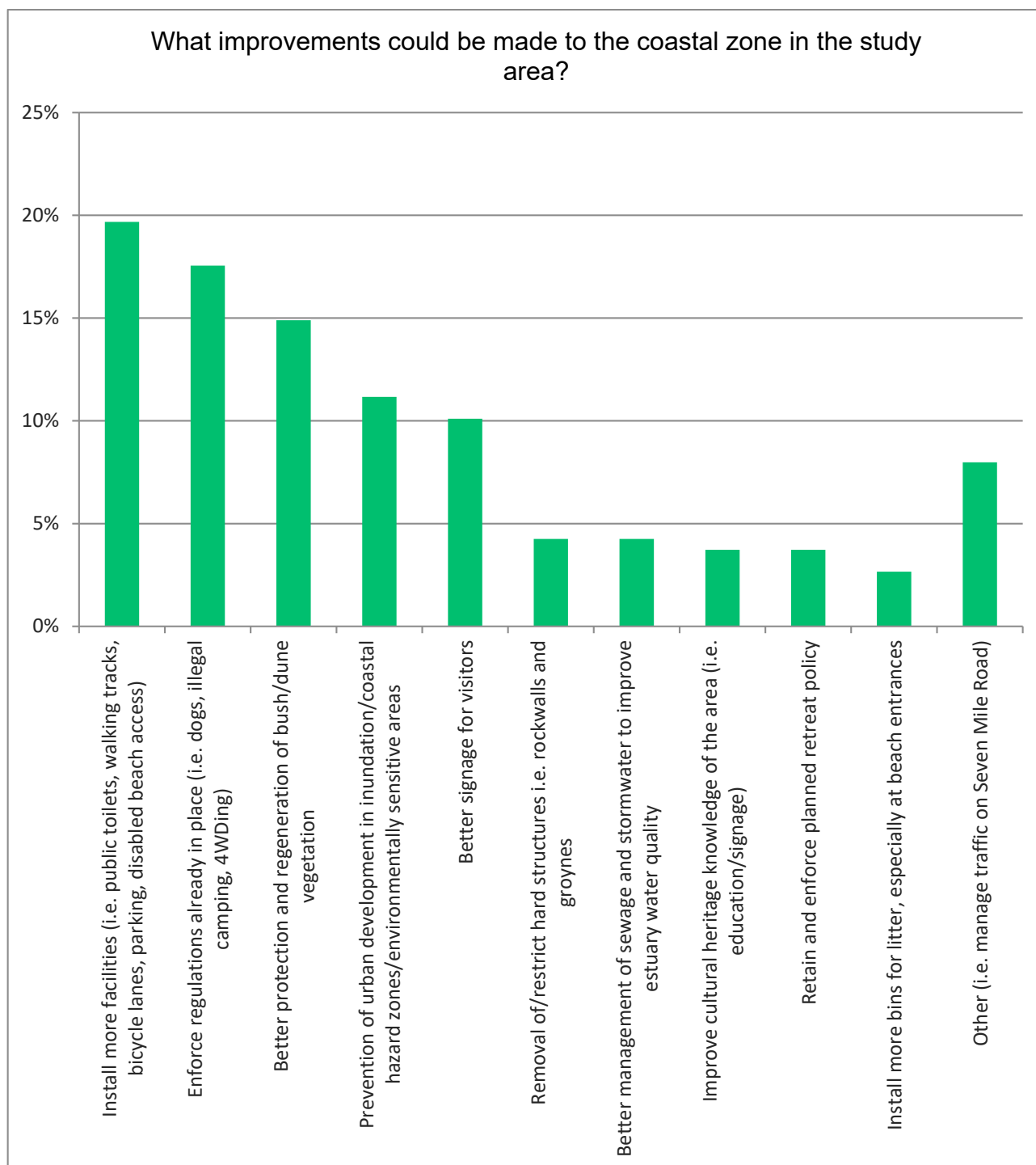
A total of 138 respondents answered Question 4, which was an open question.

Responses were reviewed for common themes and grouped into the 10 categories shown above, to provide a summary of inputs.

The majority of respondents indicated over development, over use, over crowding and the prevalence of illegal activities were the key issues, which are all intrinsically linked. Many responses included detail such as dogs illegally being walked in national parks, bush parties (i.e. bush doofs on the banks of Belongil Creek estuary) and illegal camping impacting on wildlife and threatened shorebirds as well as resulting in litter.

Many respondents indicated more education was required for tourists and visitors to the area about the values of the area, to increase the level of visitor respect and reduce tension between locals and visitors.

Question 5



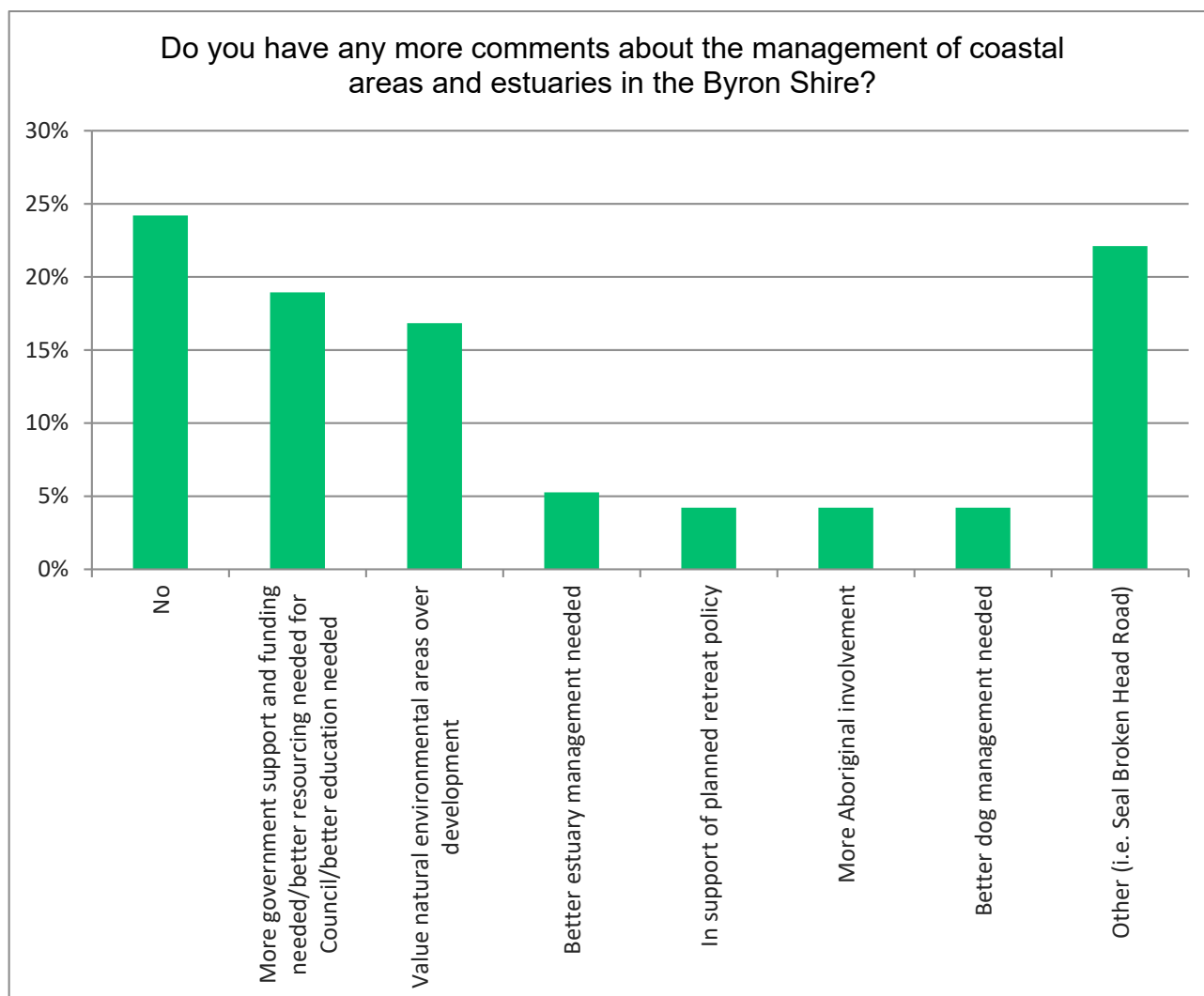
A total of 130 respondents answered Question 5, which was an open question.

Responses were reviewed for common themes and grouped into the 11 categories shown above, to provide a summary of inputs.

The majority of respondents indicated additional facilities i.e. public toilets and more bins (especially at beach entrances), are required to cope with the volume of visitors to the area. Many respondents want to see stronger enforcement of existing regulations and heftier penalties. For example, for

dogs entering natural parks/nature reserves, which disturbs nesting shorebirds and visitors camping illegally, damaging coastal and dune vegetation. Many respondents thought education of visitors (and locals) could be increased through improved and multi-lingual signage at all beach and national park/nature reserve entry points.

Question 6



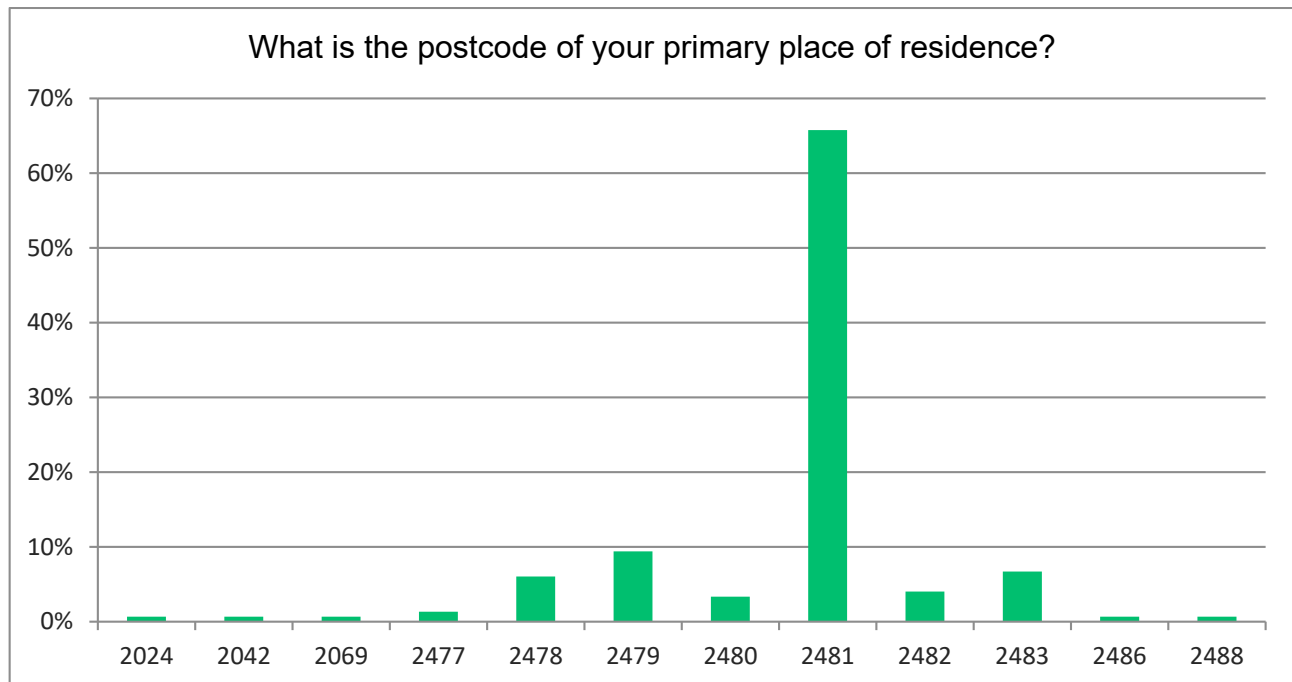
A total of 95 respondents answered Question 6, which was an open question.

Responses were reviewed for common themes and grouped into the eight categories shown above, to provide a summary of inputs.

The majority of respondents indicated that more funding and support was required for land managers to more effectively manage the area and enforce regulations. Many respondents believe better education of the community and visitors is required and that an economic value should be placed on environmental areas remaining as they are, in order to be fairly assessed against development.

The 21 'Other' responses that were received to this question included some management activity suggestions, such as to seal Broken Head Road and charge an entry fee to Broken Head Nature Reserve, in order to manage visitor numbers.

Question 7



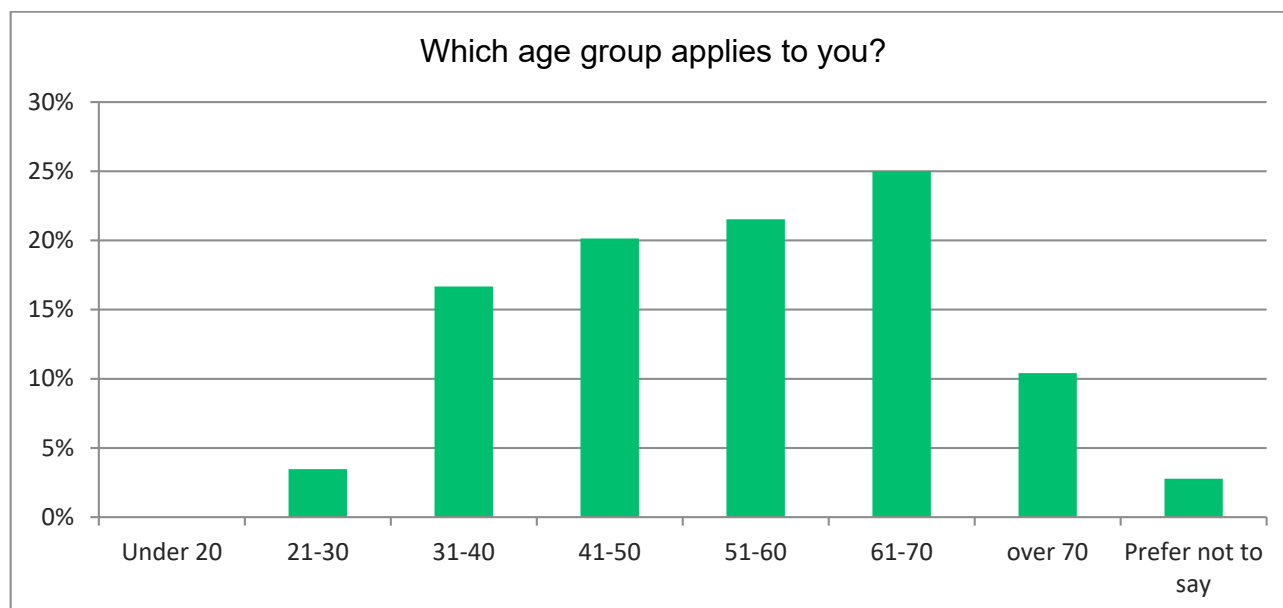
All 149 respondents answered Question 7.

The study area is located wholly within postcode 2481, which includes the suburbs of:

- Broken Head
- Byron Bay
- Ewingsdale
- Hayters Hill
- Myocum
- Skinners Shoot
- Suffolk Park
- Talofa
- Tyagarah.

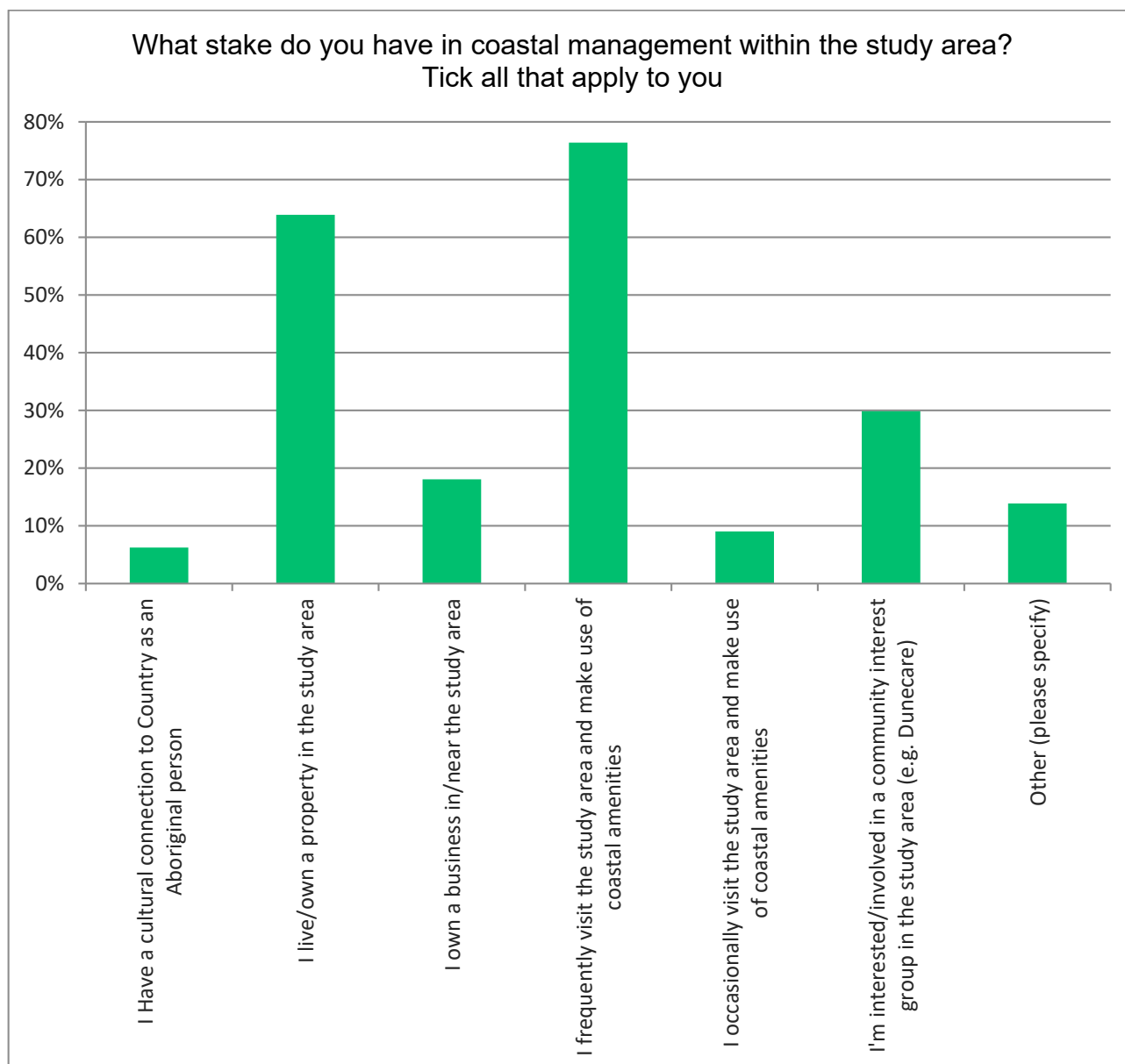
The majority of respondents (98, being 66%) indicated that their primary place of residence was within 2481, within the study area, and respondents were overwhelmingly (97%) from Byron Shire or surrounding LGA's (mostly Ballina, Lismore, Tweed).

Question 8



A total of 144 respondents answered Question 8.

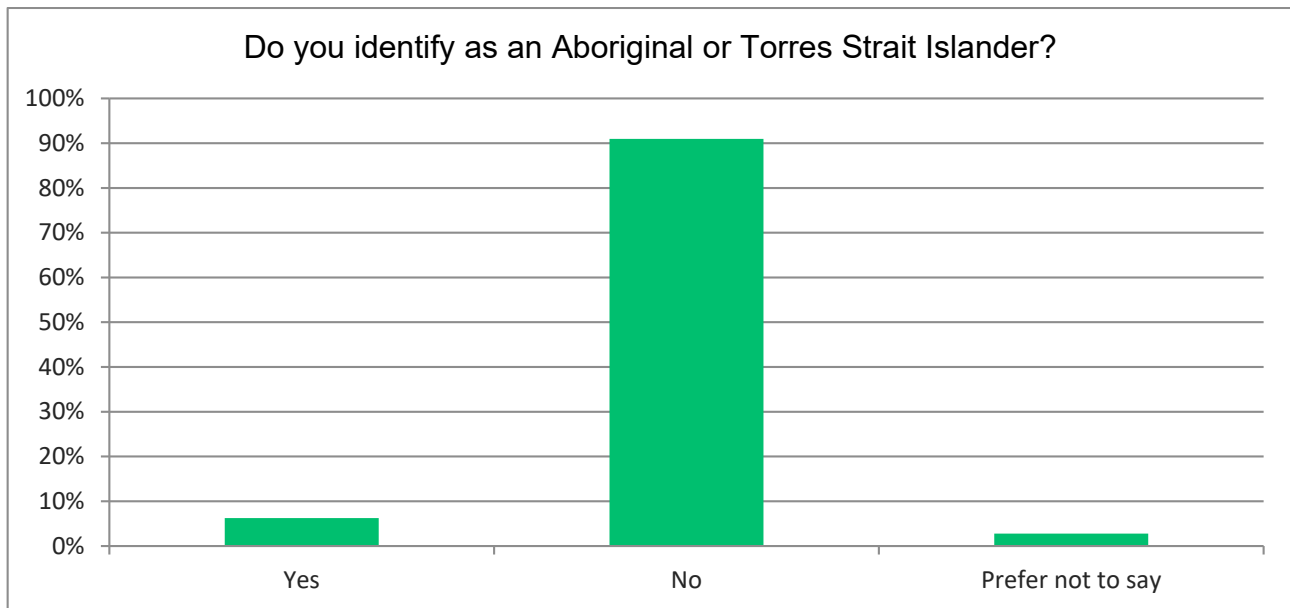
Question 9



A total of 144 respondents answered Question 9. Most respondents indicated they frequently visited the study area and many respondents also lived and/or owned a property in the study area.

The 20 'Other' responses indicated several people worked and/or studied in the study area, also providing detail on people's conservation and volunteering efforts.

Question 10



A total of 144 respondents answered Question 10.

Question 11

Question 11 was: Is there any other information you wish to provide to the study team?

One respondent submitted two PDF files:

- Submission to CZMP_BEACON_2016.pdf
- Belongil EOS Submission.pdf

The Submission to CZMP_BEACON_2016 PDF is a 76 page document entitled 'Submission to the Coastal Zone Management Plan Byron Bay Embayment (CZMP BBE)'. This submission focuses on the proposed management of Belongil Beach, which is outside the current study area (addressed in scope by BMT (2020)). The submission is primarily opposed to the construction of a rock seawall along Belongil Beach.

The Belongil EOS Submission PDF is a 72 page document entitled 'Submission to Belongil Creek Entrance Opening Strategy, dated June 2019. This submission focuses on the opening of Belongil Creek estuary, which is inside the current study area. The submission supports the increase of the estuary opening trigger level.

Both submissions include substantial detail on the existing environment at Belongil Creek estuary, such as nesting shorebird habitat and ecological communities, as well as details on the morphology of the entrance, such as the potential breakthrough of the Belongil Spit and water quality, including impacts from the West Byron STP.

Additional Input

Additional input was also received by Council at community markets by members of the community who did not wish to complete the survey online but did wish to provide feedback. Very similar key concerns within the study area were raised by respondents through this means, as follows:

- Over development and lack of development controls
- Impacts of development pressures on estuary water quality
- Availability of parking and housing
- Non-compliance issues with dogs on beaches
- Concern over the potential for nitrogen enrichment of groundwater at agricultural land in Ewingsdale as a result of reuse of effluent from the STP
- Preference is for no rock walls along Belongil Beach
- Litter, particularly plastics
- Illegal camping and parties, citing a need for more rangers
- More walking trails are desired i.e. a track from the lighthouse to the northern end of Tallow Beach.

Appendix C

Aboriginal Engagement Outcomes

Southern Byron Shire Coastline and Belongil Estuary CMP Scoping Study

Meeting with Aboriginal Community Representative

Tuesday 27th October 2020 9am – 3pm

Attendees: Byron Shire Council, DPIE, Rhelm, Arakwal Corporation, Jali LALC, Southern Cross University

Apologies: Tweed Byron LALC

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
Cultural Landscape		
Bundjalung Nation is known as the “Saltwater People”. Arakwal Bumberlin people, have lived in the coastal landscape around the Byron Bay area for thousands of years. Fishing and collection of pipis common along the open coast. Waterways and estuaries provide a rich source of food and resources. The big scrub was a supermarket and the ridgelines were the freeways.	-	-
The CMP needs to acknowledge the rich cultural “story” of the landscape rather than just focusing on registered sites. This includes recognition of the cultural connections along the coastal zone beyond the study area boundaries.	Identify the management issue of lack of cultural knowledge sharing in coastal management.	Identify mechanisms for cultural knowledge sharing to be undertaken and have a meaningful impact on coastal management.
Biodiversity and environmental values can’t be separated from cultural values.	-	-
Tweed-Byron LALC has a good example of cultural landscape mapping. This sort of tool is a useful education and communication tool, but also triggers the need for consultation when works or actions are proposed in certain areas (beyond simply near registered sites). Any cultural landscape mapping should include allowance for “buffer zones”.	Identify the data gap of cultural landscape mapping.	Cultural landscape mapping likely to be undertaken either as part of the CMP (Stage 2) or as an outcome of the CMP. This mapping could also include ‘song lines’.
Ballina Shire Council has been engaging effectively with the Government “Heritage Near Me” program to obtain signage and artwork for engaging the community: https://www.environment.nsw.gov.au/news/heritage-near-me	Review what Ballina Shire Council has been doing and make recommendations for the CMP.	-

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
Aboriginal Involvement in Coastal Management		
Ensure the rights and interests of Native Title holders are protected.	Clearly demonstrate the Native Title considerations for CM.	-
Aboriginal people are generally being consulted too late in the process. Collaboration should be undertaken from the start. There is a need for clear terms of reference for effective and appropriate early and continuing engagement.	Set up the CMP scope to ensure Aboriginal involvement at all stages of the CMP.	-
<p>The Aboriginal community needs to be at the table with stakeholders (e.g. Council and Crown Lands) in management of the coastal zone and Crown reserves.</p> <ul style="list-style-type: none"> Aboriginal people need to be at the table to tell their story. Consultation at present is inadequate. Aboriginal people need to be employed by organisations managing coastal environments and assets (e.g. National Parks, Caravan Parks, Council). Only Aboriginal people can tell the story. Northern Territory Ranger program mentioned as a well funded program with good outcomes. <p>Arakwal people often don't / can't live on Country so at least they should be able to work on Country.</p>	Identify management issue.	Look into concepts such as Ranger Funding in National Parks.
Arakwal people often don't live on Country so travel is usually necessary to attend engagement and collaboration activities. This often also results in loss of paid employment for the day.	Future engagement and collaboration activities should include provision for reimbursement of attendees.	-
<p>Aboriginal people have a responsibility to manage Country e.g. cultural burns at Broken Head (further information from Andy Baker).</p> <p>BOBBAC (Arakwal) would appreciate having more say in management of the estuary openings and being the ones to interpret cultural knowledge and understanding in management decisions.</p> <p>Issues:</p> <ul style="list-style-type: none"> Lack of knowledge sharing Lack of indigenous people as part of the process 	-	-

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
<ul style="list-style-type: none"> Lack of collaboration in decision making process. 		
<p>A site has been identified for a cultural centre. Construction of the centre would be key to increasing cultural awareness and improving protection of cultural heritage and values. Construction of the centre is limited by funding.</p>	-	Possible actions to assist in the implementation of the cultural centre.
<p>It was expressed that Aboriginal people need to tell their 'story' in media or signage or education or any other means of communication. Not Council or DPIE.</p>	Discuss further with Aboriginal stakeholders how this could be done effectively and utilise this method in all stages or actions going forward.	-
<p>It was expressed that there is not enough emphasis on sites for protection. They feel that they are an afterthought or low on the list of priorities.</p>	-	-
<p>It was expressed that a 'terms of reference' for Byron Council would be desirable.</p>	-	-
Estuaries		
<p>The estuaries (including Tallow Creek, Ti Tree Lake, and Belongil Creek) are key locations of cultural significance. Not only were they locations where Aboriginal people lived, they were a key source of food and other resources (e.g. grasses for weaving).</p>	-	-
Ti Tree Lake		
<p>Parties ("doofs") at Ti Tree Lake are a big issue. These appear to be attended primarily by tourists and other visitors to the area, often promoted through social media. Couches etc are used at parties and dumped at the lake.</p> <p>Programs to mitigate these parties should be undertaken, e.g. education through tourism operators, accommodation providers, backpackers, caravan parks, coffee shops and social media sites. Perhaps an ambassador (high profile person) could assist with this issue and generally raising awareness of cultural issues in the area and how people can respect and protect cultural values.</p> <p>A similar issue was experience on "the hill" behind Ironbark. The local high school was targeted for education and raising awareness of the cultural significance of the site and the impacts the high school</p>	Identify management issue.	<p>Identify actions to stop parties.</p> <p>Actions for education at tourist sites, school, signage, social media campaign.</p>

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
kids were having. This seems to have reduced the visitation, vandalism and litter on the site.		
Ti Tree Lake is a sacred woman's site where men should not be visiting. Even Council or other public departments should not enter the area without consulting the Aboriginal custodians and then, if permitted women staff should only be allowed to go there. This includes all field work etc.	Include this information within the Scoping study.	Identify actions to assist in developing community and the public services respect of this area as a sacred woman's site for Aboriginal women.
<p>Ti Tree Lake:</p> <ul style="list-style-type: none"> • Serene area with tannin rich waters, Melaleuca and sedges, bird life. • Plan of Management still in draft form. Confusion as to the "Aboriginal Area" versus "Aboriginal Place" and mapping in the PoM. Legal matter. Jali LALC is concerned about their due diligence. Confirmation on ownership and management arrangements required prior to further discussions about management. Draft MOU needs to protect the rights of stakeholders. MOU needs email trail and appendices with engagement area. • Predominantly a women's area (sacred women's business/ initiation) but there are conflicting stories that one area at southern end of lake was a men's area. Aboriginal men won't visit the area until this is confirmed. • Disrespectful for people to visit this place. Men and women walking and sunbathing during site visit. • Thoroughfare walkway between beach and houses of Broken Head. • No signage present regarding the cultural importance of the site or that it is Jali LALC land. Signage is important at Ti Tree Lake to "tell the story" of the location so visitors are respectful. Council applied for funding for signage. • Jali LALC has funding to do some weeding. • All activities proposed need to be done under approval from the board of Jali LALC (even water quality monitoring) and be carried out by women only with Jali LALC representatives in attendance. • Vehicular access to Broken Head Beach is accessible to anyone and used by partiers to 		<p>Possible action to implement signage at the site to tell the story of the sacred women's site to deter people from entering. Also, some social media to tell the story and education to the nearby caravan park. This would likely lead to high community surveillance and deter people from entering these sacred areas. Any signage needs to be developed closely with Aboriginal people so that they are telling the story.</p>

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
<p>transport couches to parties. Needs to be adequately managed.</p> <ul style="list-style-type: none"> Jali LALC to have further discussions with BOBBAC (Arakwal) regarding management and impacts from the quarry. 		
<p>Tallow Creek:</p> <ul style="list-style-type: none"> One of the most important sites within the area – meeting spot for recreation and also the ‘supermarket’ for Aboriginal people. Mental, spiritual and physical importance to the Arakwal people. Kids collect pipis and fishing. Recent issues with Byron High School and St Finbars students - kids pulling couches and bean bags up the big hill, hanging out at lunchtimes. <p>Arakwal have undertaken consultation with schools (talks etc) about the significance of the surrounding areas. Kids have done clean-ups.</p> <ul style="list-style-type: none"> Sand mining has impacted this area including Aboriginal people living near the estuary being evicted in the 1940s, and disturbance of cultural material dumped during the mining process. Nearest Arakwal residents are at ironbark. Family days are held at Tallow Creek; fishing and other traditional activities passed on to the children. Used to be a racecourse. The STP was a key issue for Arakwal Corp. The objective for them was to get the site restored to its original conditions. The current site has contaminated material “capped”. Unknown impacts on groundwater. Contamination is known to have leached into the caravan park (currently being remediated at the caravan park but nowhere else). Before Tallow Creek was channelised it used to “snake”. Leon had no knowledge of Aboriginal people opening the estuary entrance. Interim opening policy is driven by flooding of footbridge (Council has funding to raise this bridge) and flooding of private property backyards. <p>Further consideration needed of the real ‘risk’ of flooding to adjacent properties.</p>	<p>Consideration of ground water (quality and quantity?).</p> <p>Need to provide context in the Scoping Study on the importance and value of the area to Aboriginal people. The land is an inherent part of their body and mind.</p> <p>Vision for Arakwal – fish freely and use the location as their ancestors did.</p> <p>Broader the general community’s awareness of cultural heritage.</p>	<p>Update the Flood Model for Tallow Creek (outdated).</p>

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
<ul style="list-style-type: none"> Natural openings have appeared to cause no known 'fish kills'. Interim policy has been in place since the 2019 fish kill following an artificial opening. A fish kill also occurred in 2010 when residents illegally opened the entrance. No known illegal openings have occurred since then. 		
<p>Belongil Creek:</p> <ul style="list-style-type: none"> Cumbebin Nature Reserve – NPWS co-manage with BOBBAC (Arakwal). Significance of Belongil Creek estuary to Arakwal people – fishing, traditional basket weaving, materials (reeds for baskets), resources, recreation. Historical and current uses similar to Tallow Creek estuary – gathering, fishing, basket weaving, hunt for birds, pippies, fish, etc. Not as much use by Aboriginal people as Tallow mostly due to limited access/ ease of access. 	-	-
<p>Broken Head:</p> <p>Transient tourist place with high pressure and impact from visitation. Access is an issue along with illegal camping.</p>	-	-
<p>Arakwal people have a vision for the estuaries to be able to visit and collect resources safely and unopposed. Arakwal country seasonal calendar provides insight into what the elders (even as young children) would have accessed throughout the year, essentially the school syllabus from children.</p>	<p>Include this vision in the objectives.</p> <p>Incorporate knowledge, vision and cultural aspirations.</p>	<p>Identify actions in consultation with Aboriginal people to achieve this objective.</p> <p>How does Arakwal play a role in the on-going future management of the coast?</p> <p>Provide mechanisms for co-management of Crown areas?</p>
Registered and Identified Sites		
<p>Management of cultural sites should not just be reactionary. There should be better awareness of potential sites by agencies, contractors, developers etc. to avoid impacts on sites.</p>	<p>Identify management issues associated with this.</p>	<p>Management actions might include training and education programs, like the site briefings</p>

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
		described by Sharon and Ashley.
<p>Middens:</p> <ul style="list-style-type: none"> Over 800 middens along the NSW coast, more than a quarter of those have been disturbed. Not just “rubbish dumps” they often contain burial sites. Aboriginal sites rarely sit in isolation to each other. The Pass midden dated 1000 to 1500 years. Some middens are multi-generational, providing historical knowledge of when people lived in certain areas, what they ate and the types, the animals native to the study area, and tools they used. Middens in the area have also been found to contain materials and tools that have come from outside the region either by trade or from visiting tribes (e.g. grey wacke). Middens face destruction from both human impacts (e.g. construction works and deliberate damage and vandalism) and natural processes (e.g. coastal erosion). Middens often located over “durable” substrates such as coffee rock, or well away from the coast but coastline recession is resulting in exposure. When a midden (or any significant site) is threatened, engagement with local families should be undertaken to determine the appropriate actions. Actions may include salvaging, protection, or a ‘hands off approach’ and may vary depending on natural versus anthropogenic threat. Due to the constantly changing coastal zone, many significant sites are being exposed or lost. Numerous sites are now located offshore due to long term sea level rise. Middens are often found in areas of coffee rock as this rock was utilised to prepare meals and make fire. 	<p>Management issues to be identified relating to cultural site management.</p> <p>Identify the need for consultation with Aboriginal people to develop (and lead) appropriate management approaches. This is an issue across the whole CMP not just cultural sites.</p> <p>When looking at climate change and sea level rise the potential for large impacts to middens and areas of cultural heritage needs to be identified and addressed as a risk.</p>	<p>Ongoing engagement with Aboriginal community representatives throughout the development and implementation of the CMP.</p> <p>Forward planning for climate change and sea level rise to determine what sites may be impacted and when and what action should be done pre-emptively to protect/salvage. There needs to be planning around this in consultation with Aboriginal stakeholders.</p>

Southern Byron Shire Coastline and Belongil Estuary CMP Scoping Study

Meeting with Tweed Byron Local Aboriginal Land Council

4th October 2020

Attendees: Tweed Byron LALC, Byron Shire Council, Rhelm

Notes	Actions for Scoping Study	Consideration for later stages of the CMP
<p>Aboriginal people have been managing the coastline in the area for thousands of years.</p> <p>They continue to hold valuable knowledge about environmental and coastal management. This should be utilised through partnerships between community and agencies, such as NPWS ranger positions, Landcare (e.g. on fox and weed control) etc.</p>	<p>Risk assessment to explore issues associated with lack of Aboriginal involvement in coastal management.</p>	<p>Options for knowledge sharing and acknowledgement of information to be evaluated in Stage 3.</p> <p>Ongoing engagement with Aboriginal representatives in the preparation of the CMP to collaboratively development recommendations of the CMP.</p>
<p>Aboriginal cultural values often conflict and compete with commercial, social, tourism interests.</p> <p>Environmental values can also conflict with Aboriginal cultural values in some instances too (e.g. environmental protection of an area may limit cultural access to that same area).</p>	<p>Clearly identify where CMP objectives may conflict with Aboriginal Cultural values.</p>	<p>The impact of any coastal management options evaluated in Stage 3 on Aboriginal cultural values should be assessed.</p>
<p>Support a cultural mapping project like the one undertaken in Tweed LGA.</p>	<p>Identify the data gap of cultural landscape mapping.</p>	<p>Cultural landscape mapping likely to be undertaken either as part of the CMP (Stage 2) or as an outcome of the CMP.</p> <p>This mapping could also include 'song lines'.</p>

Appendix D

Data Compendium

Full Title	Author	Date	Format	Brief Description
Belongil Creek Entrance Opening Strategy - Final Draft Report	Alluvium Consulting	2019	Report	<p>The Belongil Creek estuary entrance has been mechanically opened under a conditional interim licence since 2001. Prior to 2001, the entrance was mechanically opened when the water level reached 1.2m AHD. A condition of the licence requires Council to develop a sustainable long-term Opening Strategy. In order to develop this Opening Strategy, a comprehensive understanding of the system, conditions and processes is first required. The study aims to:</p> <ol style="list-style-type: none"> 1. Outline existing conditions and processes within the Belongil Creek catchment 2. Outline the coastal processes that impact the estuary entrance under existing and predicted climate change scenarios 3. Assess existing flooding and flow dynamics within the Belongil Creek catchment and outline possible impacts of climate change 4. Assess the impact of the estuary opening condition on water quality 5. Assess existing aquatic and terrestrial ecology and determine the ecological communities most vulnerable to changes in the estuary entrance opening arrangements 6. Review historical management arrangements and ecological responses to entrance opening mechanisms 7. Engage with the community and stakeholders to determine management objectives for estuary opening 8. Assess different options for the management of the estuary and determine the optimal management arrangements. <p>Section 4 of the report contains the options assessment and Section 5 contains the Entrance Opening Strategy (EOS) and Environmental Management Plan (EMP), including recommended monitoring. The Strategy was adopted by Council in February 2020.</p>
Belongil Creek Catchment Issues Study	Alluvium Consulting	2019	Report	<p>This study aims to summarise the current condition of the catchment, identify the major management issues within the catchment and outline a framework for the development of a Belongil Creek catchment plan, hence the outcomes of this study are highly relevant to this CMP. It contains maps showing the major features, assets and infrastructure within the Belongil Creek catchment and defines the catchment boundary, which correlates to this CMP. It summarises the management issues in the catchment under the following headings: water quality, biodiversity, climate change, entrance management, flooding and drainage, water supply and sewage, groundwater and future land use planning. It also contains a recommended framework and actions to manage the catchment issues.</p>
Tallow Creek fish kill ICAM investigation	Alluvium Consulting	2019	Report	<p>BSC commissioned this independent, third-party investigation into the causes of a fish kill that occurred at Tallow Creek on 15 June 2019. The report documents the incident cause analysis for the fish kill event at Tallow Creek (the incident), that was associated with a mechanical opening of the sand berm entrance of Tallow Creek to the ocean. The investigation adopts the Incident Cause Analysis Method (ICAM) for investigating causes and making recommendations. The report makes a series of five recommendations with varying timeframes.</p>
Capacity assessment of the Belongil Creek Drainage System Development of a preferred STP effluent flow path	AWC	2016	Report	<i>Not Received</i>
Baywood Chase Lake Management Plan	AWC	2018	Report	<i>Not Received</i>
Technical Memorandum: Summary of technical works undertaken by AWC within the Belongil Estuary catchment and technical position on catchment hydrology and water quality	AWC	2019	Report	<i>Not Received</i>
Updated Assessment of the Byron Bay STP Treated Effluent Flows on the Belongil Catchment Water Quality and Hydrological Data Analysis from 2016 to 2020	AWC	2020	Report	<i>Not Received</i>
Tallow Estuary Entrance Management Reporting Stage 1 to Stage 8 (8 separate reports)	AWC	2016, 2017, 2018, 2019, 2020	Report	<p>These 8 reports detail flora and fauna and water quality monitoring undertaken at Tallow Creek from April 2016 to March 2020 (ongoing), in accordance with the Environmental Management Plan and Opening Strategy for Tallow Creek (BMT WBM, 2015).</p>

Full Title	Author	Date	Format	Brief Description
Tallow Creek Entrance Management Reporting – Review of Monitoring Program and Data Collected from Stage 1 (April 2016) to Stage 9 (October 2020)	AWC	2021	Report	A summary of the 9 reports detailing flora and fauna and water quality monitoring undertaken at Tallow Creek from April 2016 to October 2020, in accordance with the Environmental Management Plan and Opening Strategy for Tallow Creek (BMT WBM, 2015).
Coastal Management Program Scoping Study for Cape Byron to South Golden Beach	BMT	2020	Report	This Study is complimentary to the current study and effectively a companion document. In order to set out the coastal management issues in the Shire and how to manage them, Council is preparing a series of Coastal Management Programs (CMPs) under the guidance of the NSW Government to set out the long-term strategy for management of the coastal zone in the Byron Shire Local Government Area. Council commenced preparation of CMPs for its coastline, with the CMP Scoping Study for Cape Byron to South Golden Beach (BMT WBM, 2020) being the first in Council’s series of CMPs. The current study forms the second CMP in the series. The third CMP in the series will cover the Brunswick River estuary (TBC).
Modelling Byron Bay Erosion and Effects of Seawalls	BMT WBM	2010	Report	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. It provides 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.
Byron Shire Coastline Hazards Assessment Update	BMT WBM	2013	Report	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) 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 (former) 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) Study. The study defines the hazards that impact along the Byron coastline and determines likely landward limits of back-beach erosion escarpments inundation and shoreline movements at entrances due to the cumulative effects of these hazards for the immediate, 2050 and 2100 planning periods.
Belongil Creek Floodplain Risk Management Study and Plan Summary	BMT WBM	2015	Report	This Floodplain Risk Management Study (FRMS) draws together a wide range of floodplain management options which have been investigated and is the result of a detailed investigation and consideration of flood risk across the study area. The FRMS examines the existing and future flood risk for the study area and assesses and makes recommendations for an integrated range of modification measures to minimise the community’s exposure to flood risk.
Belongil Creek Floodplain Risk Management Plan	BMT WBM	2015	Plan	This Plan represents the fourth of the five flood risk management stages for the Belongil Creek catchment. It has been prepared for 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.
Environmental Management Plan and Opening Strategy for Tallow Creek	BMT WBM	2015	Plan	This document provides construction related environmental management guidance to Council in the conduct of an opening event (and also pre-emptive beach scraping) at the Tallow Creek mouth. It also provides operational environmental management guidance for ongoing or regular activities associated with entrance management, including flora and fauna and water quality monitoring management actions. It accords with and reflects key elements of the REF (and the NPWS permit application) completed for this activity. It also contains action levels for water quality monitoring, when monitoring criteria are exceeded.
Review of Environmental Factors: Tallow Creek Entrance Opening – Vol. 1 and Vol. 2	BMT WBM	2015	Report	This report presents a Review of Environmental Factors (REF) for the opening of the Tallow Creek entrance to manage flood levels and/or water quality within the Tallow Creek catchment, in accordance with the Management Plan provided within Council’s Tallow Creek Floodplain Risk Management Study and Plan. Volume 1 contains the REF text, while Volume 2 contains supporting materials to the REF, such as predating correspondence and reports.

Full Title	Author	Date	Format	Brief Description
New South Wales Marine Estate Threat and Risk Assessment Report	BMT WBM	2017	Report	<p>This Threat and Risk Assessment (TARA) report details the thorough assessment process undertaken, in order to consider and prioritise the social, economic and environmental threats to community benefits of the marine estate. The report outlines the key findings of the TARA undertaken at a Statewide level.</p> <p>The TARA was applied to the coastal, estuaries, coastal lakes and lagoons, beaches and ocean waters to the limit of state waters, which is three nautical miles from the coast or relevant island baseline. The landward boundary of the planning area includes coastal and estuarine waters to the limit of tidal influence but also includes adjoining land uses and activities that could affect the marine estate.</p> <p>The outputs of the TARA will be used as a key input to inform the development of management responses at a statewide scale, as well as regional and local scales. The latter primarily being addressed through new marine park management plans (note a management plan has not yet been developed for Cape Byron Marine Park). To inform future planning at a sub-regional scale, priority threats have also been identified for each region (North, Central and South). The most significant priority threats to environmental assets include: urban stormwater discharge, estuary entrance modifications, agricultural diffuse source runoff (in estuaries) and clearing riparian and adjacent habitat including wetland drainage.</p>
Byron Shire Council Local Environment Plan 1988	BSC	1988	Plan	<p>Council is currently operating under two LEPs. For Deferred Matters (DM) areas, Byron LEP 1988 land use zones apply. In November 2014, Byron LEP 1988 was amended in relation to the West Byron urban release area. The site is now zoned for a combination of residential, business, light industrial, public recreation and environmental purposes.</p>
Byron Flora and Fauna Study 1999	BSC	1999	Report	<p>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).</p> <p>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.</p> <p>Overall:</p> <ul style="list-style-type: none"> - 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.
Byron Coastline Values Study	BSC	2000	Report	<p>The Study consists of background information on the main ecological, social and economic values of the coastline in the Shire. It covers the intertidal zone, flora and fauna, cultural heritage, landscape, recreation, economic and residential values. The study area is limited to the immediate coastline and any parcels of land that adjoin the high water mark or the 50-year erosion hazard line.</p>
Draft Belongil Creek Entrance Opening Strategy	BSC	2005	Report	<p>This preliminary draft Entrance Opening Strategy (EOS) was not advanced due to findings of significant long term impacts in the REF, triggering the requirement for an EIS.</p>
Byron Shire Tourism Management Plan 2008 to 2018	BSC	2009	Plan	<p>This Plan is a living strategy developed to guide tourism in the Shire to 2018. It was 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.</p> <p>In 2019, Council started the planning process to deliver the new 10 year vision for sustainable tourism in Byron Shire - the Sustainable Visitation Strategy 2020 to 2030. The draft Strategy was on public exhibition for 45 days in October to December 2020. Submissions are currently under review. Once this Strategy is finalised it will replace the current Tourism Management Plan.</p>
Draft Coastal Zone Management Plan for Byron Shire Coastline	BSC	2010	Plan	<p>This draft Coastal Zone Management Plan (CZMP), covering the full Byron Shire coastline, has been overwritten by subsequent CZMPs for different sub-areas of management. The draft CZMP for Byron Shire Coastline 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 former NSW Coastal Policy 1997.</p> <p>The CZMP area is within the coastal zone of the complete Byron Shire, extending from the Tweed Shire border in the north to the Ballina Shire border in the south. Its focus is the coastline of Byron Shire and includes both marine and terrestrial lands.</p> <p>Note, the preface of the report provides a chronological history (from 1888 to 2009) of coastal erosion and coastal planning in the Shire.</p> <p>Part B contains the Emergency Action Plan (EAP), which details 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 Council's coastal management approach (Section 4 of the CZMP), consisting of the planned retreat policy, and protection of Byron Bay town centre (referred to as Jonson Street protection works).</p>

Full Title	Author	Date	Format	Brief Description
Byron Shire Council Development Control Plan 2010	BSC	2010	Plan	The 2010 DCP applies to land to which the Byron 1988 LEP applies i.e. all land deferred from the Byron LEP 2014, with the exception of the West Byron urban release area (where the 2014 DCP applies).
Byron Shire Council Local Environment Plan 2014	BSC	2014	Plan	The 2014 Local Environmental Plan (LEP) was prepared to conform generally to the requirements of the Standard Planning Instrument. However, a number of areas with environmental values throughout the Shire and coastal zoned lands were deferred from being zoned in the Byron LEP 2014. For these Deferred Matters (DM) areas, shaded white on the 2014 land zoning maps, Byron LEP 1988 land use zones apply. 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.
Byron Shire Council Development Control Plan 2014	BSC	2014	Plan	The purpose of Development Control Plans (DCPs) are to specify Council's requirements for quality development and sustainable environmental outcomes on land in the Shire. The 2014 DCP is the companion document to the 2014 LEP. It applies to land to which the Byron LEP 2014 applies as well as the West Byron urban release area.
Climate Change Strategic Planning Policy No 14/006	BSC	2014	Plan	This Policy sets out Council's accepted climate change parameters to inform the decision making process for strategic, infrastructure and operational planning. Council has adopted the following global climate change parameters for its planning: a) Temperature increases of 0.4oC to 2.6oC by 2065 and 0.3oC to 4.8oC by 2100 b) Sea-level rises of 17 - 38cm by 2065 and 26 - 82cm by 2100 c) Increases in rainfall intensities by 2100
Byron Shire Destination Management Plan 2014 – 2020	BSC	2014	Plan	This plan 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
Draft Coastal Zone Management Plan Byron Bay Embayment	BSC	2016	Plan	This Coastal Zone Management Plan (CZMP) was submitted to the Minister but never certified. The purpose of this CZMP is to describe proposed actions to be implemented by 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). The BBE study area is the coastline from south of Tyagarah Nature Reserve to Cape Byron, which includes Belongil Beach but not Belongil Creek estuary. The CZMP is 'open coast' focussed and does not address estuarine ecosystem health or management, except where the Belongil Creek interfaces with the open coast. This CZMP comprises 5 parts: - Part A General Information: Sets the context including previous studies, land ownership/management, legislation framework and consultation undertaken in the CZMPs development - Part B 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 - Part C Community Uses: 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 - Part D Open Coast Ecosystem Health: Addresses environmental issues relating to coastal zone management in the BBE, which are equally becoming more apparent as a result of aforementioned pressures - Part E Emergency Action Sub Plan (EASP): Details Intended Emergency Actions to be carried out by Council, 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.
Draft Coastal Zone Management Plan for the Brunswick Estuary	BSC	2018	Plan	The CZMP for the Brunswick River was last updated in 2018 by 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. The area covered by the Brunswick River CZMP does not intersect at all with the current study area. However, some of the identified values and issues of the Brunswick estuary may be applicable to the wider Byron Shire coastline, including Belongil Creek, Tallow Creek and Ti Tree Lake estuaries. Management objectives were established in the CZMP, supported by a range of management strategies in the areas of planning, economics, on ground works, investigation / research and other.

Full Title	Author	Date	Format	Brief Description
Draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment	BSC	2018	Plan	<p>This Coastal Zone Management Plan (CZMP) was submitted to the Minister but never certified. In August 2017 Council received a response from the Minister for Environment on the submitted Draft CZMP BBE (BSC, 2016) that acknowledged the complexity and range of issues associated with preparing a CZMP for this part of the coast. In October 2017 Council resolved to develop a newly formed CZMP for the Eastern Precincts of the BBE which includes the precincts of Wategos/Little Wategos Beaches, The Pass, Clarkes Beach and Main Beach.</p> <p>Management actions consist of a combination of studies, investigation and on-ground works and have been developed for a 15 year implementation period.</p> <p>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.</p> <p>The Emergency Action Sub Plan (EASP) details the Intended Emergency Actions to be carried out by Council, subject to the provisions of the EASP, in response to an Emergency. The EASP is related to the draft CZMP for the Eastern Precincts of the BBE 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.</p>
Byron Shire Recycled Water Management Strategy 2017 – 2027	BSC	2018	Plan	<p>The Strategy establishes the path for recycled water management in the Shire over the ten year period 2017 to 2027. The Strategy sets out an updated set of objectives and discusses how the objectives for recycled water management will be achieved in terms of Council's key strategic directions, specific projects, recycled water potential and timeframes. The Strategy is focussed on the beneficial use of recycled water in urban, rural and environmental applications.</p> <p>The Byron Bay recycled water management system, comprising of the Byron Bay Integrated Water Management Reserve (BBIWMR) and the Byron Bay Urban Recycled Water Scheme (BBURWS), recycles 38% of effluent from the Byron Bay STP. The recycled water management system was developed in 2005 as part of the Byron Bay STP (previously West Byron STP) upgrade which included the decommissioning of the South Byron STP.</p> <p>The BBIWMR was developed as a major integrated environmental project that used effluent for the environmental remediation of ASS, wetland and catchment degradation, loss of critical habitat and fish kills. The BBIWMR has evolved to be an intrinsic part of the Belongil landscape, providing important habitat for many species including endangered and vulnerable birds and frogs. The BBIWMR provides a significant flow path for Byron Bay STP wastewater, with 400ML of treated effluent used annually (at publication).</p> <p>The BBURWS corridor runs from the Byron Bay STP to the Byron Bay Golf Course (South Byron) supplying a very high quality recycled water for the purpose of dual reticulation (toilet flushing) and unrestricted urban municipal use (irrigation). Currently the scheme is at 70 % capacity with the Byron Bay Golf Course the major user of the recycled water. Council will continue to expand the BBURWS over the next ten years.</p>
Policy: Community Engagement 2018	BSC	2018	Plan	<p>The 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.</p> <p>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. Council has developed a number of processes to ensure these rights are upheld.</p>
Our Byron Our Future Our Community Strategic Plan 2028	BSC	2018	Plan	<p>This Plan sets out the collective vision for the next 10 years and highlights the priorities and aspirations. It is a collective document that is facilitated by Council in collaboration with the community and other partners.</p> <p>The Integrated Planning and Reporting Framework in NSW requires all councils to adopt a suite of strategic plans. This Community Strategic Plan outlines the vision, community objectives and supporting strategies which will guide Council's long-term decision making.</p> <p>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.</p> <p>It is outlined in the Plan that the community desires waterways and the coast to be managed in a sustainable manner.</p>
Draft Byron Shire Sustainable Visitation Strategy 2020 – 2030	BSC	2020	Plan	<p>The draft Strategy was on public exhibition for 45 days in October to December 2020. Submissions are currently under review. Once this Strategy is finalised it will replace the current Tourism Management Plan (BSC, 2009). The strategy contains an Action Plan outlining short and long term strategies to guide work towards a sustainable tourism future for Byron Shire.</p>
Byron Shire Local Strategic Planning Statement	BSC	2020	Plan	<p>The LSPS, dated September 2020, has been adopted by Council and endorsed by DPIE. The 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”.</p> <p>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. The LSPS is a living document, updated regularly to ensure it reflects Council's land use planning priorities, which also in turn will inform changes to Council's LEP and DCP.</p>
Byron Shire Residential Strategy	BSC	2020	Report	<p>Council's Strategy is a 20 year policy framework for the provision of future residential housing in Bangalow, Byron Bay, Brunswick Heads, Mullumbimby, New Brighton, Ocean Shores, South Golden Beach, Suffolk Park and Sunrise. Council needs a progressive residential strategy to help achieve the objectives in its Community Strategic Plan (CSP), particularly the objective to ‘manage growth and change responsibly’.</p>

Full Title	Author	Date	Format	Brief Description
Byron Shire Biodiversity Conservation Strategy 2020 – 2030	BSC	2020	Plan	The Strategy is a plan of action for Council and the community, to protect and enhance the Shire's natural environment. It describes some of the Shire's unique biodiversity values, why they are under threat, and how these threats can be managed. Chapter 4 presents the Strategic Framework and Action Plan and Chapter 5 details Strategy Implementation. The Strategy was adopted by Council on 25 June 2020.
Arakwal Memorandum of Understanding 2019-2021 Implementation Plan	BSC and BOBBAC	2019	Plan	<i>Not Received</i>
Belongil Estuary Seabird and Shorebird Management Plan	Byron Bird Buddies	2007	Report	This 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 hectares and includes open water, saltmarsh, mangrove and swamp oak floodplain forest in addition to areas of open sand. The 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 threats 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 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.
Marine Water Quality Objectives for NSW Ocean Waters – North Coast	DEC	2005	Policy	The introduction of the Marine Water Quality Objectives is part of the NSW Government's program to set water quality objectives for all its major waterways. The aim of the Marine Water Quality Objectives is to simplify and streamline the consideration of water quality in coastal planning and management. The Marine Water Quality Objectives describe the water quality needed to protect values and uses as recommended in the ANZECC Guidelines (ANZECC & ARMCANZ 2000). Section 4 lists the Marine Water Quality Objectives for NSW ocean waters and provides guidance on their use.
Local Planning for Healthy Waterways using NSW Water Quality Objectives	DEC	2006	Plan	This plan outlines how incorporating water quality objectives into strategic planning of development is a key way that local councils, as well as state government agencies, developers and the community, can contribute to improving the health of waterways.
Gold Coast, Queensland, Australia – Coastal erosion and related problems	Delft Hydraulics Laboratory	1970	Report	Comprehensive coastal investigation of erosion at the Gold Coast that describes wider coastal processes along the east coast of Australia including the behaviour of river and creek mouths.
North Coast Regional Plan 2036	DPE	2017	Plan	The North Coast Regional Plan 2036 is a 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 North Coast region consists of 12 LGAs, including Byron Shire. 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, this will protect 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 current generations have.
Cape Byron Marine Park Operational Plan	DPI	2010	Plan	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, and - 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.
Cape Byron Marine Park Zoning Map and User Guide	DPI	2020	Map	The current study area includes the open stretch of coastline that is within the Cape Byron Marine Park, from Cape Byron to the southern LGA boundary. This Marine Park extends 37km along the coastline from 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 220km ² , approximately 78km ² exists within the current CMP study area. The tidal waters of Belongil Creek and Tallow Creek are within the Cape Byron Marine Park which is managed by the Marine Parks Authority. The Zoning Plan is intended to enhance the conservation of marine habitats and species by providing various levels of protection. Belongil Creek and Tallow Creek are Special Purpose Zones with no fishing except by permit. The beach areas around Belongil Creek entrance and Broken Head are part of Sanctuary Zones, as is the offshore waters around Cape Byron. The beach areas and nearshore waters around Cape Byron, Tallow Beach and Seven Mile Beach are Habitat Protection Zones, while a general use zone exists towards the ocean boundary of the Marine Park in this southern coastline area. The Zoning Plan also notes dogs are prohibited around Belongil Creek and Tallow Creek entrances as these are threatened shorebird habitat (roosting areas). The management objectives of the Marine Park estate will be relevant to the CMP.

Full Title	Author	Date	Format	Brief Description
Byron and Tweed Shire Councils Climate Change Adaptation Action Plan	GHD	2009	Plan	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 considered included sea level rise, temperature, rainfall and extreme weather. Adaptation options for each risk were considered over the present, 2020 and 2070 timeframes.
Tropical and extratropical-origin storm wave types and their influence on the East Australian longshore sand transport system under a changing climate	Goodwin et al.	2016	Paper	This potential impacts of projected poleward expansion of the tropics on storm type distribution, headland bypassing and regional longshore transport is discussed. The expansion of the tropics with warming climate will lead to a poleward shift in storm type, with more tropical origin storms than extra-tropical storms with a southern origin. The reduction in extra-tropical storms with shore-oblique waves reduces the headland bypassing events along the southeast Australian shelf. Together with an increase in tropical storms that are shore normal, a poleward shift may result in a reduction in northward longshore transport and efficiency in headland sand bypassing
Beach fluctuations and shoreline change - NSW	Gordon, A.	1987	Paper	Review of observed storm demand along NSW beaches.
Belongil Creek Entrance Opening Strategy Review of Environmental Factors	Integrated Ecosystem Research & Management	2005	Report	This report presents a Review of Environmental Factors (REF) for the opening of the Belongil Creek entrance to manage flood levels and/or water quality within the Belongil Creek catchment, in accordance with requirements provided within Council's Belongil Estuary Management Plan. The significant long term impacts of the preliminary draft EOS triggered the requirement for an EIS. The REF concluded that, given that many of the draft EOS impacts that trigger an EIS may be effectively mitigated by current initiatives in ASS, stormwater and drainage management, resources may be most effectively used by postponing the commencement of any EIS, until revised management strategies and mitigation strategies have been put in place, and a revised EOS has been drafted.
Origins of Holocene coastal strandplains in Southeast Australia: Shoreface sand supply driven by disequilibrium morphology	Kinsela et al	2016	Report	Technical paper indicating that shoreface sand supply driven by the ongoing relaxation of disequilibrium morphology may persist at subtle rates (1–2 m ³ /m/yr) today on some southeast Australian beaches, promoting shoreline stability, and potentially moderating initial shoreline response to sea-level rise.
Byron Bay Town Centre Masterplan	McGregor Coxall for BSC	2016	Report	Completed in 2016, the Town Centre Masterplan has been developed to provide master planning and place making guidance for the town centre of Byron Bay, which is within the Belongil Creek catchment area. The Masterplan includes provisions to improve stormwater management of Byron Bay i.e. through implementation of WSUD, which will ultimately improve water quality in Belongil Creek, as this is where the majority of the townships stormwater is conveyed to. One of the 10 priority projects identified in the Masterplan is 'Creek Rehabilitation' in the Sandhills Scrubland Walk area and includes investigation of opportunities to develop a series of wetlands for stormwater management and water quality improvement.
NSW Marine Estate Management Strategy 2018–2028	MEMA	2018	Plan	The NSW marine estate is a valuable natural asset comprising tidal rivers and estuaries, the shoreline, submerged lands, offshore islands, and the waters of the NSW coast from the Queensland border to the Victorian border and out to 3 nautical miles offshore. In order to achieve the NSW Government's vision for the marine estate (a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future), the Marine Estate Management Authority (MEMA) established and embarked on a five-step decision-making process: 1. Identify community benefits and threats 2. Assess threats and risks to benefits 3. Assess current management 4. Develop and implement management responses to priority threats 5. Monitor, evaluate and report. In 2014 MEMA began work to identify the benefits of the marine estate to the community. In 2016–17, an evidence-based, statewide threat and risk assessment (statewide TARA) assessed benefits and identified the threats to these benefits that are a priority for action. This Strategy follows on and proposes a suite of initiatives and actions to address priority threats. The Strategy includes a five-year health check to measure progress of how the initiatives are performing against the key performance indicators and whether the risk of the threats identified in 2017 have changed.
North Coast Local Strategic Plan 2016-2021	North Coast Local Land Services	2016	Plan	The North Coast Local Strategic Plan (LSP) is aligned with and delivers the NSW State Strategic Plan in the North Coast Region. The strategic approach focuses on community engagement, setting and delivering local priorities, and determining how the priorities for Local Land Services (LLS) are best achieved at local level. The North Coast LSP outlines LLS's approach and commitment to building the sustainability of the North Coast Region's primary industries, natural environment and local communities. The LSP includes the following 4 goals, along with associated priorities and outcomes, actions and performance measures: * Goal 1: Resilient, self-reliant and prepared local communities * Goal 2: Biosecure, profitable, productive and sustainable primary industries * Goal 3: Healthy, diverse and connected natural environments * Goal 4: Board members and staff who are collaborative, innovative and commercially-focused.

Full Title	Author	Date	Format	Brief Description
North Coast Regional Strategic Weed Management Plan 2017 – 2022	North Coast Local Land Services	2017	Plan	The Plan focuses on managing weeds to improve the region’s biosecurity, with a vision to protect the North Coast’s environment, landscape, livelihood, cultural and lifestyle values from weeds by strengthening the sustainability of the natural environment, primary industries, and local communities in the region.
Northern Rivers Catchment Action Plan 2013 – 2023	Northern Rivers Catchment Management Authority	2013	Plan	This Plan (CAP2) is an all-of-government and all-of-community plan to guide the sustainable management of natural resources (soils, biodiversity, rivers, estuaries, wetlands, and coastal and marine environments) in the Northern Rivers Region for the next decade. CAP2 is founded on a 50-year, long-term vision and three, 10-year aspirational goals. Five strategies have been devised to attain these goals.
Arakwal National Park Plan of Management	NPWS	2007	Plan	<p>The Arakwal National Park is within the study area. The Park adjoins the Cape Byron Headland Reserve to the north and former South Byron Sewerage Treatment Plant (STP) and the Wilkinson foot-bridge over Tallow Creek to the south. The Park is 185.2 hectares and includes a 3km stretch of Tallow Beach to mean low water mark as well as the entrance to Tallow Creek estuary and its lower reaches.</p> <p>This Park was created under an Indigenous Land Use Agreement (ILUA) as part of resolving a native title claim; the first time a national park had been created under an ILUA in Australia. The ILUA recognises the rights and interests of the traditional owners of Country that includes Arakwal National Park and has been acknowledged as a model for reconciliation across Australia.</p> <p>The Plan details the values the Reserve has that are important to the Bundjalung of Byron Bay (Arakwal) people and the wider community. It explains the history of large scale sand mining that altered the sand dunes along Tallow Beach and contamination associated with the former STP. It also contains a number of actions to protect natural shoreline processes, restore Tallow Creek and manage Tallow Creek entrance as well as urban stormwater.</p>
Cumbebin Swamp Nature Reserve Plan of Management	NPWS	2012	Plan	<p>The Cumbebin Swamp Nature Reserve is within the study area. The 91 hectare Reserve is an important part of Country to the Bundjalung of Byron Bay (Arakwal) people and is subject to an Indigenous Land Use Agreement (ILUA). Under the ILUA the Reserve is jointly managed with the Bundjalung of Byron Bay (Arakwal) people through a management committee.</p> <p>Cumbebin Swamp Nature Reserve conserves a significant component of the Belongil-Cumbebin wetland (of state significance), sensitive coastal dunes, coastal swamp forests and riparian areas and contains three endangered ecological communities. Sections of Belongil Creek and its tributaries are within the Reserve. The Plan details the values the Reserve has that are important to the Bundjalung of Byron Bay (Arakwal) people and the wider community. It also contains a number of actions to protect the natural environment, the action of most relevance being to improve water quality in the estuary.</p>
Broken Head Nature Reserve Plan of Management	NPWS	2019	Plan	<p>The Broken Head Nature Reserve is within the study area. The 110 hectare Reserve is an important part of Country to the Bundjalung of Byron Bay (Arakwal) people and is subject to an Indigenous Land Use Agreement (ILUA). Under the ILUA the Reserve is jointly managed with the Bundjalung of Byron Bay (Arakwal) people through a management committee.</p> <p>The Reserve includes 3.5kms of coastline but does not include the intertidal zone which is below mean high water mark. The Reserve supports four threatened ecological communities. The Plan itself provides few particular details on coastal management matters.</p>
Letter to Byron Shire Council RE Tallow Creek Entrance Management	NPWS	2019	Letter	Letter from NPWS to BSC dated 30 September 2019 detailing NPWS' interim position on entrance opening following the fish kill event, stating that mechanical opening of the Tallow Creek mouth is not supported.
Tyagarah Nature Reserve Plan of Management	NPWS	2020	Plan	The southern part of the Reserve forms part of the Belongil wetlands system, within the Belongil Creek catchment area. Tyagarah Nature Reserve is located between the townships of Byron Bay and Brunswick Heads and 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. The plan lists management responses for the Tyagarah Nature Reserve, including working with Council to minimise the impacts of ASS runoff on the Belongil Creek estuary.
Ti Tree Lake Aboriginal Area Plan of Management	NPWS	2020	Plan	The Ti Tree Lake Aboriginal Area is within the study area. Ti Tree lake, surrounding (former) Crown land and the land which now forms the 10.5 hectare Aboriginal Area are the subject of an Indigenous land use agreement (ILUA). The Aboriginal Area is an important part of Country to the Bundjalung of Byron Bay (Arakwal) people. The Plan itself provides few particular details on coastal management matters.

Full Title	Author	Date	Format	Brief Description
Attachment 1: Summary of NPWS reserves in the Byron Bay CMP study area	NPWS	2021	Comment on Draft Scoping Study	<p>When reviewing and providing comment on the draft Scoping Study report, NPWS issued Attachment 1: Summary of NPWS reserves in the Byron Bay CMP study area to Council. This word document provides a summary of the key flora, fauna, cultural heritage significance and facilities within each of the five nature reserves located wholly within the study area and managed by NPWS:</p> <ul style="list-style-type: none"> • Cumbebin Swamp Nature Reserve • Arakwal National Park • Cape Byron State Conservation Area • Ti-tree Lake Aboriginal Area • Broken Head Nature Reserve.
State of the Beaches Reports: 2009-2010, 2010-2011, 2011-2012, 2012-2013	OEH	2010, 2011, 2012, 2014	Report	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.
Belongil Estuary Study and Management Plan	Parker and Pont	2001	Report	Outlines an integrated management plan for the estuary. Identifies major values and threatening processes. Poor water quality from urban areas, agricultural runoff and acid runoff are identified as major threats. 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.
Scoping Study on the Feasibility to Access the Cape Byron Sand Lobe for Sand Extraction for Beach Nourishment	Patterson Britton & Partners	2006	Report	<p>The Byron Bay Coastline Management Study 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:</p> <ul style="list-style-type: none"> · Byron Bay / Belongil Beach – beach nourishment with end control structure and rock seawall; · New Brighton Beach – beach nourishment. <p>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.</p> <p>The main items in the scope of work for the Scoping Study were:</p> <ul style="list-style-type: none"> · issues analysis; · literature review; · approval process; · data collection and interpretation; · detailed cost estimation and cost sharing arrangements; and · identification of data gaps.
Modelling as an aid to understand the evolution of Australia’s east coast in response to late Pleistocene-Holocene and future sea level change	Patterson D.C	2013	Report	Coastline evolution modelling to predict geological time-scale continental shelf processes associated with major sea level change (~ 100 metres), as well as the contemporary and future behaviour along the central east coast of Australia. The study investigated the role of ongoing contemporary shoreward supply of sand to the shore-face and coastline from the inner continental shelf. This is important for longer term coastline evolution and contemporary coastal management. Even a relatively low rate of long term shoreward net supply may contribute to shoreline stability where it offsets a gradient in the longshore sand transport that would otherwise lead to recession.
Depth, bed slope and wave climate dependence of long term average sand transport across the lower shoreface	Patterson et al.	2016	Paper	This study reviewed 46 year changes in nearshore bathymetry to quantify rates of net shore-normal sand transport in 10–20 m depths at northern Gold Coast. It provides insights into the migration history of a nearby river mouth which has formed a disequilibrium shoreface lobe that is evolving towards an equilibrium profile shape, which is identified in adjacent non-lobe profiles. This is relevant to understand the onshore migration of self sand deposits that exist along Tallow Beach.
Byron Bay - Hastings Point Erosion Study	PWD	1987	Report	<p>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.</p> <p>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.</p> <p>Shoreline recession rate was estimated to be around 1m per year at the Belongil Spit, the entrance to the Belongil Creek estuary.</p> <p>The study identified the need of an overall management plan. Some immediate actions were recommended.</p>

Full Title	Author	Date	Format	Brief Description
Shelf sand supply determined by glacial-age sea-level modes, submerged coastlines and wave climate	Ribo et al	2020	Paper	Investigation of the south-east Australian shelf configuration when sea level was 40 m and 60 m below present-day sea level (depths of the most persistent paleo shorelines within the last 120 ka), and the wave climate variations influencing the sediment transport pathways over this period. The study provides evidence demonstrating that the combination of shelf morphological evolution, changes in sea-level and variations in wave climate is responsible for latitudinal changes in sediment transport and deposition during the interglacial states. The paleoshoreline and shelf evolution is key to understanding the distribution of present-day shelf sand deposits and the contemporary sand budget response to future wave climate changes. This is relevant when assessing the future coastal hazards at Byron.
Biochemical Characteristics of a Northern NSW ICOLL	Shannon Waddy of SCU	2019	Report	A study of the biogeochemical characteristics of areas within and adjacent to Tallow Creek ICOLL, NSW, was conducted in order to better inform artificial opening management practices, following a fish kill in June 2019. Profiles of the water column were obtained, measuring depth, dissolved oxygen, fluorescent dissolved organic matter, and electrical conductivity. Sediment samples were also taken from the ICOLL, and analysed to quantify biochemical oxygen demand, acid volatile sulfide and chromium reducible sulfur. Photo-oxidation was also measured, using water sampled from the ICOLL. Stratification was observed in several areas of the ICOLL, and many benthic areas had very low concentrations of dissolved oxygen. Sediments were found to contain low concentrations of acid volatile sulfides, and comparatively larger concentrations of chromium reducible sulfur species. This has implications for the future management of the Tallow Creek ICOLL.
Tallow Creek Biogeochemical Study - Summary of Key Findings	Shannon Waddy of SCU	2019	Report	A summary report detailing the key findings (DO, EC, COD and BOD, AVS and CRS) and figures from the full Biochemical Characteristics of a Northern NSW ICOLL report.
Tallow Creek Floodplain Risk Management Study and Plan	SKM	2009	Plan	
Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update	SKM	2015	Plan	
Belongil Creek Flood Study	SMEC	2009	Report	The Flood Study provides maps showing the extent of flooding for a range of design events including the 100 year event. The Study includes hydraulic modelling of the Belongil Creek floodplain, including calibration and verification using historic events flood events and design runs for a range of flood events. The design events incorporated climate change scenarios based on IPCC and CSIRO models and DECC guidelines that indicate that ocean levels and rainfall intensities in Byron Bay are likely to increase over the next century in response to global climate change.
Byron Bay Drainage Strategy (Draft Report)	SMEC	2010	Report	The Draft Drainage Strategy aimed to reduce the extent and frequency of flooding in Byron Bay compared to the existing situation and reduce stormwater pollution in the Belongil Creek estuary. The study found that drainage within the CBD is highly constrained and there is limited opportunity to provide stormwater treatment of urban areas. The key recommendations from the investigation included: 1. Pump stations and improvements in street drainage required for the Town Drain area, 2. A levee along Byron Street adjacent to Town Drain, and 3. A new wetland and basin near Cowper Street to convey runoff to Clarke Beach.
Tallow Creek Flood Study	Water Studies	2002	Report	This flood study determines the flooding behaviour of Tallow Creek and forms the basis for developing the Floodplain Risk Management Plan for the Tallow Creek catchment.
Byron Shire Coastline Management Study	WBM Oceanics	2003	Report	This report, adopted by Council in 2004, 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 NSW Coastal Policy 1997 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, longer term erosion hazards exist at Suffolk Park) Relevant to the current study area, the report identified Byron Bay / Belongil Beach as one of two 'hot spots' for erosion and recession in the Byron Shire and recommended 'beach nourishment with end control structure and rock seawall' as a measure to manage the erosion and recession hazards at Byron Bay / Belongil Beach.
Byron Shire Coastline Hazard Definition Study - Final Report	WBM Oceanics Australia	2000	Report	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.

Full Title	Author	Date	Format	Brief Description
North Byron Beach Resort Estuarine and Dunal Management Plan	Wetland Care Australia	2015	Plan	<i>Not Received</i>
Cape Byron Headland Reserve Plan of Management	Wildsite Ecological Services for Cape Byron Trust	2002	Plan	<p>The Cape Byron Headland Reserve is within the study area. The Reserve extends to the low water mark and as such includes part of Tallow beach. 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. The Plan addresses the criteria of why the 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.</p> <p>The Plan 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.</p> <p>The Plan identifies that the Trust has historically been represented on Byron Council Committees associated with the development of Coastal Management Plans. The Plan itself provides few particular details on coastal management matters.</p>
Byron Bay Erosion Protection Structures - Risk Assessment	Worley Parsons	2013	Report	<p>Various erosion protection structures have been constructed along the Byron Bay foreshore, by public authorities and individual residents. At Belongil Beach, a number of interim beach access stabilisation works have been constructed by Byron Shire Council, including at Manfred Street, Don Street and Border Street. On either side of these interim works, erosion protection works adjacent to private landholdings. These have largely been constructed in an ad hoc fashion, and several have been identified by previous studies as being degraded and not compliant with contemporary coastal engineering standards.</p> <p>This report presents a Risk Assessment for each of the identified erosion protection structures in the Byron Bay Embayment.</p>
Modification of Byron Shire Coastal Hazard Lines	WRL	2009	Report	<p>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 and Stormwater erosion.</p> <p>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. 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.</p> <p>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.</p>
Peer Review of Report on Byron Bay Coastal Modelling by Dean Patterson (2010)	WRL	2011	Letter	<p>This report corresponds to a peer review of Report on Modelling Byron Bay Erosion and Effects of Seawalls (BMT WMB, 2010).</p> <p>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).</p> <p>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.</p>
Coastal Hazard Management Study - Byron Bay Embayment	WRL	2016	Report	<p>This study constitutes a further Coastal Hazard Management Study, following up from the one completed by WBM Oceanics Australia (2003).</p> <p>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 (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.</p> <p>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 publicly-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.</p> <p>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.</p>

Appendix E

Coastal Processes Report

E1 Coastal Processes, Hazards and Management

Coastal hazard is defined in the CM Act to mean the following (OEH, 2018a):

- Beach erosion
- Shoreline recession
- Coastal lake or watercourse entrance instability
- Coastal inundation
- Coastal cliff or slope instability
- Tidal inundation
- Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

The study area comprises a diverse range of environments including open coast beaches, estuaries and their catchments, dunes, foreshores and the nearshore environment. Coastal processes relevant to the study area are discussed in this section, along with identified coastal hazards. Coastal management strategies to respond to these hazards, including works present within the study area are discussed in **Section 5.3**. It is noted that Belongil Creek, which is part of this study, is located in the embayment to the north of Cape Byron which has been the subject of a previous scoping study (BMT, 2020).

E1.1 Coastal Processes and Hazards

The study area covers a dynamic and active coastal sediment compartment (**Section 1.2**). Key beaches and their adjacent environs in the study area (from south to north) that are exposed to beach erosion, shoreline recession, coastal inundation and tidal inundation are:

- Seven Mile Beach (northern portion, approximately 2.1 km of the total 8.4 km embayment, the southern portion being located within the Ballina Shire Council LGA)
- Whites Beach
- Brays Beach
- Kings Beach
- Broken Head Beach/Suffolk Park Beach/Tallow Beach embayment (a total embayment length of 7.3 km).

The key headlands within the study area that may be subject to coastal cliff or slope instability are (from south to north):

- Jews Point
- Broken Head
- Cape Byron.

There are three coastal lake/watercourses which have opening and closing entrances, being:

- Belongil Creek
- Tallow Creek
- Ti Tree (Taylors) Lake.

The major embayment in the study area containing Broken Head Beach, Suffolk Park Beach and Tallow Beach grades from natural along its southern and northern sections to low density developed at Suffolk Park that is generally set back from the active beach in central sections. It is a beach that

is impacted by waves, tides, wind and minor human modification, all of which vary longshore. This area is an extremely complex and dynamic natural system that within and through which, there is considerable sand movement. The coastal zone is subject to important regional aspects including:

- Longshore sand transport rates vary longshore within the study area. Gradients in the longshore currents (longshore gradients) due to spatial differences in wave exposure and obliqueness result in the longshore differences in sediment transport along the beaches
- Significant temporal variations in longshore transport and shoreline position particularly due to the bypassing of sand around headlands and seasonal or long-term variation in wave climate
- Onshore sand supply from the shoreface which can occur during storm events and in part, provides sand for the longshore transport system
- Infrequent tropical cyclones and east coast lows that can be linked to widespread coastal erosion and inundation.

The embayment has two key ICOLLs that interact with the open coast processes, being Ti Tree (Taylors) Lake and Tallow Creek. Belongil Creek is part of the current study but is located in the embayment to the north of Cape Byron.

Numerous previous investigations have been undertaken, the most relevant of which include:

- *Byron Shire Coastline Hazards Assessment Update* (BMT WBM, 2013) (herein ‘the 2013 Hazard Update’), which incorporates the findings of the *Modification of Byron Shire Coastal Hazard Lines* (Carley and Rayner, 2009)
- Detailed numerical modelling studies (Patterson, 2013)
- Investigations on the shoreface sand deposit (PBP, 2006)
- *Byron Bay – Hastings Point Erosion Study* (PWD, 1978) and to a lesser extent the Delft Hydraulics Laboratory report (1970).

These and other existing studies provide a reference point for current knowledge of coastal processes and hazards for the Byron Shire region, including both the agreed and the uncertain elements of that knowledge. Most recently studies have been completed of the Cape Byron – Ballina Shelf Sand Body (SSB) (Ribo *et al.*, 2020). The location of the SSB and a shore-normal profile showing its characteristics off Tallow Beach is shown in **Figure E-1**. This SSB is a large sand deposit in the deeper nearshore areas, to the southeast, east and northeast of the cape. It has also been referred to as the ‘Cape Byron Sand Lobe’. The volume of the sand deposition has been estimated as approximately 370 million cubic metres (Mm³) (PBP, 2006). Sand deposits in this area are due to Cape Byron’s interference with the EAC and nearshore currents (PBP, 2006).

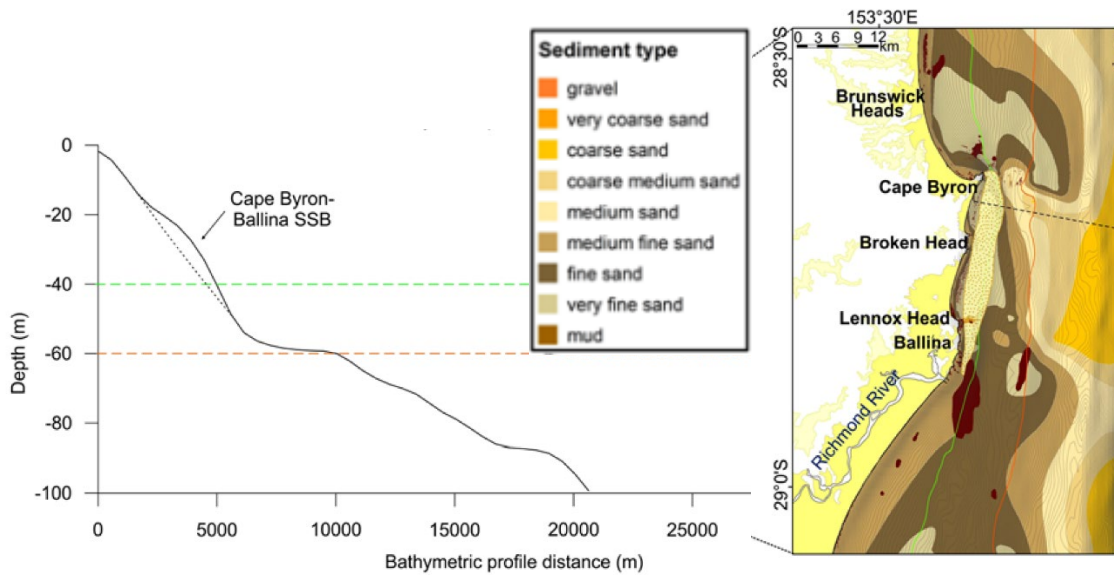


Figure E-1: Location and extents of Cape Byron – Ballina Shelf Sand Body (Ribo et al., 2020)

Key elements regarding the current state of knowledge in the open coast study area including Broken Head Beach/Suffolk Park Beach/Tallow Beach from Broken Head to Cape Byron is presented graphically in **Figure E-2**.

Coastal processes at the entrance to Belongil Creek are discussed in the CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020).



Figure E-2: Summary of the current coastal processes knowledge for Broken Head Beach/Tallow Beach Embayment

Regarding the observed shoreline behaviour of Tallow Beach, the 2013 Hazard Update states the results of the photogrammetry were “inconclusive”. It is important to recognise that Tallow Beach was extensively sand mined in the 1960s (**Figure E-3**). In addition, large variations due to storms in the late 1960, 1970’s and 1999 as well as potential inconsistencies in photogrammetry data are reasons underlining the difficulty in identifying clear long-term trends of shoreline change at this beach. The shoreline recession estimates presented in the 2013 Hazard Update were not strongly supported by factual data or other scientific evidence. Accordingly, the 2013 Hazard Update recommended that *“ongoing monitoring be continued to form the basis of future reassessments of the erosion hazard extents for this beach.”*

The separation eddy off Cape Byron tends to produce a rotation flow within the Tallow Beach environment causing a northerly flow inshore particularly when there is a strong south bound East Australian Current (EAC).

Compounding the uncertainty in the 2013 Hazard Update coastal erosion hazard lines is the shoreline recession associated with sea level rise and the application of the Bruun Rule. In addition to the Bruun Rule, the 2013 Hazard Update applied modelling techniques to account for longshore sediment transport to estimate variable sea level rise recession along the beach (i.e. higher in the southern hook and less against at Cape Byron). However, the estimates are still questionable given the convex up coastal profile due to the presence of the Cape Byron – Ballina Shelf Sand Body (SSB) offshore of Tallow Beach. In fact, the extensive lower shoreface sand body off Tallow is reasoned to promote onshore supply of sand to Tallow Beach offering a stabilising or accretional effect to the shoreline. Kinsela *et al.* (2016) and Patterson and Nielsen (2016) have noted this pattern at other East Coast locations at Tuncurry (NSW) and The Spit on the Gold Coast (QLD), respectively. In addition, the net littoral drift rate into Tallow Beach from the south provided by 2013 Hazard Update does not appear to be supported by physical evidence in terms of the flow of sand around Broken Head, the state of the beach at Lennox Head and the evidence of gravel, rather than sandy beaches at Lennox Head, all of which suggest a lesser net longshore drift. These points highlight the major issues in determining Tallow Beach’s and the wider Byron region long term behaviour based on the current literature. Hence of the importance that any Stage 2 studies and coastal vulnerability area be determined within a data-driven sediment budget type approach.

There is uncertainty with regards to net longshore transport in from the south and the sediment budget proposed by BMT WBM (2013). The sedimentary evidence in Ribo *et al.* (2020) seems to contradict the cross embayment sediment movement proposed by BMT WBM (2013) i.e. the theory that sand moving around Cape Byron must travel both inshore around the embayment but also across the bay in deeper water. The significance of this is that the BMT WBM (2013) model of sediment transport would be flawed if the Ribo *et al.* (2020) work is correct i.e. there is most likely not 400,000 to 500,000 m³ of sand coming around Cape Byron on an annual averaged basis. The Ribo *et al.* (2020) paper clearly shows this transport path does not exist. In summary, the evidence of Ribo *et al.* (2020) and the apparent stability of the entrance of Tallow Creek suggests that the net littoral drift may well be considerably less than what BMT WBM rely on for their 2013 shoreline hazard modelling (BMT WMB, 2013).

While dynamic entrance behaviour is a known issue at Belongil Creek (BMT, 2020) the entrances of Tallow Creek and Ti Tree (Taylors) Lake show little evidence of migration and can be considered relatively stable during future planning periods (BMT WBM, 2013) (possible further evidence of a net longshore drift significantly less than that suggested by BMT WBM (2013)). Longshore sand

transport and a relatively small tidal compartment results in periodic closing of the three entrances within the study area. Tallow Creek and Ti Tree ICOLLs are predominately in a closed state.

There are no known investigations into slope and cliff instability at Broken Head or Cape Byron. At this point in time it is not considered a priority issue, however there will be some need of consideration in regard to the safety of individuals when developing plans under the coastal environment and coastal use areas at later stages of the CMP. Such considerations would include the safe proximity of the public to cliff edges and on beaches under cliffs (Broken Head) and the need for appropriate signage and walking path setbacks.



Figure E-3: Photo of dredge sand mining at Tallow Beach in the early 1960's, showing the Cape Byron lighthouse in the background (Source: <http://byronbayhistoricalsociety.org.au/>)

E1.2 Recommendations for Next Stages of the CMP Process

It is understood that Council will seek to undertake a single reassessment of coastal hazards as part of Stage 2 of the CMP process for the entire LGA from Seven Mile Beach to South Golden Beach. Such a study would include not only the open coast beaches but also the banks of the estuaries. In doing so Council will need to differentiate between traditional “Hazard” mapping and “Vulnerability” mapping as now required under the CM Act. The CM Act advocates for integrated and co-ordinated coastal planning and adopts a coastal sediment compartment approach. The proposed Stage 2 study area encompasses the entire Byron Shire which covers a significant proportion of two coastal sediment compartments (see boundary at Cape Byron in **Map G002**), defined in the CM Act as:

- Cape Byron to Ballina: with extents from the Richmond River to Cape Byron, incorporating Byron Shire and Ballina Shire

- Tweed: with extents from Cape Byron to Point Danger, incorporating Byron Shire and Tweed Shire.

Consultation will be necessary with both Ballina and Tweed Shire Councils such that the proposed LGA-wide Stage 2 vulnerability studies are in accordance with the CM Act. In doing this the beach management issues within the Byron LGA can be viewed within the context of the sediment compartments and the associated sediment budgets, together with linkages to adjacent compartments, all of which must be considered if effective management options are to be pursued.

The CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020) sets out the results of a first pass risk assessment (see BMT (2020) Table 4.3) and forward plan (including recommended studies for the next stages of the CMP process) (see BMT (2020) Table 6-2).

BMT (2020) Stage 2 recommended studies have been reviewed with the following inclusions to inform the Stage 2 coastal hazard assessment for the LGA-wide study area:

- Sediment budget and quantified conceptual sand movement model, part of which is set out in the 2013 Hazard Update, utilising the latest data (e.g. the 2018 Coastal LADS/LiDAR) and knowledge (e.g. Kinsela *et al.*, 2016). The approach should be data-driven, as far as practically possible, comprehensive in its assessment of the past, present and future status of sediment (sand) movement within the study area and consistent with observable physical features and processes including headland by-passing. Consideration should be given to:
 - Longshore and temporal variation in longshore sediment transport including headland bypassing and correlations to beach erosion/accretion of either side of Cape Byron. The importance of understanding the nuance of this pathway is highlighted by the recent erosion at Clark's Beach triggering the construction of emergency and temporary geotextile revetment structures fronting Reflections Holiday Park and the Byron Beach Cafe (see **Figure E-4**). It is also highlighted by the Ribo *et al.* (2020) paper, which as noted above, seems to contradict the cross embayment sediment movement proposed by BMT WBM (2013)
 - The beach system that gives rise to the beach fluctuation zone from the landward limit of erosion down to the seaward limit at 40m depth (i.e. the full active coastal profile)
 - Adopting a sediment compartment wide approach to the sand budget will increase confidence in future coastal mapping and management. Two important issues warrant further consideration being (i) the impact of the Ballina (Richmond River) breakwaters located at the southern end of the Cape Byron to Ballina sediment compartment and (ii) Tweed Sand Bypassing which is located at the northern end of the Tweed sediment compartment and at which a great deal is known about rates of sand movement. The 2013 Hazard Update implies that the Richmond River breakwaters will alter current trends sometime in the future. These breakwaters were constructed over 100 years ago and are about 20km south of Tallow Beach. A data-driven sediment budget approach as part of Stage 2 will remove, or limit, the uncertainty the Patterson (2013) work raises regarding future trends and hence vulnerable area mapping
 - Local effects to the sediment budget around recent human modifications of the coastal zone (including temporary works) as well as creek and river entrances

- Climate change issues or changes to onshore sand supply rates (i.e. the probabilistic approach encapsulated within a sediment budget that can explore “what ifs”)
- Modify the recommended Stage 2 coastal hazard/vulnerability assessment using a probabilistic approach for the entire shire coastal zone (BMT (2020) Table 6-2, S2.01) as follows:
 - The approach and inputs to the probabilistic models should be based on the findings of the updated sediment budget (including what ifs). For example, this may mean time-based changes to the probability distributions are included, different treatments of the Bruun-rule (or other) are considered for sea level rise and/or a probabilistic distribution for the rate of onshore supply/longshore transport gradients
 - Continuous and consistent hazard/vulnerability mapping of the LGA is agreed, as is tying into known bedrock, including underwater bedrock within the potential fluctuation zones and hence profile response limiting factors, particularly in the region of the Bay to the northwest of the Cape. Known coffee rock should also be noted along with an assessment of its potential impact on recession rates (a sensitivity analysis). Recent erosion within the Byron Bay embayment has provided an opportunity to better map existing bed rock and coffee rock (see recent drone survey of Clark’s Beach, **Figure E-4**) and may complement quaternary geology maps (**Figure E-5**) and site walkover
 - The modelling of erosion storm bites and inundation from cyclonic events be considered if justified by data showing increases in cyclone frequencies in this latitude (in which data is limited). The outcomes of this modelling are relevant to potential widespread inundation of the Byron area and associated planning and emergency response requirements (particularly for infrastructure planning for critical infrastructure such as access roads and sewerage treatment).

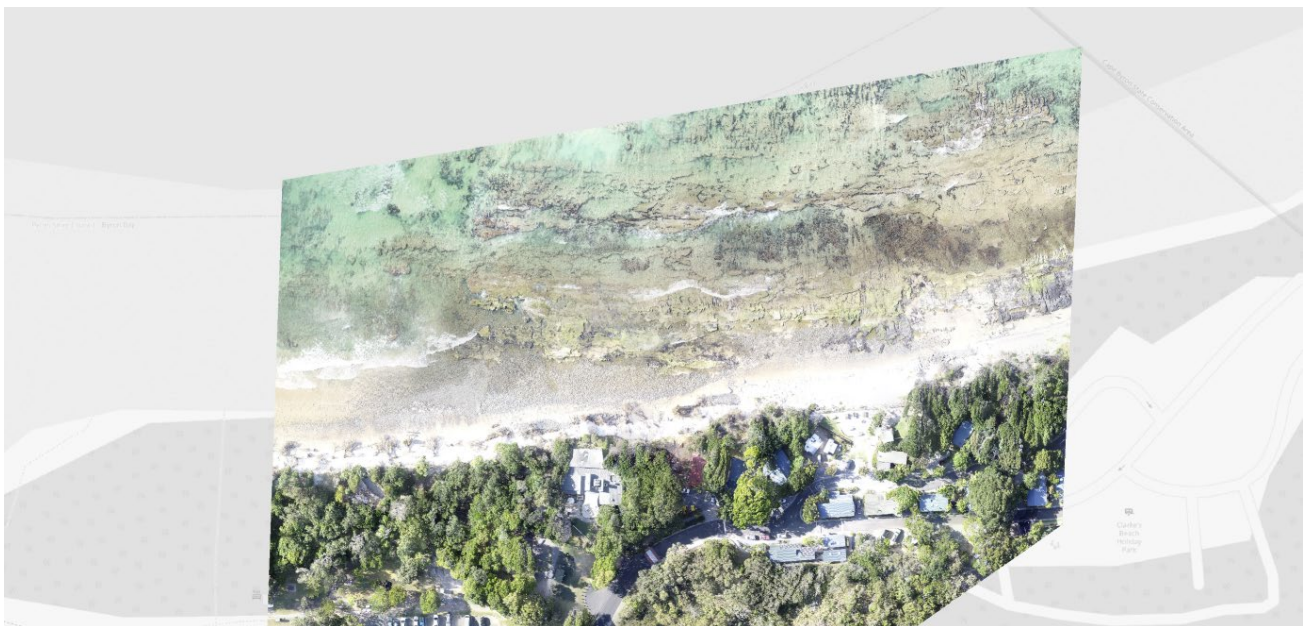


Figure E-4: Mapping of exposed bedrock, indurated sand and cobble layers at Clark’s Beach during recent erosion in October 2020

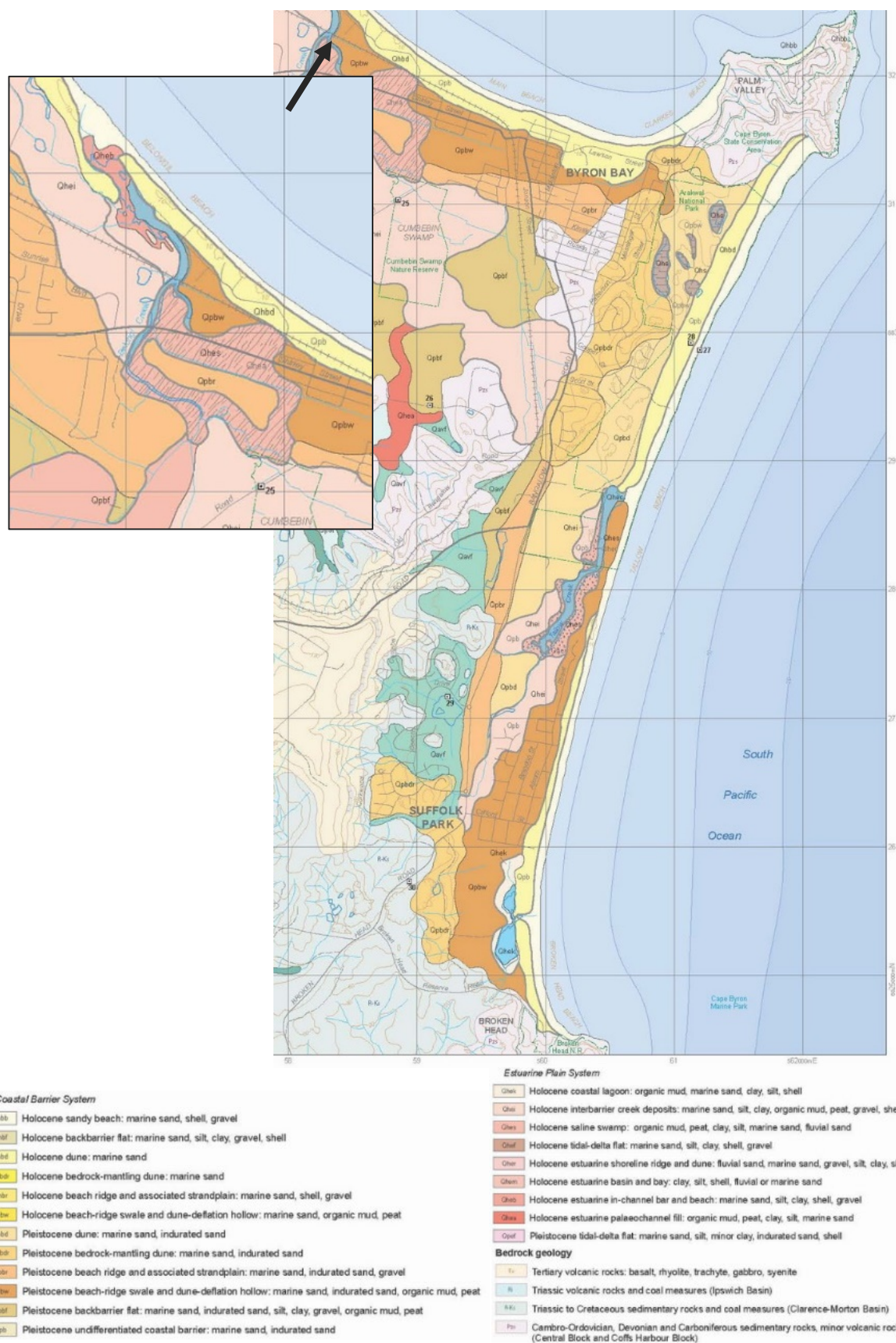


Figure E-5: Regional coastal quaternary geology map, 1:25 000 scale (Hashimoto and Troedson, 2008)

Appendix F

Review of Draft Coastal Zone
Management Plan (BSC, 2010)
and Belongil Estuary Study and
Management Plan (Parker and
Pont, 2001)

Table F-1: Review of Actions from the Draft Coastal Zone Management Plan for Byron Shire Coastline (BSC, 2010)

Note: “This CZMP was not certified and therefore there have been no actions to implement. However, Council has concurrently been taking interim management actions that it can lawfully do and fund while there is no coastal plan in place, some of which have been similar to actions in previous draft CZMPs, and the status of these actions is identified as “complete”, “in progress”, “on-going” or “partially complete” in the table below.

The status of completion of this outdated and uncertified CZMP has been identified to the best of Council’s staff knowledge during an internal review. There may be inaccuracies in the presented status of these actions.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Flora and fauna management	1.1.1	Investigate the need to erect signs (where there is currently no sign or to replace existing signs) at beach entrances, promoting the responsible use of public beaches. For example, no dogs, stay on designated paths, no fires, no removal of vegetation, remove rubbish and so on.	Byron Bay Suffolk Park	BSC	Ongoing. Recent signage installed at Tallow Creek RE dogs on leash/off leash beach areas.
Flora and fauna management	1.1.3	Implement priority dune management actions as per the BSC Vegetation Management Plans (for South Golden, New Brighton, Brunswick Heads, Belongil, Cavanbah, Main Beach, Suffolk Park, and Seven Mile Beach) and the Cape Byron Headlands Reserve Plan of Management, to increase dune volume, height and health by restoring vegetation (weed removal) and carrying out dune maintenance works. * this action also appears in Table 5-3 management action 3.2	Byron Bay (Cavanbah, Main Beach and Wategos Beach) Suffolk Park (Tallow Beach, northern Seven Mile Beach)	BSC with assistance from DECCW (for DECCW managed lands), CMA, Cape Byron Trust, Dunecare, Green Corps, etc.	Dune management is Ongoing with some actions complete (e.g. Bitou Bush under control). Council bush regenerators still use these plans (dated 2004) e.g. for species planting lists but not for priority restoration areas. Dunecare groups may follow the veg management plans for non-Council managed areas. Council bushcare regenerators don’t necessarily follow the plans now in terms of priority areas for regeneration but they are still used (e.g. for species lists).
Flora and fauna management	1.1.4	Comply with the Arakwal National Park Plan of Management values for park conservation.	Byron Bay (Arakwal National Park)	DECCW , and the Arakwal National Park Management Committee.	Unknown
Flora and fauna management	1.1.5	Conform to the: * Belongil Estuary Study and Management Plan for investigation and research about vegetation, ground truthing and fish stocks.	Byron Bay (Belongil Estuary)	BSC	Partially complete
Flora and fauna management	1.1.7	Liaise with NPWS to develop an appropriate strategy to protect the nesting area of little terns at Belongil Creek in accordance with the Belongil Seabird and Shorebird Management Plan [2007] and the relevant Priority Action Statements under the <i>Threatened Species Conservation Act</i> , 1979.	Byron Bay (Belongil Creek)	BSC with assistance from DECCW, Byron Bird Buddies.	Ongoing. Shorebird working group includes Byron Bird Buddies, Marine Parks, NPWS, BSC and Elements Resort convene prior to shorebird nesting season to monitor birds and implement actions.
Flora and fauna management	1.1.8	Implement the Byron Biodiversity Conservation Strategy actions.	Byron Bay Suffolk Park	BSC	Superseded by the 2020 Biodiversity Conservation Strategy: Ongoing.
Flora and fauna management	1.1.9	Implement the Belongil Estuary Seabird and Shorebird Management Plan.	Byron Bay	Byron Bird Buddies with assistance from BSC and DECCW.	Ongoing

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Flora and fauna management	1.1.10	Conform to Belongil Estuary Management Plan for management of the estuary.	Byron Bay (Belongil estuary)	BSC	Partially complete.
Flora and fauna management	1.1.11	Review and update BSC Vegetation Management Plans to reflect the recommendations of this CZMP for shire-wide dune management.	Byron Bay Suffolk Park	BSC	Not commenced. Review required within the same format of existing plans. Condition of areas may have improved (e.g. following implementation of 2004 controls) or worsened (e.g. due to coastal erosion). Recommended as a Stage 5 action.
Flora and fauna management	1.1.12	Develop guidelines for the management of vegetation in public coastal parks to replace dying trees as necessary.	Byron Bay Suffolk Park	BSC with assistance from LPMA	Not commenced. Replacement program required. Many trees in parks and market grounds have been removed when their natural senescence is reached (e.g. horsetailed sheoaks at Main Beach) but are not replaced.
Flora and fauna management	1.1.13	Develop a Shire-wide Shorebird and Seabird Management Plan to address management of birds with particular focus on Tallow Creek, Belongil and Brunswick Estuary mouths with reference to the Belongil Estuary Seabird and Shorebird Management Plan.	Byron Bay Suffolk Park	BSC with assistance from DECCW and Byron Bird Buddies.	Incomplete.
Flora and fauna management	1.1.14	Review the Byron DCP to ensure any lighting for the purposes of residential/commercial development and public facilities does not transmit onto the dunal system or beach of the adjacent coastline in order to minimise impacts to nesting marine turtles and emerging turtle hatchlings. Where lighting near the beach is unavoidable for safety or other reasons, minimise impacts where possible e.g. by using sodium vapour lighting and/or restricting lighting to the non- breeding period. * this action also appears in Table 5-6 management action 6.1.12	Byron Bay Suffolk Park	BSC with assistance from DECCW	Complete. 2014 DCP includes relevant provisions such as <i>"Development adjacent to beaches must prevent light arising from development spilling onto beaches to avoid potential impacts on shorebird and turtle behaviour (e.g. nesting)."</i>
Flora and fauna management	1.1.15	Undertake a study of the coastline to identify important ecological communities, flora and fauna habitats that are being/or may be impacted by climate change impacts including habitat squeeze and/or loss. The study is to identify those ecological communities that may be unable to adapt to climate change impacts due to human occupation of adjacent areas. Develop a management plan that identifies ecological habitats and communities that are priorities for protection, and the measures appropriate to protect them. Possible protection measures include buffering, restriction of public access, rezoning of adjacent lands (etc.) to allow for migration and adaptation of those communities and/or habitats.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Study RE climate change squeeze and/or loss: Incomplete. Recommended Stage 5 action (requires Stage 2 inundation mapping).
					The Biodiversity Conservation Strategy 2020-2030 contains actions for identification and protection of prioritised ecological habitats and communities with the proviso that relevant coastal elements of the strategy (e.g. relating to coastal wetlands, littoral rainforest) be incorporated into CMPs, to increase potential for funding support through the Coastal and Estuary Grants Program. In Progress. Relevant actions in the biodiversity strategy to be considered as Stage 5 actions where relevant to coastal and estuarine habitat. The Cape Byron Marine Park Operational Plan provides

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
		* this action also appears in Table 5-8 management action 8.5.3			management actions for the marine areas of the study area. Status: TBC
Flora and fauna management	1.1.16	Replace dog control signs immediately following coastal erosion events or as necessary to ensure permanent display of the regulations. * this action also appears in Table 5-3 management action 3.5	Byron Bay Suffolk Park	BSC, DECCW	Ongoing
Flora and fauna management	1.1.17	Investigate cancelling all beach driving permits throughout the Shire except for those provided for professional (commercial) fishers. * this action also appears in Table 5-7 management action 7.6.3	Byron Bay Suffolk Park (Tallow Beach and northern Seven Mile Beach)	BSC	Complete with some exceptions for commercial fishers, indigenous uses and disability access.
Flora and fauna management	1.1.18	Investigate prohibiting professional (commercial) fishers from using vehicles on beaches in or adjacent nature reserves during key wildlife usage periods. Investigate placing appropriate restrictions onto beach driving permits^. * this action also appears in Table 5-7 management action 7.6.4	Byron Bay (Tyagarah Nature Reserve) Suffolk Park (Tallow Beach and northern end of Seven Mile Beach)	BSC	Unknown - regulated through DPI Marine Parks.
Flora and fauna management	1.1.19	Promote self-regulated public avoidance of beaches adjacent to Nature Reserves during periods of key wildlife usage using media releases and community education initiatives^. * this action also appears in Table 5-7 management action 7.6.5	Byron Bay (Tyagarah Nature Reserve) Suffolk Park (Tallow Beach and Broken Head Nature Reserve beaches)	BSC, DECCW	Ongoing
Flora and fauna management	1.1.21	Install new dog control signs at the landward entrance of all beach access tracks where required * this action also appears in Table 5-3 management action 3.7	Byron Bay Suffolk Park	BSC	Complete
Flora and fauna management	1.1.22 **	Investigate open space and land with conservation value for potential as community land or greater conservation classification. (CP 1.1.5)	Byron Bay Suffolk Park	BSC	Superseded by the 2020 Biodiversity Conservation Strategy: Ongoing.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Flora and fauna management	1.1.23**	Council to contact and cooperate with NPWS and ORCA in the instance of whale/ dolphin stranding. (CP 1.2.4)	Byron Bay Suffolk Park	NPWS ORCA	Ongoing with collaboration with relevant authorities including DPI Marine Parks, NPWS and BSC.
Flora and fauna management	1.1.24**	Develop recovery and threat abatement plans for coastal threatened species in accordance with the <i>Threatened Species Conservation Act 1995</i> to provide protection to said species. (CP 1.2.6)	Byron Bay Suffolk Park	NPWS with assistance from BSC	Superseded by the <i>Biodiversity Conservation Act 2016</i> . Status: Ongoing , e.g. Save Our Species (SOS) program by NPWS.
Flora and fauna management	1.1.25**	In accordance with NSW Coastal Policy 1997 Strategic Action 1.2.7, processes threatening for coastal species will be identified and controlled where possible. (CP 1.2.7)	Byron Bay Suffolk Park	NPWS, Scientific Committee with assistance from BSC	
Flora and fauna management	1.1.26**	The need for recreational vehicle areas should be assessed in consideration of the potential to limit unauthorised motor vehicle access in environmentally sensitive areas. (CP 7.1.4)	Byron Bay Suffolk Park	EPA with assistance from BSC	Unknown . The purpose of this action is unclear. Refer to Action 1.1.17 RE the cancellation of beach driving permits.
Water quality	1.2.1	Conform to the: * Belongil Estuary Study and Management Plan [Parker and Pont, 2001] for recommendations on water quality monitoring and management.	Byron Bay (Belongil Estuary)	BSC	Partially complete : - stormwater, drainage and constructed wetlands superseded by BB Drainage Strategy. - water quality monitoring programs implemented in relation to STP compliance and entrance opening strategy.
Water quality	1.2.2**	In cooperation with EPA, establish and/or continue water quality monitoring programs and environmental studies as a background for identification of areas of unsatisfactory water quality. (CP 1.3.3)	Byron Bay Suffolk Park	DECCW, BSC	Ongoing . Council has implemented a regular surface water quality monitoring program in the Belongil and Tallow Creek catchments established since 2016. Results reported via Council's water and wastewater public data portal. Surface water quality monitoring program requires review of locations and parameters Shire wide. Format of results shown on the public data portal could be improved. Council has recently recommenced monitoring of faecal pollution (enterococci) at four locations in the Shire (including Tallow Beach and Main Beach). No water quality monitoring is currently undertaken by public authorities at Ti Tree Lake (private land). Significant volume of uncollated surface water quality data potentially available associated with individual projects e.g. STP upgrades (approx. 2004 - 2010).
Water quality	1.2.3**	Results of marine life and water quality monitoring to be published to ensure biodiversity and human health not threatened. (CP 1.3.5)	Byron Bay Suffolk Park	DECCW, NSW Fisheries	WQ: Ongoing , see above. Marine life monitoring - Unknown .

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Water quality	1.2.4**	Incorporate NSW Coastal Policy 1997 Strategic Action 1.3.7 to ensure highest possible water quality of coastal waters. (CP 1.3.7)	Byron Bay Suffolk Park	DECCW with assistance from BSC	Superseded by the <i>Marine Estate Management Act 2014</i> and Strategy including the background Threat and Risk Assessment which combined, inform this Scoping Study. Partially complete. Water quality and river flow objectives in the Belongil and Tallow Creek catchments still use those prepared for the Brunswick River catchment, i.e. default trigger values for aquatic ecosystems for slightly to moderately disturbed ecosystems in SE Australia. Specific local water quality objectives are required for the ICOLLS - recommended Stage 2 study.
Water quality	1.2.5**	Byron Shire urban stormwater management plans should aim to minimise discharge of contaminated stormwater to coastal waters as per the objectives of the NSW Coastal Policy 1997 Strategic Action 1.3.8. (CP 1.3.8)	Byron Bay Suffolk Park	DECCW, BSC	Superseded by the Byron Bay Drainage Strategy which has been absorbed into the Belongil Floodplain Risk Management Plan: In progress.
Water quality	1.2.6**	Council to ensure support is provided to NSW Waterways Authority and NSW Land and Property Management Authority for the appropriate management of vessel grey and black water in the Brunswick Estuary. Council to liaise with Waterways and LPMA to ensure regulation of vessel wastewater is being upheld in accordance with strategy 1.3.12 of CP. (CP 1.3.12)	Byron Bay Suffolk Park	Waterways Authority, DECCW, BSC	N/A. Not within study area.
Water quality	1.2.7**	State Groundwater Policy to be used to manage groundwater resources to ensure maintenance of linkages between groundwater, surface water and the coastal environment. (CP 1.3.14)	Byron Bay Suffolk Park	DECCW with support from BSC	Unknown. Requires further investigation.
Bush fire	1.3.1	Manage and maintain the Asset Protection Zones (APZ), strategic control zones, fire trails Category 1 Tallow Beach Road and Sewage Treatment Plant Road, identified in the Fire Management Strategy Arakwal National Park and Study Area, Fire Management Strategy for Cape Byron State Conservation Area, and the Cape Byron Headlands Reserve Plan of Management.	Byron Bay Suffolk Park	DECCW with assistance from BSC, and Cape Byron Trust.	Unknown - likely ongoing.
Bush fire	1.3.2	Implement the management strategies outlined in the Fire Management Strategy Arakwal National Park and Study Area.	Suffolk Park	DECCW with assistance from BSC.	Unknown - likely ongoing.
Bush fire	1.3.3	Observe management strategies identified in the Fire Management Strategy for Cape Byron State Conservation Area, Billinudgel Nature Reserve, Marshalls Creek Nature Reserve, Brunswick Heads Nature Reserve Fire Management Strategy, Cumbebin Swamp Nature Reserve Fire Management	Byron Bay Suffolk Park	DECCW with assistance from BSC, and Cape Byron Trust.	Unknown - likely ongoing.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
		Strategy and Tyagarah Nature Reserve Fire Management Strategy.			
Community involvement	1.4.1	Investigate the opportunity to develop and implement a community awareness program, with the main aim to encourage residents and local schools to increase volunteer participation in weed removal, restoration works and maintenance.	Byron Bay Suffolk Park	BSC	Partially complete through Brunswick Valley Landcare (BVL). Council provides support for 1 day per week for BVL officer.
Community involvement	1.4.2	Provide appropriate training in best environmental practices to those participating in any weed removal, restoration works and/or maintenance	Byron Bay Suffolk Park	BSC	Ongoing for Council staff. Partially complete for community involvement through information provided through Council's website and through BVL.
Community involvement	1.4.3	BSC liaising with Dunecare Groups should continue to apply for funding and assistance through grant schemes such as, EnviTE Work, EnviroTrust, CMA etc.	Byron Bay Suffolk Park	BSC, Dunecare Groups	Ongoing through BVL. Community groups supported (i.e. provision of information, letters of support) on an ad hoc basis.
Community involvement	1.4.4**	Involve the community, through programs such as Landcare and Coastcare, in implementing measures to protect and rehabilitate natural areas. (CP1.5.1)	Byron Bay Suffolk Park	DECCW, BSC	Ongoing through BVL. No local Coastcare operating in the Shire.
Community involvement	1.4.5**	Council and State Government Agencies to provide advice to community groups involved in local ecosystem protection and rehabilitation to facilitate best practice management. (CP 9.3.1)	Byron Bay Suffolk Park	BSC, NPWS, DECCW	Ongoing . Information provided through Council's website and through BVL.
Natural processes	2.1.2	Map the erosion escarpment in Suffolk Park as required. Survey to ground truth and map development proximity to mapped erosion escarpment.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Mapping: Partially complete . Mapping undertaken 2010. Ground trothing incomplete. Regular mapping of the erosion escarpment (e.g. post storm) likely to be included within EASP or as a Stage 5 action.
Natural processes	2.1.3	Investigate beach scraping to determine its: * viability now and over the medium to long- term to provide a sufficient dune height (to minimise risk of overtopping) and volume (to attempt to accommodate storm erosion) in light of climate change and associated sea level rise impacts, * viability over the medium to long-term to offset long-term coastal recession in light of climate change and associated sea level rise impacts, Investigate the potential for cost sharing to fund any beach scraping works	Suffolk Park	BSC	Complete : Beach scraping trial completed at New Brighton in 2010 (pilot), 2013 and 2017. Consider Beach Scraping as a management strategy for Suffolk Park as required.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Natural processes	2.1.4	Develop a program to review coastline hazard definition for the coastline and annually update relevant planning, development control and emergency management documents, following loss of the frontal dune to coastal erosion and/or in accordance with CSIRO and IPCC revisions of the following parameters: * measurements of Australian and global sea level change * projections of future global sea level change * projected local variations to global sea level change * changes to published extreme water levels for New South Wales and southern Queensland * changes to extreme wave height estimates for New South Wales and southern Queensland.	Byron Bay Suffolk Park	BSC with assistance from DECCW. Information provided by CSIRO and IPCC.	Partially complete. Coastal hazard mapping provided in BMT WBM (2013) Byron Shire Coastline Hazard Assessment Update. Coastal hazard assessment and mapping to be updated during Stage 2. RE Planning and development controls, urban coastal lands are a deferred matter in BLEP 2014 and the provisions of BLEP 1988 remain currently in force on relevantly affected land. A key outcome of the CMP will be to assist with resolving this issue in the context of the provisions of the Coastal SEPP. Council has prepared a Draft Byron Shire Coastline Emergency Action Sub Plan (EASP) which forms part of the Draft CZMP for the Byron Bay Embayment (BSC, 2016). The EASP was prepared under the now repealed Coastal Protection Act 1979. The EASP needs to be updated and finalised to: - reflect changes to coastal management legislation. - comprehensively cover all coastal areas of the Shire such that all beach accesses are documented and included in Council's monitoring program. - ensure fit for purpose.
Natural processes	2.1.7**	Council to stay informed of and incorporate updated studies relating to climate change and coastal areas. (CP 2.2.1)	Byron Bay Suffolk Park	BSC	Ongoing
Natural processes	2.1.8**	Incorporate updated sea level change scenarios into planning mechanisms. (CP 2.2.2)	Byron Bay Suffolk Park	BSC	Ongoing. Current Climate Change Strategic Planning Policy requires updating.
Natural processes	2.1.9**	Council should ensure integrated policy and management in accordance with <i>NSW Coastal Policy 1997</i> Strategic Action 9.3.2. (CP 9.3.2): "Councils should recognise the coastal zone as an environmentally sensitive area when preparing management plans under s402 of the Local Government Act. Details should be included in management plans of activities to be undertaken to protect the coastal zone environment, to promote ecological sustainability in the coastal zone and to implement the Coastal Policy."	Byron Bay Suffolk Park	BSC	Superseded by CM Act and SEPP addressed by this Scoping Study.
Structures	2.2.2	Make a risk analysis of erosion protection structures and works, both private and public in relation to public safety, the integrity of the structures and impacts to surrounding environment (including beach access,	Byron Bay Suffolk Park	BSC with assistance from LPMA	Risk analysis: Completed by Worley Parsons (2013) <i>Byron Bay Erosion Protection Structures – Risk Assessment</i> .

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
		beach amenity, environmental processes and threat to bird nesting species via increased erosion to the north of the Brunswick Heads wall). Develop a plan that describes how to remove structures and works and investigate ongoing maintenance of the public beach and access to the beach, which will be ranked according to the impacts and issues identified in the risk assessment in accordance with the objectives of Planned Retreat as described in this CZMP.			Develop plan for removal of structures: Incomplete . Now redundant as CZMP was not certified (planned retreat never enacted). Maintenance of the public beach and access to the beach: Ongoing on a reactive basis and not adequately funded.
Structures	2.2.4	Develop road realignment/ rebuild plan for high risk roads.	Byron Bay Suffolk Park	BSC	Unknown .
Emergency Actions Plan	2.3.1	Adopt the Emergency Actions Plan prepared as part of this CZMP (Refer Part B)	Byron Bay Suffolk Park	BSC, in consultation with the SES	Redundant . CZMP was never certified. Refer Action 2.1.4.
Emergency Actions Plan	2.3.2	Liaise with DECCW to determine any changes to the coastline and any new areas at risk, following storms	Byron Bay Suffolk Park	BSC	Ongoing .
Emergency Actions Plan	2.3.3	Review and update the EAP every five years and following all emergency events	Byron Bay Suffolk Park	BSC	Incomplete . The CZMP was never certified. The EASP is currently in draft form and is not fit for purpose. The EASP will be reviewed and updated as part of the CMP process for the Shire (refer Action 2.1.4).
Landscape and beach amenity	3.1	Ensure preservation of scenic and natural values as outlined in Plan of Management for Nature Reserves.	Byron Bay (Wategos Beach) Suffolk Park (Tallow Beach)	DECCW with BSC assistance	Ongoing .
Landscape and beach amenity	3.3	Rationalise the informal beach accesses. This will involve closing off the informal accesses and revegetating, and erecting signs outlining that it is a revegetation site. * this action also appears in Table 5-7 management Action 7.4.2	Byron Bay (Belongil Beach, Cavanbah dunes, Wategos Beach, Little Wategos Beach) Suffolk Park	BSC NPWS LPMA	Not commenced . Recommended to address through this CMP process.
Landscape and beach amenity	3.4	Ensure development complements surrounding environment and does not impact on landscape and beach amenity in accordance with the recommendations of this CZMP and the LEP and DCP.	Byron Bay (Wategos Beach) Suffolk Park (Tallow Beach)	BSC	Partially complete through LEP and DCP and CM SEPP. Recommended Stage 2 study to look into adequacy of planning controls.
Landscape and beach amenity	3.6	Regularly remove dumped materials from coastal crown lands and nature reserves^	Byron Bay Suffolk Park	BSC, DECCW, LPMA	Ongoing through occasional Council clean-ups on Council managed areas. Unknown for other agencies.
Indigenous cultural heritage	4.1.1	Conform to Arakwal National Park Plan of Management values for cultural and visitor use of parks.	Suffolk Park (ANP)	BSC, AAC, DECCW, Aboriginal Consultative Committee	Ongoing .

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Indigenous cultural heritage	4.1.2	Comply with the Arakwal National Park Plan of Management roles and responsibilities for working together (ILUA). * this action also appears in Table 5-9 management Action 9.4.1	Suffolk Park (ANP)	BSC, AAC, DECCW, Aboriginal Consultative Committee	Partially complete through the Arakwal MOU.
Non-Indigenous cultural heritage	4.2.1	Abide by the Byron Shire Council Cultural Plan 2008–2013 and implement the appropriate actions.	Byron Bay Suffolk Park	BSC	Approximately 55% of original actions complete and many actions incorporated into other Council plans (e.g. Tourism plans). Superseded by Arts and Culture Policy 2020: Ongoing .
Non-Indigenous cultural heritage	4.2.2	Consider recommendations of the Byron Shire Community-Based Heritage Study	Byron Bay Suffolk Park	BSC	Unknown
Conservation	5.1.1	Investigate the opportunities to prepare and undertake an education campaign to educate people on destructive dune behaviour. For example, walking in the dune systems, camping on the dunes and so forth.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Ongoing through media releases, signage and supporting BVL.
Sustainable use of resources	5.2.3**	Use of land resource mapping should be used to assist in the assessment of suitability of proposed land uses. (CP 5.1.1)	Byron Bay Suffolk Park	DLWC, NSW Agriculture with assistance from BSC	Ongoing e.g. through HEV mapping.
Sustainable use of resources	5.2.4**	The Goals, strategies and activities of Councils management plans are to ensure protection of environmentally sensitive coastal areas and to promote ecological sustainable use of Councils coastal area. (CP 5.2.2)	Byron Bay Suffolk Park	BSC	Ongoing - incorporated as community strategic plan goals in the CSP.
Commercial activities	5.3.1	Commercial activities on Crown Reserves are to be assessed under consideration of the CZMP, specifically the CZMP's nine management goals, to ensure that the activity, or proposed activity, accords with the goals and objectives of the CZMP. * this action also appears in Table 5-7 management Action 7.3.2	Byron Bay Suffolk Park	BSC	Partially complete - Commercial activities on Crown Lands Policy developed. Requires review at completion of CMP.
Commercial activities	5.3.2**	Local tourism operators and tourism operators that undertake business within the Byron Shire should be informed of the "Guidelines for Tourism Development Adjacent to Natural Areas". (CP 5.1.11)	Byron Bay Suffolk Park	BSC	Superseded by the provisions of the CM SEPP. Factsheet or similar is not provided but DA's assessed in accordance with the relevant legislation including CM SEPP and referred to relevant authorities, e.g. DPI.
Development control	6.1.1	Incorporate more stringent development control provisions into Byron LEP to ensure more legislative support for planned retreat. Review the LEP in accordance with the principles and goals of this CZMP. When reviewed, the Byron LEP is to have regard to the Affordable Housing and the Strategic Actions in the NSW Coastal Policy 1997.	Byron Bay Suffolk Park	BSC	Planned retreat: Not commenced . CZMP was not certified.
					Affordable housing strategy: In progress .

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Development control	6.1.2	<p>Incorporate more stringent development control provisions into the Byron DCP to ensure appropriate development control in support of planned retreat. The DCP is to be reviewed in accordance with the principles and goals of this CZMP to provide prescriptive measures for development on coastal lands to ensure the appropriate aesthetic design of small, modular, relocatable dwellings permitted in Planning Precinct 1, and to encourage development in Planning Precinct 2 to be built in a relocatable design. The DCP is to incorporate uniform standards for demountability for development on coastal hazard lands (Planning Precincts 1 & 2).</p> <p>High density, affordable housing is not encouraged in Planning Precinct 1 or 2 and should focus outside of the Coastal Planning Precincts. However, low density, relocatable housing should be investigated for public lands where appropriate. DCP review is to incorporate this requirement in accordance with Goal 6 of the NSW Coastal Policy 1997 and goals of the CZMP.</p>	Byron Bay Suffolk Park	BSC	Planned retreat: Not commenced . CZMP was not certified. Pilot study for E4 Environmental Living Zone being trialled at Elements Resort.
					DCP review: Complete . Action largely already incorporated into 2010 DCP at time of CZMP preparation, and equivalent provisions of 2014 DCP (E5).
Development control	6.1.3	Develop DCP for Coastal Precinct planning guidelines for Precinct 1 and 2 including provisions for renovations	Byron Bay Suffolk Park	BSC	Complete : Action largely already incorporated into 2010 DCP at time of CZMP preparation, and equivalent provisions of 2014 DCP (E5).
Development control	6.1.4	Any new developments must comply with the LEP and DCPs and be made aware of the planned retreat policy enforced (or to be enforced). The LEP and DCPs will provide prescriptive measures for development. The DCP is to incorporate a uniform 20 m trigger for relocatable development in Planning Precinct 1 and Planning Precinct 2 and a 50 m trigger for non-relocatable development in Planning Precinct 2. The standards are to ensure that the scale, bulk and density of dwellings is such that re-location of the dwelling, in the event of lapsing development consent conditions, is achievable as certified by a structural engineer.	Byron Bay Suffolk Park	BSC	Complete : Action largely already incorporated into 2010 DCP at time of CZMP preparation, and equivalent provisions of 2014 DCP (E5).
Development control	6.1.5	The Byron DCP to incorporate uniform standards for demountability for development on coastal hazard lands (PP1 and PP2). The standards are to ensure the scale, bulk and density of dwellings is to be such that relocation of the dwellings, in the event of lapsing development consent conditions, is achievable as certified by a structural engineer.	Byron Bay Suffolk Park	BSC	Complete : Action largely already incorporated into 2010 DCP at time of CZMP preparation, and equivalent provisions of 2014 DCP (E5).

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Development control	6.1.6	Develop a policy to determine the issues, including triggers, relating to the enforcement of planned retreat in the absence of consenting retreat action by the owner.	Byron Bay Suffolk Park	BSC	Incomplete. CZMP was never certified.
Development control	6.1.7	That Council adopt a compliance policy for the annual inspection of Coastal development within the coastal planning precincts. This program should investigate compliance with the relocatability conditions of the relevant development consent.	Byron Bay Suffolk Park	BSC	Incomplete.
Development control	6.1.9	Comply with the Tallow Creek Floodplain Risk Management Plan for appropriate restrictions on future development, and proposed structural upgrades.	Suffolk Park	BSC	Amendments to planning controls: Complete.
					Structural upgrades: Not commenced.
Development control	6.1.10	Finalise the Floodplain Risk Management Plan for Belongil Creek	Byron Bay	BSC	Complete. FRMP developed in 2015: Partially complete.
Development control	6.1.11	Audit property in Hazard Area 1 to find out the development history.	Byron Bay Suffolk Park	BSC	Partially Complete. Byron Bay: Complete Suffolk Park: Not commenced.
Development control	6.1.13**	Byron LEP to include provisions giving effect to the objectives and management provisions of marine park legislation. (CP 1.1.10)	Byron Bay Suffolk Park	BSC	Unknown
Development control	6.1.14**	Incorporate conditions of NSW Coastal Policy 1997 Strategic Action 1.4.7 into the Byron LEP and Byron DCP. (CP 1.4.7)	Byron Bay Suffolk Park	BSC	Superseded by CM Act and CM SEPP.
Development control	6.1.15**	Principles of Appendix C Table 3 of the NSW Coastal Policy to be incorporated in the Byron LEP and Byron DCP, as well as used in the development application assessment process. (CP 3.2.4)	Byron Bay Suffolk Park	BSC	Superseded by CM Act and CM SEPP.
Development control	6.1.16**	Where new tourist development is permissible and adjacent to foreshore areas, the Byron LEP 1988 or Byron DCP 2002 when next reviewed should include a requirement for the provision of public access to the foreshore. (CP7.1.5)	Byron Bay Suffolk Park	BSC	Unknown. Current stance is that foreshore access should be rationalised and formalised and maintenance of access ways is already inadequately funded.
Development control	6.1.17**	Council to cooperate with DoP and Surf Life Saving NSW Inc to ensure a coastal safety assessment for any new coastal developments, in accordance with NSW Coastal Policy 1997 Strategic Action 7.2.3. (CP 7.2.3)	Byron Bay Suffolk Park	BSC	NA
Voluntary Purchase Scheme (VPS)	6.2.1	Develop criteria to assess eligibility of properties for VPS and for determining priority properties.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Not commenced. CMP never certified.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Voluntary Purchase Scheme (VPS)	6.2.2	Develop criteria for assessing the value of lands considered eligible for voluntary purchase.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Not commenced. Would be partially looked into under the CMP process.
Unused road closures	7.1.1	Implement the closure of unused road reserves on beaches.	Byron Bay Suffolk Park	Department of Planning with assistance from BSC	Not commenced
Car parking	7.2.1	Investigate the need to improve car parking in areas where the beach is un-patrolled and within the 50 year erosion hazard line.	Byron Bay (Wategos Beach, Main Beach, Belongil Beach) Suffolk Park	BSC	Ongoing
Public facilities	7.3.4**	Public amenities review should be undertaken for coastal areas and estuary foreshores within the Byron Shire in accordance with NSW Coastal Policy 1997 Strategic Action 7.1.2. (CP 7.1.2): <i>"Public facilities will be provided at appropriate locations and with appropriate safety standards to facilitate fair and equitable access to and enjoyment of the recreational amenity of the coast and estuary foreshores".</i>	Byron Bay Suffolk Park	BSC	Partially complete. Refer Byron Shire Open Space and Recreation Needs Assessment and Action Plan 2017-2036 (ROSS Planning, 2018) (TRIM ref E2018/110511).
Access	7.4.1	Develop a plan to identify and if necessary acquire the lands that are required to ensure public access to the beach is preserved. * this action also appears in Table 5-8 Management Action 8.2.1	Byron Bay Suffolk Park	BSC and LPMA	Not commenced
Access	7.4.5	Formal beach access is to be maintained in a safe condition, suitable for public use: * Clean-up and re-instate beach access tracks following damage from coastal erosion. * Beach scrape sand around beach access points to maintain low grade (slope) accesses.	All shire beaches	BSC	Ongoing on a reactive basis and inadequately funded. No disabled access in the Shire available.
Access	7.4.6	Cooperate with the Cape Byron Trust to assess access roads to determine joint management issues and responses associated with the maintenance of vegetation integrity, water quality, visitor safety and general provision of access.	Byron Bay	BSC with assistance from Cape Byron Trust	Ongoing , e.g. through improvements to parking and public walkways at Wategos.
Access	7.4.7	Investigate use of Section 94 Open Space contributions to fund beach access improvements due to increase usage associated with population growth.	Byron Bay Suffolk Park	BSC	Unknown.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Access	7.4.8**	Council to assess and upgrade where necessary relevant safety warning signs to ensure safe use of the coast in conjunction with relevant state government departments. (CP 7.2.6)	Byron Bay Suffolk Park	BSC, NPWS, DECCW	Coastal Public Safety Risk Assessment for the Byron Shire LGA 2018 (CM9: E2021/56553 and E2021/56432) undertaken in conjunction with Surf Life Saving NSW and Coastcare Australia. Includes summary of existing signage on Council and NPWS managed areas and recommends controls for proposed signage aligning with Australian standards and best practice guidance for risk management, as well as recommending improvements (e.g. consolidation/removal/consistency) as funding becomes available. In progress - requires funding, potentially through Stage 5 action.
Dog exercise areas	7.5.2	Investigate opportunities to increase patrols by Council and NPWS Rangers of the beaches and coastal open spaces.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Ongoing
Dog exercise areas	7.5.3	Follow the Cape Byron Marine Park Zone requirements with respect to dog and horse access.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Ongoing
Recreation	7.6.1	With respect to water- based recreational activities, ensure the requirements of the Cape Byron Marine Park Zone are complied with.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Unknown. Regulated through DPI Marine Parks TfNSW. Council regulates commercial activities (e.g. surf schools and kayak tours) on Council managed Crown land.
Recreation	7.6.2	Cooperate with the Cape Byron Trust in regards to coordinated recreation management within the Coastal area.	Byron Bay Suffolk Park	BSC with assistance from Cape Byron Trust.	Unknown. Superseded by this CMP.
Recreation	7.6.6**	Council to ensure beach signs and flags comply with Standards Association of Australia and any specific legislation. (CP 7.2.5)	Byron Bay Suffolk Park	BSC, DECCW, NPWS	In progress - Refer 7.4.8.
Communications Plan	8.1.1	Prepare a communication strategy including use of Council's website / media releases, that will inform the community about the potential risk from and emergency response to damaging coastal storms including impacts of flood and coastal erosion.	Byron Bay Suffolk Park	BSC with assistance from SES	Partially complete through Emergency Dashboard. Communications undertaken on an ad hoc basis as required. Recommended as a Stage 5 action.
Communications Plan	8.1.2	Formally advise beach front landholders of the design storm bite distance which may impact their local coastline as projected in the Byron Shire Coastline Hazard Definition Study (WBM 2000) or any more recent hazard assessment as completed.	Byron Bay Suffolk Park	BSC	Not commenced. CZMP was never certified. Property planning certificates capture whether properties are affected by coastal hazards.
Education	8.3.1	Abide by the values outlined in the Arakwal Plan of Management about interpretation, information and research	Suffolk Park (Arakwal National Park)	BSC, AAC, NPWS, Aboriginal Consultative Committee	Ongoing
Education	8.3.3	Ensure information on the Cape Byron Marine Park is included as part of education for water-based recreational activities and general boating.	Byron Bay Suffolk Park	BSC, DECCW	Council regulates commercial activities (e.g. surf schools and kayak tours) on Council managed Crown land. Licensing for relevant recreational activities and boating and education is provided through TfNSW and DPI Marine Parks: Ongoing.

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Education	8.3.4**	Byron Shire Council should include details of coastal environment programs in their annual reports in accordance with NSW Coastal Policy 1997 Strategic Action 8.3.4. (CP 8.3.4)	Byron Bay Suffolk Park	BSC	Ongoing through the IP&R Framework reporting.
Education	8.3.5**	Encourage ongoing development of those involved in coastal management in the Byron Shire by sharing of information on progressions in coastal management including conferences, seminars, etc. (CP 8.4.2)	Byron Bay Suffolk Park	BSC	Ongoing through delivery of Operational Plan (Actions 3.2.2.1 and 3.2.2.2) and sharing of information through comms team and a variety of engagement strategies.
Monitoring	8.4.2	Develop a monitoring program to monitor vegetation restoration works.	Byron Bay (Wategos Beach) Suffolk Park (Tallow Beach)	BSC	Not commenced. Council monitors through recording amount of herbicide use and staff time on ground. Low priority (potentially only when required for grant funded projects).
Research and review	8.5.1	Review and monitor the movement of the erosion escarpment and predictions for climate change impacts and long-term shoreline recession to ensure BSC's planning lines fully accommodate those projections. Give due consideration to risk management, environmental management, and the maintenance of beach access and amenity.	Byron Bay Suffolk Park	BSC with assistance from LPMA	In progress. Shire wide mapping of erosion escarpment is regularly reviewed and updated and is recommended as a Stage 5 action.
Research and review	8.5.2	Develop a monitoring program that allows regular monitoring of the erosion escarpment position relevant to its proximity to beach front development.	Byron Bay Suffolk Park	BSC with assistance from DECCW	Not commenced. Refer to above action.
Research and review	8.5.4**	Identify and address, where appropriate, gaps in coastal information. (CP 8.1.3)	Byron Bay Suffolk Park	Coastal Council	Complete through this CMP process and ongoing.
MOU with other land managers	9.1.1	Develop a MOU on Coastal Management with Arakwal Aboriginal Corporation, Land and Property Management Authority, Marine Parks Authority and Cape Byron Headland Trust.	Byron Bay Suffolk Park	BSC	Partially complete In July 2013, The Arakwal MOU created in 2012 between BSC and BOBBAC (Arakwal) to recognise the latter as traditional owners within Byron Shire and to recognise their importance as a stakeholder group with respect to matters that may affect the Arakwal community (BSC, 2016). This MoU does not include LPMA, MPA or Cape Byron Headland Trust. MOU Implementation Plan - Ongoing
Infrastructure and Utility Services Retreat Policy	9.2.1	Develop a policy in conjunction with other utility providers for a 100-year plan that includes the maintenance, management and retreat of existing infrastructure.	Byron Bay Suffolk Park	BSC with assistance from Infrastructure and utility service providers	Not commenced. CZMP was never certified.
Other	9.5.1**	Provide opportunity for input from catchment management committees and trusts in coastal environments protection and restoration. (CP 1.5.2)	Byron Bay Suffolk Park	BSC	Ongoing Relevant advisory committees and panels include: Coastal Estuary Catchment Panel; Floodplain Risk Management Advisory Committee; Biodiversity Advisory Committee; Water, Waste Sewer Advisory Committee

Category	Action #	Management actions	Management area	Responsibility	Status of Completion
Other	9.5.2**	Appropriate reporting mechanisms on implementation of coastal data/ information in coastal planning and management will be determined based on the Comprehensive Coastal Assessment (DoP) and NSW Coastal Policy 1997 in lieu of the Coastal Council requirements. (CP 8.1.2)	Byron Bay Suffolk Park	BSC	Superseded by NSW Coastal Management Framework

Table F-2: Review of Actions from the Belongil Estuary Study and Management Plan (Parker and Pont, 2001)

Action	Strategy	Category	Priority	Actions	Status	Comments
1	Water quality: diffuse and point sources including urban stormwater	Water Quality	High	Reduction of contaminant loads at their source: education, management and regulation	Incomplete	Some aspects incorporated into the <i>Byron Bay Drainage Strategy</i> (BBDS) (SMEC, 2010) which is absorbed into the Belongil Creek Floodplain Risk Management Plan (BCFRMP) (BMT WBM, 2015).
2		Water Quality	High	Complete Butler Street wetland in accordance with best practice and community expectations.	Not commenced	Superseded by BBDS and BCFRMP: design and conceptual planning in progress.
3		Water Quality	High	Evaluate other sites for potential pollutant controls and stormwater treatment systems including wetland systems, e.g. the industrial drains.	Partially complete	-
4		Water Quality	High	Adoption and funding of SMP recommendations		Superseded by BBDS and BCFRMP: design and conceptual planning in progress.
5		Planning	High	Encourage and implement source controls in New Developments	Ongoing	SMP, DCP. New developments are subject to s/water controls as per DCP
6		Water Quality	High	Develop surface water quality monitoring program and install a permanent data logger	Complete/ Ongoing	SWQ monitoring recommenced in 2016. Permanent data logger installed.
7		Water Quality	High	Continue to maintain Butler Street GPT	NA	Removed as part of the Byron Bypass project. Stormwater treatments in design as part of the BBDS.
8		Water Quality	High	Enforce litter and pet dropping regulations	Ongoing	Signs, rangers
9		Water Quality	Medium	Investigate potential for contamination from Butler Street landfill pursuant to the requirements of Section 60 of the <i>Contaminated Land Management Act 1997</i> .	In Progress	Council is currently working with the EPA to assess the presence and extent of potential groundwater contamination from the former Butler Street landfill from per-and-poly fluoroalkyl (PFAS) substances.
10		Education	Medium	Maintain community consultation (media / field days) to educate community on stormwater pollution	Unknown	-
11		Hydrology	Medium	Investigate the possibility of drain management works with landholders	Ongoing	Drain maintenance recently undertaken in upper catchment.
12		Education	Low	Continue joint Council community funding applications	Ongoing	Council have a small budget
13		Water Quality	Low	Conduct drainage upgrades to implement strategies in this plan	Not commenced	Superseded by BBDS, SMP (2010). Funding and implementation required

Action	Strategy	Category	Priority	Actions	Status	Comments
14	Acid sulfate soils and drainage issues in the catchment	Water Quality	Low	Investigate flood detention and infiltration opportunities	Complete	Byron Bay Drainage Strategy (SMEC, 2010), SMP (2010). Funding and implementation required
15		Water Quality	Low	Undertake experimental drain re-shaping	Unknown	Preliminary discussions with Landowners and Drainage Union. Aim to improve flow and reduce pollutants
16		Planning	High	Support formation of an ASS working group	Not commenced	-
17		Planning	High	Prepare and implement ASS priority area management plan	Not commenced	-
18		Planning	High	Finalise and implement ASS LEP	Complete	2014 Maps LEP / GIS layers
19		Planning	High	Delineate buffer zones to Belongil Estuary which incorporates the LEP amendment	NA	Superseded by model ASS clause incorporated into 2010 LEP
20			High	Incorporate results of the PPK drilling program into the BESMP	Unknown	
21		Hydrology	Medium	Support the West Byron Wastewater Management Project (for management of ASS in upper catchment)	Complete	ASS runoff in surface waters have reduced in incidence since the regeneration and effluent irrigation of the 24ha irrigation area
22		Hydrology	Low	Increase scope of water table trials	In progress	Council installed addition data loggers with quarterly reports from Australian Wetland Consultants (AWA). Council proposed to construct an additional flow path from WBSTP to the Belongil estuary
23		Environmental	Low	Lodge funding application for ASS monitoring	NA	Monitoring of surface water pH occurs approximately monthly as part of the STP surface water monitoring program. Sites are included in the upper catchment (e.g. Morans Drain, Upper Union Drain and the effluent drain from the STP).
24		Planning	Low	Input into Sunny-brand Chicken Co and Byron Bypass EIS	Complete	Council provided input into the EIS process for the Highway - compensatory habitat
25		Hydrology	High	Support West Byron Wastewater Steering Committee goal of maximum reuse	Ongoing	Recycled Water is of a quality for Dual Reticulation. In 2016, BSC was known to operate one of the largest recycled water schemes in NSW (DPI Water 2016). BSC is currently investigating additional opportunities for reuse
26		Hydrology	High	Support Belongil Rehabilitation project using West Byron wastewater	Complete	-
27		Water Quality	Unrated	Continue using Typha or natural wetlands to reduce nutrients	Ongoing	Council continues to manage wetlands to reduce nutrients. BSC are required to monitor total phosphorous fortnightly at the discharge point from the BBIWMR wetlands to the Belongil Creek (EPA 4). The sampling results indicate that TP in effluent discharged is consistently under the EPL 90th percentile concentration limit of 0.3 mg/L with an average of 0.07 mg/L (Oct 2013 – Oct 2015; and Aug 2016 – Feb 2021), among the lowest of all surface water sites monitored in the catchment. The constructed wetlands reduce phosphorous of wastewater by 26% (WWMS, Draft 2015)
28		Environmental	Unrated	Investigate the leasing or acquiring land for tree planting	Complete	24 Ha Melaleuca regeneration site established as part of the Byron Bay Integrated Water Management Reserve (BBIWMR) and the Byron Bay Urban Recycled Water Scheme (BBURWS)

Action	Strategy	Category	Priority	Actions	Status	Comments
29	Entrance management and flooding of Byron township	Hydrology	High	The estuary mouth is to be kept open continuously at the interim benchmark level of 1m in conjunction with monitoring water quality parameters.	NA	Operates as an intermittent closed and open lake or lagoon (ICOLL) system. Licenced to open creek entrance when 1.1m at Ewingsdale Bridge. Licence valid until 2022. Council operate the estuary in accordance with the <i>Belongil Creek Entrance Opening Strategy</i> (EOS) (Alluvium, 2019b). The EOS specifies ongoing and event based water quality monitoring requirements. Council reports on a six monthly basis.
30		Hydrology	High	Conduct further investigation into upper catchment remediation works (e.g. trial drop-boards) in conjunction with an estuary opening strategy.	Partially complete	EOS adopted in 2020. EOS (Alluvium, 2019b) included preliminary consideration into the creation of weirs to decouple the catchment from the estuary. The EOS identified considerable uncertainties from this option which would require further investigation into the appropriate locations and type of water control structures required.
31		Planning	High	Continue to liaise with DLWC regarding a Part 5 application for estuary opening.	Complete	<i>Belongil Creek Entrance Opening Strategy - Review of Environmental Factors</i> (Integrated Ecosystem Research & Management, 2005)
32		Hydrology	High	Monitor the protocol for entrance opening including: water quality, width of estuary and time and date of opening	Ongoing	Council undertakes monitoring 1 day before opening and 6 days after opening as well as monthly monitoring of a suite of phys-chem parameters and continual water level monitoring. Monitoring since 2002. Council reports on a six monthly basis.
33	Riparian zone management, erosion and sedimentation		High	Adopt actions which support water quality and acid sulfate soil management, particularly as they relate to sediment control	As above (Action 1 – 28)	-
34		Planning	High	Define suitable foreshore reserves and riparian buffers to maintain bank stability, wildlife habitat, fauna corridors, pollutant filtering and visual amenity	Incomplete	-
35		Planning	High	Introduce appropriate zoning for riparian zone protection (LEP amendment or clause)	Superseded	Attempted in draft LEP 2012. Overridden by NSW State Government Ezone review recommendations report (2015). Council to comply with those recommendations: Native veg – E2 Environmental Conservation. Any other/non-native veg = E3 or riparian overlay. Biodiversity DCP. State guidelines for riparian buffers.
36		Education	High	Encourage weed control (including Bitou Bush), revegetation and rehabilitation of riparian zone by community groups and Council where required	Ongoing	Primarily through Brunswick Valley Landcare (BVL) on private property though funding and resources is limited. There is limited Council managed land in the riparian zone within the study area. Requires additional funding and resources for implementation.
37	Recreation and visual amenity		High	Adopt Actions 33 - 36	As above (Actions 33 - 36)	-
38		Education	High	Encourage community appreciation of the estuary (e.g. education programs / user-friendly signage)	Incomplete	
39	Wetland management and revegetation, habitat and species conservation		High	Adopt actions in this plan which support fishery and shorebird habitat	As above	
40		Planning	High	Identify and protect significant estuarine and aquatic habitats such as saltmarsh, mangroves, seagrass beds, beach-nesting sites, intertidal	Ongoing	Wetlands protected under CM SEPP. Seagrass, marine habitat and some wetlands protected through Cape Byron Marine Park zoning, FM Act and MEMA Act.

Action	Strategy	Category	Priority	Actions	Status	Comments
				areas, roost sites and islands by rezoning, dedication, reservation, or through DCP.		The majority of beach-nesting and roost sites are under NPWS tenure and managed in accordance with PoM's and the Biodiversity Conservation Act. Also refer Belongil Estuary Seabird and Shorebird Management Plan (BBB, 2007).
				Support the Byron Bay, Suffolk Park, Ewingsdale Settlement Strategy riparian buffer	Incomplete	Council attempted preparation of an LEP those areas but was overridden by NSW State Government.
41		Environmental	High	Enforce dog exclusion zones at mouth of estuary	Ongoing	Signs, rangers.
42		Environmental	Unrated	Investigate rehabilitation and revegetation opportunities	Ongoing	Aligns with Biodiversity Conservation Strategy action to map priority restoration investment for HEV vegetation.
43		Environmental	Unrated	Encourage NPWS to undertake fox eradication programs	Ongoing	Fox baiting around WBSTP, wetlands and 24ha. WetlandCare Australia's Coastal20 Wetlands Project has undertaken strategic fox control over 11.3 ha
44	Cultural heritage	Cultural	High	Support the implementation of the Arakwal Agreement	Ongoing	MOU between BSC and BOBBAC (Arakwal) signed in 2013. MOU Implementation Plan: Ongoing.
45		Cultural	High	Consult with Aboriginal Land Council and Consultative Committee if issues arise	Ongoing	
46	Flooding	Planning	Medium	Prepare and implement a Belongil Floodplain Management Plan and Study	Complete	Belongil Creek Floodplain Risk Management Plan and Study (2015). Plan in progress.

Appendix G

First Pass Risk Assessment Methodology and Outcomes

G1 First Pass Risk Assessment

G1.1 Methodology

The first pass risk assessment in Stage 1 is a qualitative risk assessment using available information to help inform the scope of the CMP. It is a relatively straightforward way to prioritise the threats to the coastal environment and risks from coastal hazards. The goal is to identify what values and assets might be at risk and then establish whether the risk is large enough to warrant a more detailed assessment / further assessed in subsequent stages of the CMP (OEH, 2018c).

The risk assessment specifically assessed the vulnerability (including sensitivity and tolerance) of environmental, economic and social/cultural values to coastal risks as well as benefits and opportunities.

Risk is a function of the likelihood of a hazard or threat occurring and the consequences of the hazard or threat, with the consequences combining the concepts of magnitude, sensitivity and duration (OEH, 2018c).

The Coastal Management Manual (OEH, 2018c) indicates the assessment process should be systematic and demonstrate that both likelihood and consequence have been considered, which involves applying qualitative scales of likelihood and consequence.

G1.1.1 Consequence and Likelihood Scales and Risk Matrix

In order to undertake the first pass risk assessment the consequence and likelihood scales recommended in the Coastal Management Manual were used, sourced from *Australian Greenhouse Office Climate Change Impacts and Risk Management* (AGO, 2006). The risk matrix recommended in the *Coastal Management Manual* was also used (note this differs from that presented in AGO (2006), which is indicated as the source). The consequence and likelihood scales used are shown in **Table G-1** and **Table G-2** and the risk matrix used is shown in **Table G-3**.

Notably one change was made to the AGO (2006) Consequence Scale table as an outcome of the Agency Workshop held in February 2021. This was to include cultural heritage in the success criteria by rewording 'Environment and sustainability' to 'Environment, sustainability and cultural heritage' and including cultural heritage in each rating description to ensure impacts to cultural heritage were adequately considered in the risk assessment process.

To determine a consequence rating, each threat was rated against each consequence success criteria in **Table G-1** and conservatively, the highest rating i.e. the worst consequence that might occur as an impact of the threat, determined the overall consequence rating for that threat.

Table G-1: Consequence Scale (Adapted from: AGO, 2006)

Rating	Success criteria				
	Public safety	Local economy and growth	Community and lifestyle	Environment, sustainability and cultural heritage	Public administration
Catastrophic	Large numbers of serious injuries or loss of lives	Regional decline leading to widespread business failure, loss of employment and hardship	The region would be seen as very unattractive, moribund and unable to support its community	Major widespread loss of environmental amenity and/or cultural heritage and progressive irrecoverable environmental and/or cultural heritage damage	Public administration would fall into decay and cease to be effective
Major	Isolated instances of serious injuries or loss of lives	Regional stagnation such that businesses are unable to thrive and employment does not keep pace with population growth	Severe and widespread decline in services and quality of life within the community	Severe loss of environmental amenity and/or cultural heritage and a danger of continuing environmental and/or cultural heritage damage	Public administration would struggle to remain effective and would be seen to be in danger of failing completely
Moderate	Small numbers of injuries	Significant general reduction in economic performance relative to current forecasts	General appreciable decline in services	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Public administration would be under severe pressure on several fronts
Minor	Serious near misses or minor injuries	Individually significant but isolated areas of reduction in economic performance relative to current forecasts	Isolated but noticeable examples of decline in services	Minor instances of environmental and/or cultural heritage damage that could be reversed	Isolated instances of public administration being under severe pressure
Insignificant	Appearance of a threat but no actual harm	Minor shortfall relative to current forecasts	There would be minor areas in which the region was unable to maintain its current services	No environmental or cultural heritage damage	There would be minor instances of public administration being under more than usual stress but it could be managed

Table G-2: Likelihood Scale (Adapted from AGO, 2006)

Rating	Recurrent risks	Single events
Almost certain	Could occur several times per year	More likely than not - Probability greater than 50%
Likely	May arise about once per year	As likely as not - 50/50 chance
Possible	May arise once in ten years	Less likely than not but still appreciable - Probability less than 50% but still quite high
Unlikely	May arise once in ten years to 25 years	Unlikely but not negligible - Probability low but noticeably greater than zero
Rare	Unlikely during a 25 year period	Negligible - Probability very small, close to zero

Table G-3: Risk Matrix (Source: OEH, 2018c)

	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	High	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

G1.1.2 Confidence Scales

In addition, a confidence level was assigned to each threat assessment based on the *National Emergency Risk Assessment Guidelines* (AIDR, 2020) to provide an indication of the robustness of the risk assessment approach before using its outputs to determine possible action. The confidence level is used to identify and communicate uncertainty (e.g. lack of data informing the assessment). Assessing confidence also addresses decision makers' concerns for whether there is a need for more detailed risk assessment (AIDR, 2020).

Note that the detailed risk assessment in Stage 2 of the CMP process will incorporate the findings of the detailed studies/investigations recommended in Stage 1. The confidence scales are shown in **Table G-4**.

To determine a confidence level for the risk rating, a separate assessment was made for supporting evidence, expertise and participant agreement. Each assessment was then rated using the criteria in **Table G-4** and the lowest rating of the three assessed confidence levels determined the overall confidence rating in the risk.

Table G-4: Confidence Scales (Source: AIDR, 2020)

Confidence Level	Descriptor	Supporting Evidence	Expertise	Participant Agreement
Highest	Assessed likelihood, consequence or risk is easily assessed to one level, with almost no uncertainty	<p>Recent historical event of similar magnitude to that being assessed in the community of interest</p> <p>Quantitative modelling and analysis of highest quality and length of data relating directly to the affected community, used to derive results of direct relevance to the scenario being assessed</p>	<p>Risk assessment team contains relevant and demonstrated technical expertise in the field being assessed, and experience in data and/or modelling of direct relevance to the scenario being assessed, and</p> <p>Technical expertise is highly influential in the decisions of the risk assessment team</p>	Agreement among participants on the assessment of levels of likelihood, consequence or risk
High	Assessed likelihood, consequence or risk has only one level, but with some uncertainty in the assessment	<p>Recent historical event of similar magnitude to that being assessed in a directly comparable community of interest</p> <p>Quantitative modelling and analysis uses sufficient quality and length of data to derive results of direct relevance to the event being assessed</p>	<p>Risk assessment team contains relevant technical expertise in the field being assessed, and experience with data and/or modelling relating to the event being assessed, and</p> <p>Technical expertise is highly influential in the decisions of the risk assessment team</p>	Disagreement on only minor aspects, which have little effect on the assessment of levels of likelihood or consequence
Moderate	Assessed likelihood, consequence or risk could be one of two levels, with significant uncertainty	<p>Historical event of similar magnitude to that being assessed in a comparable community of interest</p> <p>Quantitative modelling and analysis with reasonable extrapolation of data required to derive results of direct relevance to the event being assessed</p>	<p>Risk assessment team contains relevant technical expertise in the field being assessed, and experience in data and/or modelling of relevance to the event being assessed, and</p> <p>Technical expertise is used by the risk assessment team</p>	Disagreement on significant issues, which would lead to different levels of likelihood or consequence depending on which argument was followed

Confidence Level	Descriptor	Supporting Evidence	Expertise	Participant Agreement
Low	Assessed likelihood, consequence or risk could be one of three or more levels, with major uncertainty	Some comparable historical events through anecdotal information Quantitative modelling and analysis with extensive extrapolation of data required to derive results of relevance to the event being assessed	Risk assessment team contains technical expertise related to the field being assessed Technical expertise is taken into account by the risk assessment team	Disagreements on fundamental issues relating to the assessment of likelihood or consequence, which would lead to a range of rating levels
Lowest	Assessed likelihood, consequence or risk could be one of four or more levels, with fundamental uncertainty	No historical events or quantitative modelled results to support the levels	No relevant technical expertise is available to the team for analysis	Fundamental disagreement on levels of likelihood, consequence or risk, with little prospect of agreement

G1.1.3 Timeframes Assessed

The risk assessment process was undertaken using existing studies, knowledge and management documents and knowledge of current management arrangements. The process assessed current and future risks (20, 50, 80 years (being 2100, in line with coastal hazard assessment lines) and 100 years), considered to be the residual risk with current management arrangements applied.

The risk rating was applied using the risk matrix (**Table G-3**), based on the consequence and likelihood assigned to each threat. For the future risks, future pressures such as population growth, tourism, urban development and climate change were taken into account.

G1.2 Full Outcomes of the Risk Assessment

The full outcomes of the first pass risk assessment are shown in **Table G-5**, showing the following information for each management issue:

- Management issue description/detail/consequences, including key hotspots
- How the management issue was identified (i.e. data source)
- Values affected by the management issue
- Likelihood, consequence, risk ratings for all timeframes and confidence rating
- Current management arrangements
- Available information/data and studies relating to the issue
- Data gaps
- Recommended studies for Stage 2 and/or Stage 5.

Management Issues / Threats					Values Affected										
No.	Description	Detail and Key Areas of Concern	Consequence	Data Source	V1 - Natural, healthy character	V2 - Biodiversity and ecosystem integrity	V3 - Good water quality	V4 - Aboriginal cultural heritage and use	V5 - Accessibility and safety	V6 - Amenity and recreation	V7 - Socialisation and participation	V8 - Education / scientific	V9 - Tourism	V10 - Fishing (commercial, recreational and cultural)	V11 - Agricultural, industrial and urban lands
T1	Beach erosion	Severity of beach erosion hazard varies along the study area, overall it is considered moderate to high, with key areas of concern at: * Tallow Beach * Suffolk Park Beach * Broken Head Beach * Seven Mile Beach (within the study area) Climate change and associated sea level rise is a stressor that will exacerbate this management issue into the future, similarly for T2 to T6 (all the Coastal Hazards).	* 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 * Damage to or Loss of public assets and facilities * Damage to or Loss of private land and assets * Loss or changes to existing surf breaks, etc. * Loss of or impacts to Aboriginal cultural heritage sites and places (noting potential burial sites in the back beach area) * Changes to land boundaries and associated responsibilities with sea level rise.	* CM Act * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020) * Coastline Hazard Assessment Update (BMT WBM, 2013) * Byron Bay Hastings Point erosion study (PWD, 1978)	X	X		X	X	X			X		X
T2	Shoreline recession	Severity of beach shoreline recession is currently poorly understood and potentially varies along the study area, with key areas of concern at: * Tallow Beach * Suffolk Park Beach * Broken Head Beach * Seven Mile Beach (within the study area) Available evidence suggests that, unlike the coastline to the north of Cape Byron, there currently appears to be little evidence of long term shoreline recession along the coastline to the south of Cape Byron in the study area.	* Habitat loss (especially dune habitats, but may also include littoral rainforest, coastal wetlands and associated fauna) * 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. * Loss of or impacts to Aboriginal cultural heritage sites and places * Changes to land boundaries and associated responsibilities with sea level rise	* CM Act * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X		X	X	X			X		X
T3a	Coastal inundation	Severity of coastal inundation varies along the study area, overall it is considered high, and likely to become a greater issue with sea level rise with key areas of concern at: * Suffolk Park (i.e. private residences and Suffolk Beachfront Holiday Park) * Creek/estuary and entrance areas as a result of combined high rainfall, ocean storm surge and large waves	* Ingress of oceanic waters over the period of storm into land and assets behind dunes and coastal barriers (e.g. Belongil Spit) and lower level bedrock outcrops * Ingress of oceanic waters to upper reaches of creeks/estuaries (e.g. Belongil, Tallow Creek) due to combined high rainfall, ocean storm surge and large waves * Damages may be minor i.e. for habitats adapted to inundation, to major i.e. a built asset (including a utility, such as wastewater pumping station) requires fixing, removal or replacement after an oceanic inundation event * Loss of or impacts to Aboriginal cultural heritage sites and places * Inundation may increase pollutants in the estuaries and open ocean waters i.e. if onsite septic tanks become inundated or if agricultural lands become inundated	* CM Act * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020) * Byron Shire Coastline Hazard Assessment Update (BMT WBM, 2013) * Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update (SKM, 2015)	X	X	X	X	X	X	X		X		X
T3b	Tidal inundation	Severity of tidal inundation varies along the study area, overall it is considered high, and likely to become a greater issue with sea level rise with key areas of concern at: * Belongil Creek estuary (low-lying catchment areas subject to estuarine inundation, impact on industrial area and resorts) * Tallow Creek estuary (low-lying catchment areas and housing subject to estuarine inundation)	* Potential loss of life in flood events * Nuisance inundation and damage to private and public assets due to tidal ingress * Loss of or impacts to Aboriginal cultural heritage sites and places * Inundation may increase pollutants in the estuaries and open ocean waters i.e. if onsite septic tanks become inundated or if agricultural lands become inundated * Change/drift in ecosystems - but limited area available for migration/limited capacity to accommodate change in the system * Reduced resilience of ecosystems to climate change	* CM Act	X	X	X	X	X	X	X		X		X
T3c	Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters	The interaction of tidal waters and waves with catchment floodwaters during high rainfall events is an issue in Belongil and Tallow Creek catchments if coinciding with large wave conditions. Areas of the Belongil Creek catchment most vulnerable to flooding are located along the creek in the north of the catchment and on the eastern side of the catchment in the Byron Bay township (BMT WBM, 2015a). Vulnerabilities as documented by BMT WBM (2015a) include: (1) Low lying properties located adjacent to the creek entrance and town drain (within Byron Bay, west of the North Coast Railway line) (2) Byron Bay, which is susceptible to flooding from both intense short duration storms over the town catchment and ocean storm tide events. In the Tallow Creek catchment, in the lower catchment downstream of Broken Head Road, flooding is dominated by storm tide levels and is also governed by Tallow Creek ICOLL entrance conditions (SKM, 2015). Properties adjoining Belongil Creek, north of the railway line, are within a high hazard zone from both coastal erosion hazard and flood hazard. Due to the high velocities encountered along the creek, there is also a very high stream bank erosion risk for properties adjoining the creek, north of the Railway Line Bridge (BMT WBM, 2015a).	* As for T3a * Loss of habitat/vegetation along unstable estuary banks * Public safety risk along unstable, eroding foreshores * Threat to private land and assets	* CM Act * NSW Government Floodplain Management Program	X	X	X	X	X	X	X		X		X
T4a	Coastal watercourse entrance variability	Belongil Creek estuary is a key area of concern for entrance variability (in plan form) with some erosion of littoral rainforest and private land occurring near the entrance. Tallow Creek and Ti Tree (Taylors) Lake estuaries do not appear to be threatened by entrance movement to the same degree as Belongil Creek estuary.	* Loss of habitat/vegetation along unstable estuary banks near entrance i.e. Littoral rainforest near Belongil Creek estuary entrance * Potential for a breakthrough in a new alignment at Belongil Creek estuary entrance * Loss of or impacts to Aboriginal cultural heritage sites and places * Loss of property to the north of the Belongil Creek entrance if entrance migrates to the north	* CM Act * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X	X	X	X	X			X		X
T4b	Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLS)	Belongil Creek and Tallow Creek have in the past been both naturally and mechanically opened. Both have entrance management policies in place, however they are currently based on opening at a trigger levels to overcome flood risk. Both natural and artificial opening of these estuaries in the past has resulted in significant fish kills and Council's current practice is to not open Tallow Creek artificially.	* Temporary erosion of sandy areas * Temporary inundation and sedimentation/shoaling within the zone where the ICOLLS exit to the ocean * Changes to estuarine water quality, vegetation type and extent and aquatic ecosystem composition, including fish assemblages * Impacts to Aboriginal cultural fishing practices * Potential Fish kills (under certain conditions) * Potential permanent changes to physio-chemical conditions and ICOLL ecological regimes	* NSW Marine Estate TARA Report (BMT WBM, 2017)	X	X	X	X	X	X			X	X	X
T5	Dune slope instability	The potential severity of dune slope instabilities varies along the study area in relation to the varying dune height and is generally associated with an erosion event and/or uncontrolled public access. In the case of the former subsequent accretion results in the re-building of dunes and in regard to access this can be readily addressed using controlled access. Overall it is considered high, with key areas of concern at: * Tallow Beach * Suffolk Park Beach * Broken Head Beach * Seven Mile Beach (within the study area)	* Property damage (due to zone of reduced foundation) * Loss of or impacts to Aboriginal cultural heritage sites and places * Loss of dune vegetation * Potential migration of dunes landward * Potential public safety issue Note: 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 (BMT 2020).	* CM Act * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X		X	X	X		X			
T6	Coastal cliff instability	The Cape Byron Headland Reserve Plan of Management (Wildsite Ecological Services, 2002) and the Broken Head Nature Reserve Plan of Management (NPWS, 2019a) discuss the geology of the respective coastal headlands and the high erodibility of these landforms. Key hot spots threatened by cliff instability are: * Cape Byron * Broken Head	* Loss of or impacts to Aboriginal cultural heritage sites and places * Potential public safety issue (the nature of cliff failure is such that it occurs suddenly and without warning posing a hazard to life for those in the proximity of both the top and the base of the subject cliff) Note: Land slip and rock falls at cliff and bedrock outcrops adjacent to the ocean and beach. In some cases the landslide 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 (BMT, 2020).	* CM Act * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020) * Cape Byron Headland Reserve Plan of Management (Wildsite Ecological Services, 2002) * Broken Head Nature Reserve Plan of Management (NPWS, 2019a)	X				X	X			X		
T7	Conflict over resource access and use	Conflicts can occur between residents and/or visitors and will be exacerbated by population growth (residents and visitors). Known areas of concern include: * Belongil Creek estuary (dogs accessing prohibited area at estuary entrance) * Cosy Corner (surfing etiquette) * Tallow Beach (dog exercise area, illegal camping) * Tallow Creek estuary (dogs accessing prohibited area at estuary entrance) * Suffolk Park Beach (dog exercise area, illegal camping) * Ti Tree Lake (Aboriginal cultural place - sacred women's site) * Broken Head Beach (illegal camping) * Broken Head Nature Reserve (illegal parking, illegal camping) * Seven Mile Beach (within study area; illegal camping, illegal four wheel driving)	* Loss of amenity (e.g. through dumping, defecation, noise etc.) * Safety incidents i.e. with dogs, debris from parties, prevention of ambulance access * Loss of habitat and/or wildlife i.e. nesting shorebirds and turtles conflicting with recreational use (trampling), dog walking, illegal four wheel driving, parties, etc. * Loss of or impacts to Aboriginal cultural heritage sites and places	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)		X		X	X	X	X		X	X	
T8	Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)	Increasing use and overuse is a result of increased tourism, coastal development and population growth. Existing infrastructure and facilities that support beach and estuary use include carparks, toilets, showers, picnic tables, accessways and parkland. High risk locations include: * Belongil Creek estuary * Tallow Beach * Tallow Creek estuary * Suffolk Park Beach * Broken Head Beach * Broken Head Nature Reserve * Seven Mile Beach (within the study area)	Increasing use and demand can exacerbate the creation of informal accessways in public reserves and from private properties and trampling, in turn leading to vegetation and dune damage and disruption to shorebirds and other habitat. Increase in turtle nesting has been observed on Tallows Beach. Illegal fires and clearing of vegetation for camping impacting habitat.	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X		X		X		X	X	X	
T9	Poorly located, poorly maintained and/or inappropriate access and supporting facilities	High risk locations, where there are reduced facilities to service the increasing demand, include: * Belongil Creek estuary * Tallow Beach * Suffolk Park Beach * Broken Head Beach * Seven Mile Beach (within the study area)	Creation of informal accessways in public reserves and from private properties and trampling, in turn leading to vegetation and dune damage and disruption to shorebirds and other habitat. Damage particularly likely following storm erosion that creates back of beach erosion escarpments that make beach access difficult and hence alternate paths developed and/or a breakdown of the escarpment that leads to further vulnerability of areas adjacent to access ways.	* CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X		X	X	X	X		X		

Management Issues / Threats					Values Affected										
No.	Description	Detail and Key Areas of Concern	Consequence	Data Source	V1 - Natural, healthy character	V2 - Biodiversity and ecosystem integrity	V3 - Good water quality	V4 - Aboriginal cultural heritage and use	V5 - Accessibility and safety	V6 - Amenity and recreation	V7 - Socialisation and participation	V8 - Education / scientific	V9 - Tourism	V10 - Fishing (commercial, recreational and cultural)	V11 - Agricultural, industrial and urban lands
T10	Anti-social behaviour and unsafe practices	Anti-social behaviour and unsafe practices such as bush doofs (outdoor dance parties at the beach or in the bush) as well as nudity and sexual activity are known to occur at the following key areas of concern: * Belongil Creek entrance (parties and nudists) * Tallow Creek estuary * Cosy Corner (Tallow Beach) * Broken Head Nature Reserve beaches e.g. Whites Beach frequented by nudists * Ti Tree (Taylors) Lake (parties)	* Litter (small and large items) * Safety impacts on other beach users i.e. broken glass, hot coals on beach and discarded needles * May disturb wildlife and habitat i.e. bush doofs at Belongil Creek entrance have been known to trample nesting shorebird habitat * Amenity impacts: rubbish - bottles, chairs, camping equipment, litter * Pressure on compliance officers and clean up crews * Impacts on Aboriginal cultural heritage such as at Ti Tree Lake	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)		X		X	X	X	X		X		
T11	Passive recreational use (swimming, surfing, dog walking, bush walking, etc.)	Known to occur at the following key areas: * Belongil Creek entrance (nesting sea birds disturbed by public) * Cosy Corner (Tallow Beach) * Tallow Creek entrance (nesting sea birds disturbed by public) * Kings Beach (unofficial nudist beach) * All dog beaches (access by dogs above MHW where not permitted)	* Uncontrolled beach access can result in dune habitat degradation and wildlife disturbance i.e. nesting shorebirds * Recreational use can result in litter and plastics on the beach and in the ocean * Potential public health risk of swimming in Tallow Creek * Loss of or impacts to Aboriginal cultural heritage sites and places	* CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)		X	X	X	X	X		X	X		
T12	Active recreational use (recreational boating and fishing, motorised watercraft, drones, four wheel driving, etc.) and commercial fishing	Known to occur at the following key areas: * Northern part of Seven Mile Beach within Byron Shire LGA (illegal 4WDing, quad biking in the dunes, biking on the beaches) * Broken Head Beach (illegal 4WDing, quad biking in the dunes, biking on the beaches) * Belongil and Tallow Creek estuary mouths (illegal collection (fishing and crabbing))	* Speeding and speed boats can impact amenity, wildlife and aquatic vegetation * Fishing can be a source of litter and plastics in the marine environment if not properly managed * Fishing can result in unintended by-catch and/or entanglement of marine animals * Changes to fish assemblages and trophic structures and impacts to threatened aquatic species if recreational and commercial fishing is not regulated adequately (i.e. overfishing occurs) * Loss of or impacts to Aboriginal cultural heritage sites and places i.e. when watercraft access the beach to launch * Impacts to Aboriginal cultural fishing practices * Drones can impact native animals and amenity	* CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)		X	X	X	X	X		X	X	X	
T13	Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)	Increasing visiting and resident populations results in intensification and expansion of coastal development. Urban development pressure is evident at the following locations: * Belongil Creek estuary (inc. intensifying of development within coastal hazard zone and industrial and urban catchment areas impacting the estuary i.e. Byron Bay) * Elements Resort * (Future) West Byron Urban Release Area * Suffolk Park	* Increased potential for habitat disturbance and loss particularly on greenfield sites * Increased pressure on recreational resources and beach amenity * Potential reduction in water quality and increased quantity of runoff into creeks and the ocean, including direct impacts via stormwater outlets * Potential increase in litter and plastics entering the creeks (and eventually flowing to the ocean) and the ocean directly * Inappropriate development can also potentially limit future management options as climate change impacts materialise	* CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X	X	X				X		X	
T14a	Water pollution from urban stormwater and treated effluent discharge	Water quality impacts are primarily in the three estuaries of the study area but also in the open ocean in the vicinity of the creek entrances and stormwater drains, due to increased stormwater runoff, increased volume of treated effluent being discharged into Belongil Creek estuary and increased pollutant loads with increasing development pressures. Key areas of concern are: * Belongil Creek: Butler Street drain stormwater, Morans drain acid runoff, treated effluent discharge as part of the BBIWMS * Tallow Creek: possible contamination from remaining tertiary treatment ponds at former STP (via groundwater), Baywood Chase Lake, general catchment stormwater inputs, nutrient recycling in estuary. Both estuaries receive urban stormwater that contains a range of contaminants. Ti Tree (Taylors) Lake also receives urban stormwater discharges to a lesser degree. There is limited primary stormwater treatment infrastructure in the study area. Groundwater is also a contributing factor to estuarine water quality, however very little is known about groundwater influences in the study area. Sea level rise will impact on groundwater salinity. The potential for PFAS contamination of groundwater from the former Butler St landfill (see https://www.byron.nsw.gov.au/Services/Water-sewer/Contamination-at-Butler-Street-Reserve and https://www.epa.nsw.gov.au/your-environment/contaminated-land/pfas-investigation-program/pfas-investigation-sites/byron-bay-butler-street-reserve)	* Nutrient enrichment can lead to algal blooms * Reduced water quality impacts aquatic and marine life i.e. low DO can lead to fish kills * Contaminants, such as heavy metals and TPH can impact aquatic and marine life, which can have direct (recreational restrictions in the water i.e. no swimming) or indirect impacts (i.e. contamination of fish with heavy metals, which may impact recreational and cultural fishing activities) * Litter in stormwater runoff, particularly plastic, can make its way into the ocean, harming marine life and seabirds	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X	X	X	X	X			X	X	X
T14b	Water pollution from agricultural diffuse source runoff	* Belongil Creek catchment contains significant agricultural lands (mainly used for grazing) * Tallow Creek catchment contains much more limited agricultural land, however, pollutants from agricultural diffuse source runoff need to be considered for cultural fishing purposes, as Council's aim is to reinstate cultural fishing practices at Tallow Creek.	* Agricultural contaminants, such as pesticides can impact aquatic and marine life. If fish and crustaceans etc. become contaminated with pesticides this may impact cultural fishing opportunities * Nutrient enrichment can lead to algal blooms	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X	X	X	X	X			X	X	
T14c	Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics	Litter along the beaches and estuaries and marine plastics are key community concerns, based on the community feedback survey and is a known issue at: * Belongil Creek entrance * Tallow Creek banks * Ti Tree Lakes banks. Bush parties (doofs) have occurred at all these locations, resulting in substantial litter. General recreational use of the study area also results in litter.	* Litter/plastics can harm aquatic and marine life and seabirds * Reduction in amenity * People defecate in the sand dunes and similar areas, this can cause a public health risk	* NSW Marine Estate TARA Report (BMT WBM, 2017)	X	X	X	X	X	X			X	X	X
T15	Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLS	Poorly sited coastal development - and associated works such as revetments etc. - may negatively interact with natural coastal processes, which may result in enhanced impacts (particularly to 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. along Belongil Creek estuary foreshores) and future developments.	As for coastal hazards above (T1 to T6) * Council liability particularly with regards to future planning decisions and risks	* CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X		X	X	X			X	X	X
T16	Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)	Examples of non-compliance may include: * Illegal camping, dogs/4WD on beaches, parties, littering * Fishing after dark * Destruction of dune vegetation * Development or use of land in breach of conditions of development consent or restrictions as to use * Non sanctioned management actions by the community such as manual opening of estuary entrances by members of the public	* Habitat disturbance and loss (especially dune habitats, but may also include littoral rainforest, coastal wetlands and associated fauna) * Fish kills * Public safety incidents * Litter, especially after beach parties i.e. 5m3 of rubbish left on banks of Tallow Creek after one bush doof - puts administrative strain on rangers to clean up	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)		X	X	X	X	X			X	X	X
T17	Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment	Key coastal environments of high value include: * Dunes * Nature reserves * National parks * Estuaries * Riparian areas * Buffer areas * Wetlands and littoral rainforest areas * Reefs Absentee landlords and leasing of properties for holiday rental can exacerbate the disconnection of the community with their coastal environment.	* Exacerbation of some of the other threats noted above, including, but not limited to unofficial breakouts of the estuaries by members of the community * Disrespect to Aboriginal cultural practices	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X	X	X	X	X	X	X	X	X	X
T18	Insufficient or inappropriate governance and management of the coastal environment	* Where governance and management is lacking or inappropriate, this may 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 * Governance and management often overlaps (overlapping legislation and organisation) * Crown Lands have wide reaching responsibilities but limited resources	* Exacerbation of all of the other threats noted above * Loss of confidence by the public in regulatory authorities	* NSW Marine Estate TARA Report (BMT WBM, 2017) * CMP Scoping Study for Cape Byron to South Golden Beach (BMT, 2020)	X	X	X	X	X	X	X	X	X	X	X
T19	Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment	The lack of Aboriginal involvement in decision-making has been identified as a major threat to culture state-wide in the TARA. The need for Aboriginal knowledge and expertise to be incorporated into the ongoing management of Land and Sea Country is recognised by government. Adequate engagement is required with Traditional Owners of the study area to ensure the Aboriginal cultural heritage and use within the area is maintained, knowledge of it is shared (in a sensitive manner) and to ensure the community/visitors to the area are aware of the cultural values of the study area.	* Inadequate inclusion of management of Aboriginal cultural heritage values of the study area in the CMP * Lack of respect shown by community/visitors to the area, either deliberately or due to a lack of awareness * Loss of or impacts to Aboriginal cultural heritage sites and places	* NSW Marine Estate TARA Report (BMT WBM, 2017) * Stakeholder and community consultation	X	X		X	X	X	X	X	X	X	

Management Issues / Threats		Risk Assessment																
No.	Description	Current Consequence - Key Category	Current Consequence - Rating	Current Consequence - Description	Current Likelihood - Rating	Current Likelihood - Description	Current Risk: 2020	Future Risk: 2040 (+ 20 years)	Future Risk: 2070 (+ 50 years)	Future (2100) Consequence - Key Category	Future (2100) Consequence - Rating	Future Consequence - Description	Future (2100) Likelihood - Rating	Future Likelihood - Description	Future Risk: 2100	Future Risk: 2120 (+ 100 years)	Confidence - Key Category	Confidence - Rating
T1	Beach erosion	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Possible	May arise once in ten years	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T2	Shoreline recession	Community and lifestyle	Moderate	General appreciable decline in services	Rare	Unlikely during a 25 year period	Medium	Medium	Medium	Community and lifestyle	Moderate	General appreciable decline in services	Possible	May arise once in ten years	High	High	Supporting Evidence	Moderate
T3a	Coastal inundation	Community and lifestyle	Major	Severe and widespread decline in services and quality of life within the community	Possible	May arise once in ten years	High	High	High	Community and lifestyle	Catastrophic	The region would be seen as very unattractive, moribund and unable to support its community	Almost certain	Could occur several times per year	Extreme	Extreme	Supporting Evidence	Moderate
T3b	Tidal inundation	Community and lifestyle	Major	Severe and widespread decline in services and quality of life within the community	Possible	May arise once in ten years	High	High	High	Community and lifestyle	Major	Severe and widespread decline in services and quality of life within the community	Almost certain	Could occur several times per year	Extreme	Extreme	Supporting Evidence	Moderate
T3c	Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters	Community and lifestyle	Moderate	General appreciable decline in services	Possible	May arise once in ten years	High	High	High	Community and lifestyle	Major	Severe and widespread decline in services and quality of life within the community	Almost certain	Could occur several times per year	Extreme	Extreme	Supporting Evidence	Moderate
T4a	Coastal watercourse entrance variability	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Possible	May arise once in ten years	Medium	Medium	Medium	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	Supporting Evidence	Moderate
T4b	Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs)	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T5	Dune slope instability	Public safety	Moderate	Small numbers of injuries	Possible	May arise once in ten years	High	High	High	Public safety	Moderate	Small numbers of injuries	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T6	Coastal cliff instability	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Unlikely	May arise once in ten years to 25 years	Medium	Medium	Medium	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Unlikely	May arise once in ten years to 25 years	Medium	Medium	Supporting Evidence	Low
T7	Conflict over resource access and use	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T8	Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Possible	May arise once in ten years	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T9	Poorly located, poorly maintained and/or inappropriate access and supporting facilities	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Likely	May arise about once per year	Medium	Medium	Medium	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T10	Anti-social behaviour and unsafe practices	Public safety	Minor	Serious near misses or minor injuries	Almost certain	Could occur several times per year	High	High	High	Public safety	Moderate	Small numbers of injuries	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T11	Passive recreational use (swimming, surfing, dog walking, bush walking, etc.)	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Possible	May arise once in ten years	Medium	Medium	Medium	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Likely	May arise about once per year	Medium	Medium	Supporting Evidence	Moderate
T12	Active recreational use (recreational boating and fishing, motorised watercraft, drones, four wheel driving, etc.) and commercial fishing	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Likely	May arise about once per year	Medium	Medium	Medium	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	Supporting Evidence	Moderate
T13	Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Major	Severe loss of environmental amenity and/or cultural heritage and a danger of continuing environmental and/or cultural heritage damage	Almost certain	Could occur several times per year	Extreme	Extreme	Supporting Evidence	Moderate
T14a	Water pollution from urban stormwater and treated effluent discharge	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Major	Severe loss of environmental amenity and/or cultural heritage and a danger of continuing environmental and/or cultural heritage damage	Almost certain	Could occur several times per year	Extreme	Extreme	Supporting Evidence	Moderate
T14b	Water pollution from agricultural diffuse source runoff	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate

Management Issues / Threats		Risk Assessment																
No.	Description	Current Consequence - Key Category	Current Consequence - Rating	Current Consequence - Description	Current Likelihood - Rating	Current Likelihood - Description	Current Risk: 2020	Future Risk: 2040 (+ 20 years)	Future Risk: 2070 (+ 50 years)	Future (2100) Consequence - Key Category	Future (2100) Consequence - Rating	Future Consequence - Description	Future (2100) Likelihood - Rating	Future Likelihood - Description	Future Risk: 2100	Future Risk: 2120 (+ 100 years)	Confidence - Key Category	Confidence - Rating
T14c	Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Likely	May arise about once per year	Medium	Medium	Medium	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T15	Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLs	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T16	Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)	Public administration	Moderate	Public administration would be under severe pressure on several fronts	Almost certain	Could occur several times per year	High	High	High	Public administration	Moderate	Public administration would be under severe pressure on several fronts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T17	Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Minor	Minor instances of environmental and/or cultural heritage damage that could be reversed	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T18	Insufficient or inappropriate governance and management of the coastal environment	Public administration	Moderate	Public administration would be under severe pressure on several fronts	Likely	May arise about once per year	High	High	High	Public administration	Moderate	Public administration would be under severe pressure on several fronts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	Moderate
T19	Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Likely	May arise about once per year	High	High	High	Environment, sustainability and cultural heritage	Moderate	Isolated but significant instances of environmental and/or cultural heritage damage that might be reversed with intensive efforts	Almost certain	Could occur several times per year	High	High	Supporting Evidence	High

Table G-5: Full outcomes of the first pass risk assessment

Management Issues / Threats		Current Management Arrangements		Available Information and Data		Recommended Studies for Stage 2 and/or Stage 3					
No.	Description	Description	Adequacy	Gaps/Improvements	Key References	Adequacy	Gaps/Improvements	No.	Name	Priority	Type of study / Level of detail / Comments
T1	Beach erosion	<ul style="list-style-type: none">Coastal legislation (CM Act, CM SEPP)LEP, DCP (Part J) and DA processNPWS PoMsLocal Master PlansDune management including revegetation, fencing (exclusion & sand catching) etc.Access management such as formal walkways and fencingExisting court orders and approvalsDraft Byron Shire Coastline Emergency Action Sub Plan (EASP), which forms Part E of the Draft CZMP BBE (BSC, 2016)	Inadequate	<ul style="list-style-type: none">Coordinated and consistent management approach for entire Shire coastlineInformation and education about the threat (improve people's understanding)FundingPolicyCoordination of management between responsible partiesPlace a value on natural area e.g. wetlands and rainforestsPlace a value on the cultural landscape, not just on known/registered Aboriginal heritage sitesUnderstanding full impact of engineering solutions / avoid reactive (ad hoc) worksViability of land acquisition (e.g. no current funding)Downdrift managementStrengthen planning lawsImplications of relevant court orders and development approvals for management optionsCoordination of management between responsible partiesPeople (education, cooperation and involvement)Consultation with Aboriginal people is required to determine and plan how impacts to middens and cultural heritage sites and artefacts can be managed due to beach erosion	<ul style="list-style-type: none">Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013)Byron Bay Hastings Point erosion study (PWD, 1978)	Moderate	<ul style="list-style-type: none">Hazard lines are based on 1978 study which included significant uncertainties and contingencies due to a lack of data at the timeHazard lines along National Parks and Reserves have not been mapped and hazard lines have not been tied to known bedrockAt high risk locations a quantitative probabilistic approach may be required to extend to the 2100 planning horizon and include at risk areas in keeping with current NSW guidelines and to support a more rigorous and detailed risk based cost-benefit analysis of management options	S2-1	Coastal Hazard Study	High	Coastal Hazard Assessment (2021) – Review and Update (for the entire Byron Shire LGA coastline). A consultant is presently being engaged with the project due to commence in June 2021. <ul style="list-style-type: none">Sediment budget and quantified conceptual sand movement modelProbabilistic assessment of beach erosion and shoreline recessionCoastal inundation (dune and seawall wave runup and overtopping)Tidal inundationCoastal entrance instabilityCliff instabilityErosion and inundation of foreshores
T2	Shoreline recession	As above for T1 Beach erosion, noting that certain actions will become less effective over time if recession occurs e.g. dune management	Inadequate	As above for T1 Beach erosion	As above for T1 Beach erosion.	Moderate	As above for T1 Beach erosion.	S2-1	Coastal Hazard Study	High	See S2-1
T3a	Coastal inundation	<ul style="list-style-type: none">Monitor and respond under existing management structureEmergency response plan (inundation / disaster)LEP, DCP (Part J) and DA processLocal Master Plans (i.e. Byron Bay Masterplan for stormwater management into Belongil Creek)Definition of flood levels (heights)Dune management including revegetation, fencing (exclusion & sand catching) etc.Strategic entrance opening strategy for Belongil Creek ICOLL (mechanical opening) and associated licenses for openingStrategic entrance opening strategy for Tallow Creek ICOLL is not supported by NPWS due to recent fish kills; NPWS (2019b) Interim opening strategy in place and associated license for berm scraping	Moderate	<ul style="list-style-type: none">Coordinated and consistent management approach for entire Shire coastlinePrepare for sea level riseConsider raise and repair of protection structuresInformation and education about the threat (improve people's understanding)FundingPolicyCoordination of management between responsible partiesPeople (education, cooperation and involvement)	<ul style="list-style-type: none">Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013)Belongil Creek Floodplain Risk Management Plan (BMT WBM, 2015a)Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update (SKM, 2015)	Moderate	<ul style="list-style-type: none">A flooding joint probability analysis (i.e. tide + storm surge + waves + catchment flood + sea level rise) has not been undertaken in accordance with the latest guidelines	S2-1	Coastal Hazard Study	High	See S2-1
T3b	Tidal inundation	<ul style="list-style-type: none">Strategic entrance opening strategy for Belongil Creek ICOLL (mechanical opening) and associated licenses for openingStrategic entrance opening strategy for Tallow Creek ICOLL is not supported by NPWS due to recent fish kills; NPWS (2019b) Interim opening strategy in placeCouncil uses Guardian IMS to receive near real-time water level and rainfall level and predictions to guide decision making for ICOLL entrance openingActions for implementation as specified in the Belongil Creek Floodplain Risk Management Plan (BMT WBM, 2015a) and Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update (SKM, 2015)Definition of flood planning levels	Moderate	<ul style="list-style-type: none">As above for T3a Coastal inundationAdaptable entrance management strategies considering natural instability/dynamics and sea level rise amongst other factorsBest practice entrance management in consideration of threats to other estuary values (i.e. biodiversity, cultural heritage, rather than actions to solely to manage catchment flood riskThe Belongil Creek Flood Study (SMC, 2009) included climate change events in the design floods modelled, however, these were based on 2007 IPCC climate change estimatesThe Tallow Creek Flood Study (Water Studies, 2002) results were based on climate conditions that did not reflect potential impacts of climate change, so considerations for climate change were addressed in the Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update (SKM, 2015)	<ul style="list-style-type: none">Tallow Creek Flood Study (Water Studies, 2002)Tallow Creek Floodplain Risk Management Study and Plan - 2015 Update (SKM, 2015)Environmental Management Plan and Opening Strategy for Tallow Creek (BMT WBM, 2015b)NPWS letter to Council RE: Tallow Creek Entrance Management, dated 30 September 2019 (NPWS, 2019b), which details NPWS interim position on mechanical opening and scraping of the berm of Tallow Creek ICOLL, which affects the above mentioned opening strategy for Tallow CreekBelongil Creek Flood Study (SMC, 2009)Belongil Creek Floodplain Risk Management Plan (BMT WBM, 2015a)Belongil Creek Entrance Opening Strategy (Alluvium, 2019b)	Moderate	<ul style="list-style-type: none">As above for T3aBoth opening strategies should be reviewed in Stage 3 of the CMP process to ensure they remain consistent with the understanding of coastal processes and to update the Tallow Creek opening strategy in line with best practice	S2-1	Coastal Hazard Study	High	See S2-1
T3c	Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters	As above for T3b	Moderate	As above for T3b	As above for T3b	Inadequate	As above for T3a	S2-1	Coastal Hazard Study	High	See S2-1
T4a	Coastal watercourse entrance variability	<ul style="list-style-type: none">Strategic entrance opening strategy for Belongil Creek ICOLL (mechanical opening) and associated licenses for openingStrategic entrance opening strategy for Tallow Creek ICOLL is not supported by NPWS due to recent fish kills; NPWS (2019b) Interim opening strategy in place and associated license for berm scrapingCouncil uses Guardian IMS to receive near real-time water level and rainfall level and predictions to guide decision making for ICOLL entrance openingMonitor and respond under existing management structureDrainage Management Plan (in prep)	Moderate	<ul style="list-style-type: none">Adaptable entrance management strategies considering natural instability/dynamics and sea level rise amongst other factorsBest practice entrance management in consideration of threats to other estuary values (i.e. biodiversity, cultural heritage, rather than actions to solely to manage catchment flood riskCoordinated and consistent management approach for entire Shire coastline	<ul style="list-style-type: none">Belongil Creek Entrance Opening Strategy (Alluvium, 2019b)Environmental Management Plan and Opening Strategy for Tallow Creek (BMT WBM, 2015b)NPWS letter to Council RE: Tallow Creek Entrance Management, dated 30 September 2019 (NPWS, 2019b), which details NPWS interim position on mechanical opening and scraping of the berm of Tallow Creek ICOLL, which affects the above mentioned opening strategy for Tallow CreekByron Shire Coastline Hazards Assessment Update (BMT WBM, 2013)	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). A detailed study to investigate likely entrance dynamics and shoreline stability with issues such as increased flood flows due to intensification of catchment development and sea level rise has not been conducted but is desirable.	S2-1	Coastal Hazard Study	High	See S2-1
T4b	Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs)	<ul style="list-style-type: none">Strategic entrance opening strategy for Belongil Creek ICOLL (mechanical opening) and associated licenses for openingStrategic entrance opening strategy for Tallow Creek ICOLL is not supported by NPWS due to recent fish kills; NPWS (2019b) Interim opening strategy in place and associated license for berm scrapingCouncil uses Guardian IMS to receive near real-time water level and rainfall level and predictions to guide decision making for ICOLL entrance openingMonitor and respond under existing management structure	Moderate	As above for T4a Coastal watercourse entrance instability	As above for T4a.	Moderate	As above for T3b	S2-10 S2-11	Review ICOLL Opening Policies	High	Tallow and Belongil Estuaries opening strategies should be reviewed in Stage 3 to ensure they remain consistent with the understanding of coastal processes (updated in Stage 2) and to update them in line with best practice. It is not expected that updates will include hydraulic modelling of berm scour (this could be done as part of future flood studies). It is expected that opening trigger levels for consideration will be determined from survey of low lying assets requiring protection from inundation. It is noted that the ICOLL opening strategies would undergo further testing and possible updates as part of the Floodplain Risk Management Process (separate to the CMP).
T5	Dune slope instability	<ul style="list-style-type: none">Coastal legislation (CM Act, CM SEPP)LEP, DCP (Part J) and DA processDune management including revegetation, fencing (exclusion & sand catching) etc.Access management such as formal walkways, fencing and stabilisationAd-hoc and formal protection structures e.g. in front of Elements ResortEASP	Inadequate	<ul style="list-style-type: none">Coordinated and consistent management including adequate planning controlsFundingPeople (Education, cooperation and involvement)	As above for T1 Beach erosion.	Adequate	None identified	N/A	Allowances for reduced foundation capacity given in BMT WBM (2013) are sufficient for planning purposes.	N/A	
T6	Coastal cliff instability	<ul style="list-style-type: none">Coastal legislation (CM Act, CM SEPP)LEP, DCP (Part J) and DA processEASPAccess management i.e. fencingPlans of management i.e. for Cape Byron Headland Reserve Plan of Management (Wildsite Ecological Services, 2002)	Inadequate	<ul style="list-style-type: none">Information, particularly in regard to the actual cliff stability of Cape Byron and Broken HeadPublic safety risk management, in particular appropriate signageCoordinated and consistent management	<ul style="list-style-type: none">CM ActCape Byron Headland Reserve Plan of Management (Wildsite Ecological Services, 2002)Broken Head Nature Reserve Plan of Management (NPWS, 2019a)	Inadequate	<ul style="list-style-type: none">Gap in local (documented) information on:Cliff stabilityConsideration of impact of sea level rise on cliffsPublic safety risks and management including adequate signage	S2-1	Coastal Hazard Study	High	See S2-1
T7	Conflict over resource access and use	<ul style="list-style-type: none">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 occursDogs walking zoned areas/ dedicated dog beaches/ dog bagsSignageRangersSurf etiquette and signageCompliance and policy (NSW)Maintenance and asset / infrastructure investment, e.g. routine maintenance of beach ramp, beach accessways etc.Licenses for commercial tourist operatorsDune management including revegetation, fencing (exclusion & sand catching) etc. (Council and volunteers, e.g. Byron bird buddies (fencing))Collaboration with NPWS and Aboriginal organisations on education programsLicenses and education by public authorities for boating and fishing4WD on Seven Mile Beach (and associated impacts from driving in dunes and dogs) and added pressure from closure of South Ballina Beach in March 2021.	Moderate	<ul style="list-style-type: none">Council has limited resources (compliance officers and rangers) and are constrained in the area of the coastline able to be effectively managedLimited resources of other organisations - e.g. Jail LALC (with regards to parties at T1 Tree Lake), Crown Lands with regards to illegal camping on Crown managed lands, PoliceSocial media promotion of sensitive locations and or inappropriate activities	<ul style="list-style-type: none">The North Coast Regional Plan 2036 (DPE, 2017)The North Coast Local Strategic Plan 2016 – 2021 (North Coast LLS, 2016)Byron Shire Local Strategic Planning Statement (BSC, 2020b)Population and tourism statistics, community surveysPlans of Management of the following:<ul style="list-style-type: none">Cape Byron State Conservation Area (Cape Byron Headland Reserve) (Wildsite Ecological Services, 2002)Arakwal National Park (NPWS, 2007)T1 Tree Lake Aboriginal Area (NPWS, 2020a)Broken Head Nature Reserve (NPWS, 2019a)Cumbelin Swamp Nature Reserve (NPWS, 2012)Tyagarah Nature Reserve (partly within the study area) (NPWS, 2020b)	Inadequate	<ul style="list-style-type: none">Shire-wide policy for beach use, access, congestion and overcrowding management (illegal camping etc.) - and funding to implementUp-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. This is in part addressed in the draft Sustainable Visitation Strategy 2020-2030 (BSC, 2020)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 assistance for antisocial behaviourEvidence based research on the potential effects on wildlife from various recreational uses, and how to manage the impacts sympathetically	Ad3-1	Review Part C of the 2016 BBE CZMP	Medium	Review and update Part C of the 2016 BBE CZMP (Community Uses of the Coastal Zone) to ensure compliance with IPR Framework-inclusion of beaches, public reserves, recreation facilities, accessways etc in Council (and other State Agencies) in Asset Management Plans; and consideration of the Byron Shire Open Space and Recreation Needs Assessment and Action Plan J62017 - 2036.
T8	Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)	As above for T7	Moderate	<ul style="list-style-type: none">Coordinated and consistent management and provision of infrastructureAsset management: maintenance (particularly of accessways after erosion events), upgrades, renewal projectsAdditional resources for compliance and monitoring	<ul style="list-style-type: none">Byron Shire Biodiversity Conservation Strategy 2020 – 2030 (BSC, 2020a)CM SEPP mapping i.e. coastal wetland and littoral rainforest area	Adequate	<ul style="list-style-type: none">There is a discrepancy between Council's Littoral Rainforest mapping and the Coastal SEPP mapping of Littoral Rainforest	S2-4	Investigate and resolve the discrepancy between Council's Littoral Rainforest mapping and the Coastal SEPP mapping of Littoral Rainforest within the study area	Medium	Investigate and ground truth discrepancies between Council's mapping of Littoral Rainforest and Coastal Wetlands with the CM SEPP mapping and identify whether a planning proposal to amend the SEPP mapping is required.
T9	Poorly located, poorly maintained and/or inappropriate access and supporting facilities	<ul style="list-style-type: none">SignageRangersCompliance and policy (NSW)Maintenance and asset / infrastructure investment, e.g. routine maintenance of beach ramp, beach accessways etc.Licenses for commercial tourist operatorsDune management including revegetation, fencing (exclusion & sand catching) etc. (Council and volunteers, e.g. Byron bird buddies (fencing))EASP	Moderate	<ul style="list-style-type: none">Coordinated and consistent management and provision of infrastructureAsset management: maintenance (particularly of accessways after erosion events), upgrades, renewal projectsAdditional resources for compliance and monitoringEducation (e.g. of private property owners creating access ways)Prevention of access (e.g. no bollards at beach access ramp to Broken Head Beach)	<ul style="list-style-type: none">EASPByron Shire Council Open Spaces Asset Management Plans 2020 - 2029	Adequate	<ul style="list-style-type: none">The value of beaches was investigated in the WRL (2016) Coastal Hazard Management Study – Byron Bay Embayment, which estimated the economic value of beach-related tourism expenditure in Byron Shire at over \$93 million per year. However this was based on 2016 tourism data and conservative calculation assumptions	Ad3-3	Economic valuation of the coastal zone and the cost of the infrastructure necessary to support usage (BMT, 2020).	Medium	Economic valuation of the coastal zone (i.e. all natural and built assets, including beaches themselves) based upon the combined social, environmental and economic benefits off 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).
T10	Anti-social behaviour and unsafe practices	As above for T7	Moderate	<ul style="list-style-type: none">Coordinated and consistent management and provision of infrastructureAdditional resources for compliance and monitoringEducation (of visitors and tourism operators) e.g. as to the value of the natural character and of the Aboriginal cultural landscape value.	<ul style="list-style-type: none">Community and stakeholder feedback obtained during online surveys, project meetings and workshopsVarious media articles such as the following regarding bush doofs that have occurred on the banks of Tallow and Belongil Creeks:<ul style="list-style-type: none">https://www.northernstar.com.au/news/gallery-for-doofs-sake-make-them-stop/3158304/https://www.byronnews.com.au/news/letter-doof-heads-traising-our-environment/3168877/https://www.abc.net.au/news/2020-12-05/byron-bay-bush-doof-nsw-police-go-fundme-warning/12950642	Inadequate	As above for T7	Ad3-3	Economic valuation of the coastal zone and the cost of the infrastructure necessary to support usage (BMT, 2020).	Medium	See Ad3-3
T11	Passive recreational use (swimming, surfing, dog walking, bush walking, etc.)	As above for T7	Moderate	<ul style="list-style-type: none">Coordinated and consistent management and provision of infrastructureAdditional resources for compliance and monitoringEducation and signage (e.g. at T1 Tree Lake)	<ul style="list-style-type: none">Byron Shire Local Strategic Planning Statement (BSC, 2020b)	Inadequate	As above for T7	Ad3-4	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	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 access and other facilities on the coastline, such as implemented through the shire-wide beach policy, masterplans/PoMs, or asset management plan (BMT, 2020). 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 (BMT, 2020).
T12	Active recreational use (recreational boating and fishing, motorised watercraft, drones, four wheel driving, etc.) and commercial fishing	As above for T7	Moderate	As above for T7	<ul style="list-style-type: none">CBMP Zoning Map and User Guide (DPI, 2020a and 2020b)	Adequate	As above for T7	Ad3-7	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	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 (BMT, 2020). This should also include cultural access requirements (for Aboriginal people) and management of general public access to sites of cultural significance. This should be undertaken in consultation with Aboriginal land holder, and community representatives.
T13	Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)	<ul style="list-style-type: none">CM SEPP (wetland and littoral rainforest protection)BC ActFM ActNPWS PoMsLEP (land use zoning), DCP (Part J) and DA processEducationSignage	Moderate	<ul style="list-style-type: none">Need for stronger legislation and policy i.e. Council's DCPNeed for greater awareness of planning information and documents	<ul style="list-style-type: none">Byron Shire Biodiversity Conservation Strategy 2020 – 2030 (BSC, 2020a)CM SEPP mapping i.e. coastal wetland and littoral rainforest area	Adequate	As above for T8	S2-4	Investigate and ground truth discrepancies between Council's mapping of Littoral Rainforest and Coastal Wetlands with the CM SEPP mapping and identify whether a planning proposal to amend the SEPP mapping is required.	High	Additional note: 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 and offsets etc. should be considered for inclusion when preparing the CMP (BMT, 2020).

Table G-5: Full outcomes of the first pass risk assessment

Management Issues / Threats		Current Management Arrangements		Available Information and Data		Recommended Studies for Stage 2 and/or Stage 3					
No.	Description	Description	Adequacy	Gaps/Improvements	Key References	Adequacy	Gaps/Improvements	No.	Name	Priority	Type of study / Level of detail / Comments
T14a	Water pollution from urban stormwater and treated effluent discharge	<ul style="list-style-type: none">* 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.* Existing management arrangements include:<ul style="list-style-type: none">* Monitoring of water quality as required by the entrance opening policies for Belongil and Tallow Creeks and for management of effluent discharge from BBSTP* Beach Watch monitoring of E.coli levels at Suffolk Park Beach* Standard Asset management practices for stormwater assets (e.g. Town Drain, Union Drain, outlets direct to beaches)* WSUD Policy and Strategy	Moderate	<ul style="list-style-type: none">* Education on importance of vegetating river banks to filter and nutrient strip treated effluent runoff* Council implementation of new/best practice methods (e.g. OEH's Risk Based Framework) in land use planning and asset management to manage existing stormwater runoff issues. Council to implement pollution source identification program and opportunities for pollution minimisation.* Funding	<ul style="list-style-type: none">* Beachwatch WQ monitoring program State of the Beaches reports for Tallow Beach/Suffolk Park Beach/Broken Head Beach* Belongil Creek Entrance Opening Strategy (Alluvium, 2019b)* Environmental Management Plan and Opening Strategy for Tallow Creek (BMT WBM, 2015b)* Belongil Creek Catchment Issues Study (Alluvium, 2019a)* Byron Shire Recycled Water Management Strategy 2017 – 2027 (BSC, 2018a)* Review of Environmental Factors: Tallow Creek Entrance Opening – Vol. 1 &2 (BMT WBM, 2015c)* A series of eight monitoring reports documenting water quality monitoring in Tallow Creek from April 2016 to March 2020 (AWC, 2016; AWC, 2017a; AWC, 2017b; AWC, 2018a; AWC, 2018b; AWC, 2019; AWC, 2020a; AWC, 2020b)* Council's water quality data provided in Excel format for review	Moderate	<p>While it is understood that the tertiary ponds and Tallow Creek are currently not used for primary contact, including wading or swimming, the creek is uncontrolled, and the surface water quality and use of these water bodies for recreation use requires on-going and specialist assessment into the temporal and spatial water quality (Cavvanbah, 2012). Further investigation is required as to any connectivity between the former South Byron STP tertiary treatment ponds with groundwater and hence potential for impact on the adjacent estuary.</p> <p>Council currently undertakes water quality monitoring and analysis of Belongil and Tallow Creeks, however only some of the data is analysed from a perspective of environmental health. Improvements could include:</p> <ul style="list-style-type: none">- A source identification program could assist in the implementation of a source control program e.g. assist the understanding of bacterial contamination sources to ICOLLs (sewage versus dogbird/cattle). If sewage is identified, then ID of sources of overflow/illegal connections, etc.- Collation of all relevant surface water quality data Shire-wide, and analysis from an environmental health perspective of the catchments, and regular reporting to the community in an easy to understand format.- Amendments to the surface water quality monitoring program to ensure capture of relevant data for environmental health including baseline data prior to proposed large scale developments.	S2-5	Identification of water quality pollution sources (e.g. potential sources of bacterial contamination in ICOLLs, acid runoff in the Belongil catchment, consideration of West Byron development, and macrolimicro plastics) and composition to inform management strategies developed in Stage 3 of the CMP. It is expected that this assessment would be undertaken largely as a desk top assessment, with some ground truthing. The outcome would include recommendations for detailed water quality monitoring that may be included in CMP options assessed in Stage 3.	High	<p>The possible connection of the two tertiary treatment ponds with groundwater and hence impacts on the adjacent Tallow Creek estuary and its biota requires further investigation. While it is understood that the tertiary ponds and Tallow Creek are currently not used for primary contact, including wading or swimming, the creek is uncontrolled, and the surface water quality and use of these water bodies for recreation use requires on-going and specialist assessment into the temporal and spatial water quality (Cavvanbah, 2012).</p> <p>There is a need to back track existing sources of water pollution and implement a source control program. A source identification program would assist in the implementation of a source control program e.g. assist the understanding of bacterial contamination sources to ICOLLs (sewage versus dogbird/cattle). If sewage is identified, then ID of sources of overflow/illegal connections, etc.</p> <p>Review Byron's shire-wide surface water monitoring program to ensure its adequacy from an environmental health perspective. This would involve collation of all relevant surface water quality data shire-wide, and analysis from an environmental health perspective of the catchments. A review of reporting format to the community should be undertaken and improved. Amendments to the surface water quality monitoring program should be made if necessary to ensure capture of relevant data for environmental health, including baseline data prior to proposed large scale developments.</p> <p>The Byron Shire Recycled Water Management Strategy 2017 – 2027 (BSC, 2018a) states "A condition of approval for the augmented Byron Bay STP included no increase in nutrient loads discharged to the Belongil Catchment", however it doesn't appear to discuss discharge volumes or any limit placed on these, including during wet weather events or La Nina periods.</p> <p>Additional note: 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) (BMT, 2020).</p>
T14b	Water pollution from agricultural diffuse source runoff	<ul style="list-style-type: none">* Council supports individual projects that indirectly improve catchment health (e.g. Bring Back the Bruns - outside of study area) and regenerative farming (reactive educational program for interested farmers Shire wide) but there is no strategic basis and no specific focus on Belongil or Tallow catchments.* Council bush regeneration (again, project based); focused only on Council managed land including weed control and natural regeneration projects (minimal planting) at western Butler Street and western Alcorn Street, and Lillypilly biobanking project. Collaboration with Landcare and Dune care groups on public land. Other projects (Bringing Back the Bruns, and Saltwater Creek Mullumbimby are outside of the study area).* Brunswick Valley Landcare working with private landholders* A recent analysis of the health of fish within Tallow Creek has been undertaken by collaboration between Marine Parks/Arakwal/SCU to understand pesticide levels within fish. A variety of fish were sourced (from the creek post the June 2019 fish kill) for analysis of pesticides to gain knowledge about the health of fish within the creek for Arakwal consumption (cultural fishing practices). Results are pending.	Moderate	<ul style="list-style-type: none">* Education on importance of vegetating river banks to filter and nutrient strip agricultural runoff and run off from golf course* No strategic direction for Council to guide agricultural best practice, regenerative farming, rural/agricultural drainage, etc.* Need for additional staff, in particular, a bush regen officer to work with private landholders, especially when new to the area (unfamiliar with local weeds and with management of red soils)* Lack of unfenced stock access to prevent cattle access to the creek/drains (primarily a concern in the Brunswick River but also Belongil Creek catchment)* Limited adaption to interest in emerging best practice farming techniques by multigeneration landowners doing what's always been done* Lack of effort to control camphor laurel* Inconsistent views of environmental threat versus koala habitat value of camphor laurels by different parties	<ul style="list-style-type: none">* As above for T14a* Other MEMA projects e.g. Pilot Bank Management Strategies, Decision Support Tool for Estuary Bank Management* External monitoring of regeneration projects and feral animal control	Moderate	See above for T14a	S2-5	Identification of water quality pollution sources	High	See S2-5
T14c	Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics	<ul style="list-style-type: none">* Management of Council managed coastal environment and parks by Council's Open Spaces and Better Byron crew (e.g. litter picking)* Waste collection service* formalised waste collection points and pickups* waste education and prevention programs, e.g. resource recovery education program; litter prevention program with a key focus on the marine environment and provision of infrastructure (butt bins, signage etc.), e.g. Butt Free Byron Shire campaign; Take 3 For The Sea campaign* collaborate with and provide funding to local Not For Profit e.g. Positive Change for Marine Life for beach and litter cleans (e.g. as currently being undertaken at entrance to Belongil Beach)* provide free waste disposal for NGOs and the Dunescare/Coastal groups undertaking clean ups* EPA regulation and compliance	Moderate	<ul style="list-style-type: none">* Management of macro and microplastics entering the drain network and waterways	<ul style="list-style-type: none">* NSW Marine Estate TARA Report (BMT WBM, 2017)* Community and stakeholder feedback obtained during online surveys, project meetings and workshops	Moderate	<ul style="list-style-type: none">* Data on the composition of and sources of macro and micro plastics to the drain network and marine environment	S2-5	Identification of water quality pollution sources	High	See S2-5
T15	Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLs	<ul style="list-style-type: none">* Coastal legislation (CM Act, CM SEPP)* LEP, DCP (Part J) and DA process* Environmental Zones (E Zones) are designed to protect or manage land that is of important environmental value. Council has commenced the process to apply E Zones by amending the Byron LEP 2014 in accordance with the State Government's Northern Councils E Zone Review recommendations* Council is taking a pragmatic approach to development within coastal wetland buffer zones ensuring "no net detrimental impact" e.g. ensuring runoff from development does not significantly impact the wetland and stipulating restoration of areas during the DA process* Some coastal areas are identified as a Deferred Matter under the Byron LEP 2014. This applies to the following zones under the Byron LEP 1988: 7(1) Coastal lands and 7(2) Urban Coastal Lands. Such areas will be considered under a separate review process and remain as a Deferred Matter under the Byron Local LEP 2014 until appropriate planning controls are developed in consultation with the State Government.	Inadequate	<ul style="list-style-type: none">* As for coastal hazards above (T1 to T6)* Council could utilise E Zone living at Elements Resort, where development is outside of hazard lines or removable* Littoral Rainforest is at risk of ongoing development pressure i.e. some small residential private properties are currently mapped as Littoral Rainforest but are zoned residential under the 1988 LEP	<ul style="list-style-type: none">* As for coastal hazards above (T1 to T6)	Moderate	<ul style="list-style-type: none">* As for coastal hazards above (T1 to T6)	S2-1	Coastal Hazard Study	High	See S2-1
T16	Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)	<ul style="list-style-type: none">* Coastal legislation (CM Act, CM SEPP)* Other legislation (FM Act, MEMA Act, Water Management Act 2000) and policy regulated by DPI Fisheries, RMS, etc.* LEP, DCP (Part J) and DA process* Rangers* Education campaigns* Volunteer groups*Belongil Catchment Drainage Board (BCDB)	Inadequate	<ul style="list-style-type: none">* Shire wide competing priorities for resourcing of monitoring and compliance action* Insufficient finance allocation for compliance officers* Fact sheets and easily digestible information (digital format and hard copies), e.g. support people's understanding of values and threats and on-site signage* Coordinated and consistent management approach for entire Shire coastline* Coordination of management between responsible parties* Funding* Investigate the roles/responsibilities of the Belongil Catchment Drainage Board and their alignment with Council's responsibilities for catchment and estuary management and the provision of key services	<ul style="list-style-type: none">* NSW Marine Estate TARA Report (BMT WBM, 2017)* 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	None identified	S2-7	Implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A	High	The Community and Stakeholder Engagement Strategy (CSES) will be implemented throughout the CMP development process, which will increase community awareness, achieve community involvement in the process and engage the community in the management of the coastal environment. Implementation of the CSES will 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. Increased education and involvement should support improved compliance by users.
T17	Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment	As above for T16	Inadequate	As above for T16	As above for T16	Adequate	None identified	S2-7	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A	High	Engagement activities should include education activities in addition to activities design to receive feedback on the CMP.
T18	Insufficient or inappropriate governance and management of the coastal environment	As above for T16	Inadequate	<ul style="list-style-type: none">* As above for T16* Lack of specific policy for commercial activity and dogs on beaches in CBMP (dependence on adjacent land managers)* No cumulative impact assessment in CBMP* Multiple agencies with different resources, focuses, projects and funding availability* Inconsistent setting of priorities by different agencies/organisations in the same coastal zone* Broader acknowledgement of Native Title areas is required* Understanding of Land and Sea Country and connection needs to be strengthened* Planning controls need to be strengthened to address the objectives of the CM Act* No Predictive Aboriginal Cultural Heritage mapping has been undertaken for the Byron LGA (for example as has been undertaken by Tweed Shire Council, presented in their Aboriginal Cultural Heritage Management Plan)	<ul style="list-style-type: none">* As above for T16* Community and stakeholder feedback obtained during online surveys, project meetings and workshops	Adequate	None identified	S2-3	Governance audit, including a review of planning controls	High	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 (BMT, 2020). This governance audit should also include a detailed review of planning controls currently in place i.e. SEPPs, LEP, DCP. <p>The follow on action from this in Stage 3 would be to develop draft coastal management planning controls for inclusion in the LEP and DCP, giving consideration to the CM Act and CM SEPP, which Council could implement when updating their LEP and DCP.</p>
T19	Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment	<ul style="list-style-type: none">* Coastal legislation (CM Act, CM SEPP)* Other legislation (Native Title Act, FM Act, MEMA Act, etc)* LEP, DCP (Part J) and DA process* LALC and BOBBAC arrangements* Education campaigns	Inadequate	<ul style="list-style-type: none">* Broader acknowledgement of Native Title areas is required* Understanding of Land and Sea Country and connection needs to be strengthened* Signage and education programs and campaigns about the significance of Aboriginal cultural heritage and use of the area need to be improved to increase awareness* Aboriginal groups, including BOBBAC (Arakwal), Jali LALC and Tweed-Byron LALC need to be included in the decision-making process regarding management actions for the coastal area from project initiation to ensure their views, opinions, knowledge, etc is considered and incorporated	<ul style="list-style-type: none">* NSW Marine Estate TARA Report (BMT WBM, 2017)* Community and stakeholder feedback obtained during online surveys, project meetings and workshops	Adequate	None identified	S2-4 S2-6	Preliminary cultural mapping Aboriginal engagement	High	Preliminary Aboriginal cultural heritage and values mapping. This would form the preliminary work which would potentially recommend more detailed mapping or known and predicted places of Aboriginal cultural significance, and the connections between these places. This more detailed work would be considered in Stage 3 for inclusion as an action of the CMP. The preliminary work would aim to gather existing known data (e.g. AHMS sites and other documented resources) and also consider, through engagement with Aboriginal community representatives, landscape characteristics within the context of traditional Aboriginal settlement, resources, pathway, cultural and spiritual practices. <p>The outcome of this action should be preliminary mapping and associated reporting, along with recommendations for additional knowledge collection, engagement, and strategies for ongoing maintenance and ownership of the mapping project by the relevant Aboriginal communities. These recommendations would be considered in Stage 3 of the CMP.</p> <p>Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.</p>

Appendix H

Preliminary Business Case



Southern Byron Shire Coastline and Belongil Estuary CMP Scoping Study

Preliminary Business Case

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Preliminary Business Case

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1 Preliminary Business Case

This document provides a preliminary business case which demonstrates the need for a Coastal Management Program (CMP) to support the on-going management of the Southern Byron Shire Coastline and Belongil Estuary and provide assurance regarding the governance and funding structures proposed to deliver the program. At this scoping study (Stage 1) phase of development of the CMP, details of the proposed works and quantification of benefits arising is limited. As the specifics of the CMP are determined, the business case will be revised to provide further justification and support for the program to proceed and funding to be released.

The business case has been developed with a view to being a living, standalone document to the CMP, updated as needed to support funding and approval submissions as the CMP shifts from planning into implementation. However, it is recognised that a significant portion of the context and background information will also be updated during this time. As such, for this version of the Business Case, the Scoping Study document should be referenced for the relevant background information.

The business case adopts the following structure:

- Section 1: Preliminary Business Case – Introduction and summary of the strategic context into which the CMP is proposed to be developed, including the problem statement
- Section 2: Proposed Solution and Benefits Realisation – The proposed change to address the identified need and associated benefits that will be realised by adopting the change
- Section 3: Proposed Southern Byron Shire Coastline and Belongil Estuary CMP – A description of the program and associated costs and funding sources
- Section 4: Governance – An outline of proposed governance structures to ensure the successful implementation of program and expenditure of government funding

1.1 Context

The context and background to this business case is contained within the Coastal Management Program Scoping Study (Stage 1) for the Southern Byron Shire Coastline and Belongil Estuary (Rhelm, 2021).

However, this section should be updated in Stage 3 of the CMP to ensure this business case can be read as a stand alone document that supports any funding applications for funding for the implementation of the CMP.

1.2 The Problem Statement

In the absence of a CMP that is certified under the CM Act, many of the environmental, social and economic values of the region will continue to be put at risk from coastal hazards. The following section outlines the key problems with the current coastal management approach adopted by Council and why that is not sustainable.

1.3 The Problem Statement: Risks of not Preparing a CMP

The coastal issues for the study area have been described at length in the Southern Byron Shire Coastline and Belongil Estuary Stage 1 – Scoping Study. The coastal threats faced by Council are complex and, amongst others, include:

- Threat 1 – Beach erosion

- Threat 2 – Shoreline recession
- Threat 3a – Coastal inundation
- Threat 3b – Tidal inundation
- Threat 3c – Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters
- Threat 4a – Coastal watercourse entrance variability
- Threat 4b – Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs)
- Threat 5 – Dune slope instability
- Threat 6 – Coastal cliff instability
- Threat 7 – Conflict over resource access and use
- Threat 8 – Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)
- Threat 9 – Poorly located, poorly maintained and/or inappropriate access and supporting facilities
- Threat 10 – Anti-social behaviour and unsafe practices
- Threat 11 – Passive recreational use (swimming, surfing, dog walking, bush walking, etc.)
- Threat 12 – Active recreational use (recreational boating and fishing, motorised watercraft, drones, four wheel driving, etc.) and commercial fishing
- Threat 13 – Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)
- Threat 14a – Water pollution from urban stormwater and treated effluent discharge
- Threat 14b – Water pollution from agricultural diffuse source runoff
- Threat 14c – Pollution of water, beach sand and other habitat areas from litter, solid waste, marine debris and microplastics
- Threat 15 – Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts on both the open coast and the ICOLLs
- Threat 16 – Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)
- Threat 17 – Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment
- Threat 18 – Insufficient or inappropriate governance and management of the coastal environment
- Threat 19 – Lack of Aboriginal involvement in decision-making and insufficient knowledge sharing regarding cultural heritage and use within the coastal environment.

Council has been managing the associated risks within the study area through the existing (and somewhat limited) planning controls, various ongoing services (e.g. ICOLL entrance management, drainage maintenance, STP compliance monitoring, dune regeneration) and through individual projects on an ad hoc basis as required or as directed. Whilst some of these projects align with recommendations from past management plans (CZMP, estuary management plans or other), implementation of those previous plans has been negligible to date and minimal reduction in coastal risk or hazard has been achieved within this section of the coast since the preparation of the Draft Coastal Zone Management Plan for Byron Shire Coastline (BSC, 2010). The lack of certification of

the 2010 CZMP and subsequent attempts at preparing CZMPs, e.g. for the Byron Bay Embayment has resulted in a draft CZMP that has:

- Not been able to access significant state funding for its recommendations: Council has sought to implement a prioritised subset of actions that it can lawfully do and fund, some of which have been similar in actions to previous draft CZMPs as best it can with its limited available internal funds and from seeking one-off grants from other bodies as applicable. As a consequence, the majority of coastal management actions have been ad hoc and responsive to specific coastal events, as opposed to planned and holistic. Implementation is made harder by the financial constraints associated with a low rate paying base of Council. In addition, until recently there has only been one coastal officer to prepare coastal management plans, apply for funding and implement coastal management actions.
- Struggled to obtain community legitimacy: The lack of formal State Government support has led to community members seeing the draft plans as recommendation from Council that are not necessarily in line with State legislature. As a number of recommendations within the plans relate to or impact upon private property in the foreshore zone, there have been several formal legal challenges on a range of coastal issues.

Since the replacement of the *Coastal Protection Act 1979* in 2016 with the CM Act, it is no longer possible for the CZMP to be Gazetted and for the reasons discussed above, the CZMP does not inform current projects or workplans. The four main risks of inactivity and continued attempts to implement the CZMP include:

- **Funding:** Continued inability to access funds to support management of the coastal zone. Council is prevented from applying for and thus obtaining funds through the NSW Coastal and Estuary Program in absence of a certified plan. Whilst some actions may be funded in absence of a certified CMP through the NSW Coastal and Estuary Program, all applications are contestable, and the activities only allow minor works. Other funding programs may be suitable for implementation of some actions, however the NSW Coastal and Estuary Program remains the key funding mechanism for coast and estuary management.
- **Implementation:** State Government and Council will need to continue to adopt a reactive approach to coastal management, which due to limitations of available funding will necessarily be piecemeal, limited and ad hoc, and likely be subject to the changing direction of Council and the community:
 - Sections of coast, unable to be addressed will continue to be exposed to forecast hazards and potential damage to, or loss of, property and infrastructure and risks to public safety, as well as associated damage to environmental, cultural, social and economic values.
 - The potential will continue for ad hoc actions taken in one location may adversely affect assets and values in other locations.
 - Council's ability to analyse coastal emergency responses or impacts following events continues to be limited.
- **Legitimacy:** Until there is a certified plan there will be continued lack of social legitimacy for implementation of ad hoc action, and continuing potential for further court actions against State Government and Council, with continuing adverse impacts on resources and risks.
- **Scope:** While the draft 2010 CZMP was developed in accordance with State Guidelines applicable at the time, the draft plan is highly focused upon physical hazard reduction. Current guidance regarding coastal management adopts a broader and more holistic suite of

considerations in its identification and prioritisation of the coastal issues and management actions. In the absence of a holistic coastal management program that considers all coastal values and threats to these values, coastal management may not consider a broader range of community, stakeholder economic, climate change, catchment processes and environmental issues and values.

Council's current coastal management scope is limited to maintaining existing coastal services, and ad hoc projects that are often reactionary in nature. This would likely be the ongoing scope of coastal management in the absence of a CMP.

Related to this are a range of secondary risks and costs, including:

- Increased pressure on coastal areas from actions occurring that would not be permitted under a certified comprehensive management plan.
- Increased misalignment between local activities and broader regional actions and NSW policy.
- Uncertainty for community members, property owners and businesses regarding investment within the region. There is a community sentiment that it is trapped within a perpetual planning cycle.
- Inefficiencies and repeat expenditure of Council and State Government funds in response to repeated plans and coastal damages and risks.
- Inability to readily incorporate a collaborative planning approach that recognises a wider scale approach to coastal management, as promoted by the State.

Given the significant issues faced by Council in the development of a certified plan, it is considered unlikely that a do-nothing scenario will lead to any substantive change in this outcome and that Council will continue to struggle to make material improvements in its coastal management. Ultimately, this could result in the realisation of identified hazards and the loss of environmental, social and economic values. Given the economic benefits generated from tourism and environmental values, the long-term costs of a 'do-nothing' approach, may be significant to the region as a whole as well as at a State and national level.

2 Proposed Solution and Benefits Realisation

2.1 Proposed Solution

The proposed solution to the problem statement is to prepare and seek certification of a CMP under the CM Act for the Southern Byron Shire Coastline and Belongil Estuary. The implementation of the CMP and its component stages are discussed in more depth in **Section 4**.

2.2 Benefits of a CMP

A certified CMP would permit a number of significant benefits to be realised, including:

- Improved Funding security
- Improved Social legitimacy
- Holistic coastal planning
- Collaborative management opportunities.

2.2.1 Funding Security

Through provision of a certified CMP, Council has defined an accessible pathway through which funding may be sought to support and supplement the implementation of recommended actions identified within the CMP. Provision of such funds, if awarded, will help break the current cycle of perpetual planning and lack of achieving the approval for implementation phases to commence, helping to overcome the low rate base faced by Council.

Moreover, as ultimate funding for CMP initiatives is predicated on the demonstration of economic viability (i.e. cost benefit analysis), the CMP process also provides an effective mechanism to ensure that funding is directed towards the highest performing value for money options.

2.2.2 Social Legitimacy

Provision of a certified CMP provides both social and legal support to Council in its coastal management. Community members may be less inclined to challenge proposed actions in the NSW Land and Environment Court, where the proposed actions have previously been approved under the CM Act. This will serve to help expedite the roll out of mitigation measures and break the current cycle of planning and interim action.

From a legislative perspective, Council is likely to benefit as Section 733 of the Local Government Act 1993 provides statutory exemption from liability for Councils in respect of advice, actions or omissions by local councils done in good faith relating to the likelihood of land being affected by a coastal hazard. Relevant to the indemnities afforded by actions covered by Section 733, actions covered include the making of a CMP and acting substantially in accordance with the principles and mandatory requirements set out in the Manual. Consequently, preparing and implementing a CMP, in accordance with the Manual will be covered by Section 733.

Social acceptance and enhancement of Council reputation is likely to facilitate stakeholder engagement with community members and interest groups within the study area. It is also likely to engender confidence within the community, stakeholders and government bodies that coastal management is being developed through a regulatory compliant statutory framework with funding available in a way that is designed to incorporate community, cultural, societal, economic and environmental elements in the management process. This, in turn, may increase opportunities to

attract funding, and will help provide certainty in planning, and investment and decision making by for both Council, State Government and the community.

2.2.3 Holistic Coastal Planning

Council's preceding CZMPs do not present a holistic management program in line with current recommended assessments as outlined within the Manual. There is a need to ensure the standards adopted within coastal planning reflect current best industry practice and information. There are a number of places where Council's existing supporting policies require update. For example, Council's *Climate Change Strategic Planning Policy No 14/006* (2014b) utilises sea level rise parameters of 0.17 to 0.38 m by 2065, and 0.26 to 0.82 m by 2100. These levels are based on global projections in sea level rise from the IPCC (2013) Summary Report for Policymakers, as well as DECCW's *NSW Sea Level Rise Policy Statement* (2009), both of which are now outdated.

It is important that coastal managers have a proper and holistic understanding of the risks and opportunities within the coastal zone and the consequences of specific courses of management action. Accurate and detailed information about risk and consequence is necessary to assist decision makers in generating effective management strategies which identify and prioritise future actions and investment. The current CZMPs are comparatively limited in their breadth of management in terms of the risks considered, with a strong focus upon physical hazard identification and management. In contrast, a CMP adopts a greater breadth in risk analysis, providing a mechanism that can encapsulate the full array of risks to the environment, local economy, community and cultural elements of area. A coastal management program that can identify and incorporate the full suite of issues is more likely to generate an optimal outcome in light of uncertainty than a limited or ad hoc approach.

Similarly, it is recognised that NSW catchment management (previously under catchment action plans (CAP)) is now anticipated to be completed as part of CMPs and represents an opportunity for this element to be brought into the overarching strategy rather than operated as a separate management plan by Council.

2.2.4 Collaborative Management Opportunities

Development of a CMP will ensure that Council's coastal management is aligned with the state-wide approach to coastal management. As such, it will also be aligned with the monitoring, evaluation and improvement of concurrently implemented CMPs and facilitate knowledge sharing between agencies.

The NSW Coastal Management Framework provides flexibility around the scope, structure and governance arrangements of a CMP, providing 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 benefit within the Byron Shire. Implementation will allow access to a clearly defined management and governance framework supported by regulatory bodies and subsequent funding opportunities. Further to this, the CMP integrated process allows access to collaboration with adjacent bodies in terms of undertaking studies and in implementing interventions that may have a larger than LGA impact. For example, the study area is part of a wider sediment compartment that incorporates three LGA regions in the Far North Coast Region (Tweed, Byron and Ballina). In addition to the knowledge sharing opportunity this provides, this may also generate cost sharing opportunities on studies and interventions and access to knowledge sharing network developed as part of the CMP process.

On a more local scale, the preparation of the CMP represents a strategic opportunity to improve engagement with the various land owners, coastal managers and stakeholders, gaining broad community support for the program and their commitment to contribute towards the necessary studies and implementation of management actions as agreed within the final CMP.

2.3 Investment Logic Map

The program Investment Logic Map (**Figure 2-1**) summarises the case for Council to develop a CMP, demonstrating the linkages between the current problems faced, the outcomes sought and ultimately the benefits to be realised through a CMP.

It should be noted that the objectives shown in the Investment Logic Map are a summary of the full suite of CMP objectives outlined in the Scoping Study.

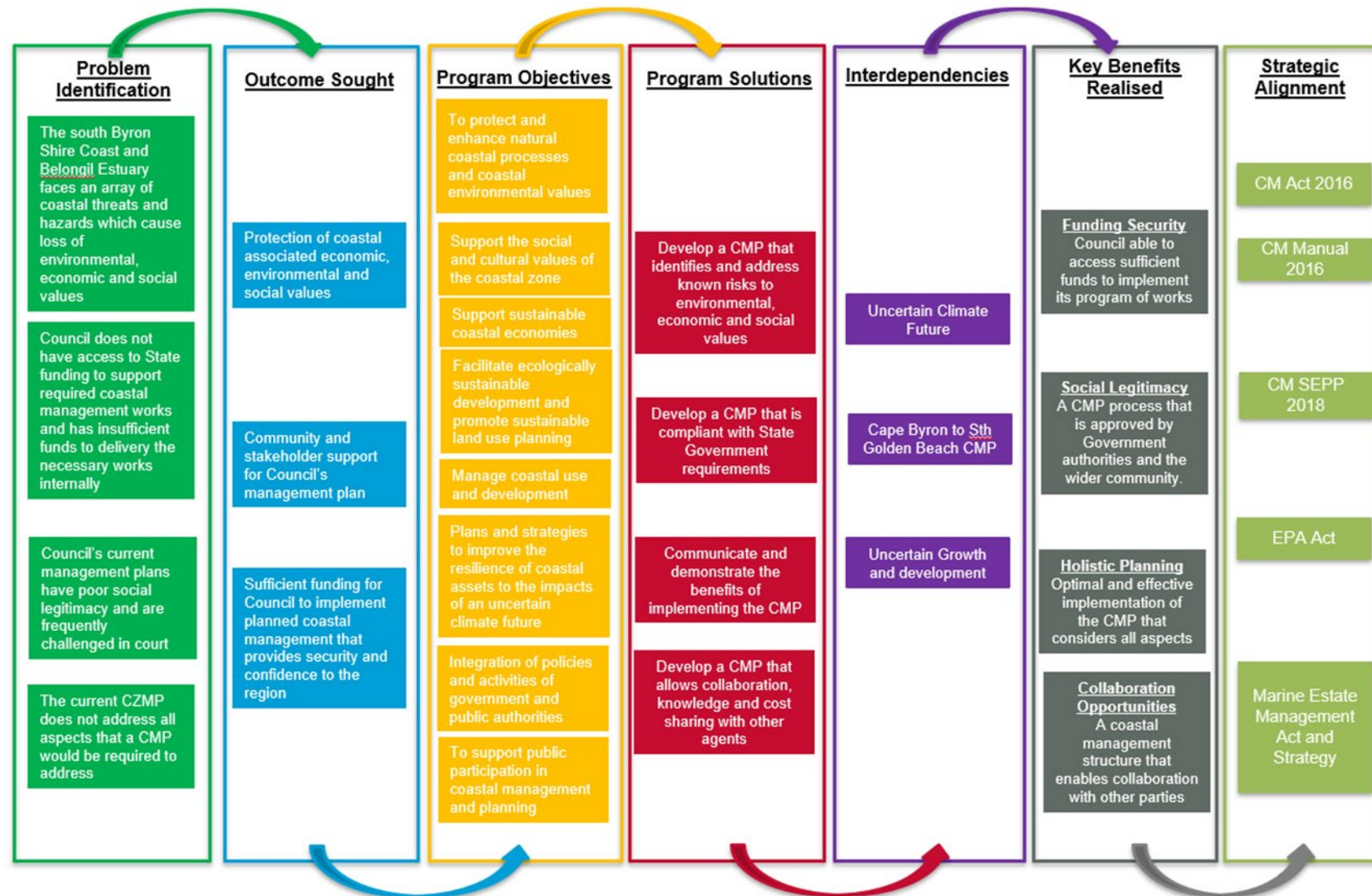


Figure 2-1 Investment Logic Map

2.4 Risks associated with provision of a CMP

While the CMP will address the problem statement and support the realisation of the identified benefits, it is acknowledged that its introduction can lead to a number of risks which require management, monitoring and evaluation over its implementation life and the service life of its resultant actions. Key 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 responsibilities – As the lead of the CMP processes, once certified, Council has responsibility to lead its implementation (Division 4 Section 22 of the CM Act):
 - 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.
 - In particular, without limiting subsection (1), a local council is to give effect to its CMP 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
 - (b) the preparation of planning proposals and development control plans under the Environmental Planning and Assessment Act 1979.
- Under Part 4 (Section 26) of the CM Act, the NSW Coastal Council may undertake audits of Council's implementation of the CMP. If the NSW Coastal Council is of the opinion that Council is not complying with its CMP to a significant extent, the NSW Coastal Council may make recommendations to the Minister on appropriate remedial actions to be taken, including that the Minister refer the matter to the Minister administering the Local Government Act 1993 for further consideration.
- Inability to implement of actions – there remains a risk that actions in a certified CMP may not be able to be implemented due to matters beyond Council's control for example legislative change, State Government directions, unavailability of funding or physical changes to the coastal environment etc. Inability to implement actions may lead to the vision and objectives of the CMP becoming unattainable or loss of community confidence in the CMP for example.
- Conflict with other resource commitments and demands of Council and agencies – Preparing a CMP may result in conflict within Council and contributing agencies and stakeholders, in terms of competing need for scarce resources (including but not limited to funding and staff). However, the CMP preparation process is required to be thorough, so any potential conflicts will need to be identified, and controls implemented to mitigate associated risks.
- Competition with other councils – while there is significant state funding available, the funding is finite and there may be both real and perceived competition between councils for State Government support. This may also affect community opinions regarding perceived inequality in value pending amount of funding invested/made available.

It is recognised that the limited success of CZMP plan process in the past may represent a project risk to future CMP implementation. Although never certified, an audit was undertaken on the actions of the CZMP (refer Section 5.3.1 and Appendix F of the Scoping Study), to not only identify what actions may be relevant to be carried forward into the CMP but also identify lessons learnt in implementation (refer Section 5.3.8 of the Scoping Study). It was found that whilst approximately half of the actions had been implemented in some form over the past twenty years (either completed, in progress/ongoing or partially complete), the progress on many actions was unknown and records regarding the outcomes for actions that had been implemented against intended indicators were unavailable. The lack of certification of the CZMP is likely the cause of this record keeping issue (i.e. no requirement for a timely review), and whilst this issue would be addressed through implementation of a certified CMP as part of the IP&R process, the issue may still remain should a CMP not be certified.



3 Proposed Southern Byron Shire Coastline and Belongil Estuary CMP



Council proposes to develop a CMP for the Southern Byron Shire Coastline and Belongil Estuary. Council will manage the CMP development, implementation and reporting process(es). This includes the preparation, development and review of, and the contents of, all 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*.

3.1 Proposed CMP structure and elements

The stages and processes for implementation of a CMP are clearly defined in the in the CMP Manual. This document is the Preliminary Business Case (as part of Stage 1 – Scoping study) for Council to proceed with the subsequent stages of the CMP framework. The subsequent steps, assuming approval at each stage, are outlined below in **Table 3-1**:

Table 3-1 Requirements for Subsequent Stages 2 to 5 of the CMP Process

Stage	Description in CM Manual (OEH, 2018a)
Stage 2: Determine risks, vulnerabilities and opportunities 	<p>Stage 2 involves undertaking detailed studies that help councils to identify, analyse and evaluate risks, vulnerabilities and opportunities.</p> <p>This includes:</p> <ul style="list-style-type: none"> • Engaging with the community and stakeholders • Refining the understanding of key management issues • Filling knowledge gaps by undertaking technical studies • Identifying threats to coastal values and areas exposed to coastal hazards • Analysing and evaluating current and future risks (detailed risk assessment) • Identifying scenarios for environmental, 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 • Identifying timing and priorities for responses, thresholds and lead times.
Stage 3: Identify and evaluate options 	<p>Stage 3 involves the identification and evaluation of management options.</p> <p>This includes:</p> <ul style="list-style-type: none"> • Identifying and collating information on management options • Evaluating management actions, considering their feasibility, viability and acceptability to stakeholders • Selecting preferred management actions and determining priorities • Engaging public authorities about implications for their assets or responsibilities • Evaluating mapping options and implications if a planning proposal is being prepared • Identifying pathways and timing of management actions • Preparing a business plan for implementation.

Stage	Description in CM Manual (OEH, 2018a)
Stage 4: Prepare, exhibit, finalise, certify and adopt the CMP 	<p>Stage 4 includes:</p> <ul style="list-style-type: none"> • Preparing a draft CMP • Exhibiting the draft CMP and any related planning proposal • Reviewing and adopting the draft CMP • Submitting the draft CMP to the Minister administering the CM Act, for certification • Publishing the certified CMP in the Gazette • Making the CMP available to the community. <p>Prior to exhibition, councils may seek advice from DPIE on the draft CMP.</p>
Stage 5: Implement, monitor, evaluate and report 	<p>Stage 5 involves:</p> <ul style="list-style-type: none"> • Implementing actions in the published CMP through the Integrated Planning and Reporting (IP&R) framework and land-use planning system • Implementing actions in partnership with adjoining councils and public authorities where relevant • Implementing an effective monitoring, evaluation and reporting (MER) program • Monitoring indicators, trigger points and thresholds • Reporting to stakeholders and the community on progress and outcomes through the IP&R framework • Reviewing and updating the CMP at least every 10 years. <p>The evaluation of program outcomes will contribute to council's review of its Community Strategic Plan.</p>

3.2 Previous Investigations

Council has undertaken numerous studies and assessments in coastal management over the past two decades. While not developed specifically for the CMP these studies will be utilised in the CMP to allow both time and costs saving in the CMP development. Extensive review of these existing studies and assessments has been undertaken as part of a literature review (Appendix D of the Scoping Study), which was undertaken to identify key 'knowledge gaps' of future studies that may be required. This literature review and identification of knowledge gaps and potential required studies is discussed in depth in Section 7 of the Scoping Study (Rhelm, 2021). A summary of the key documents that may be utilised in the development of the CMP is listed below, noting that this 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 (refer to Section 5.3 of the Scoping Study). 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.
- An assessment of community uses has 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) that 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.

3.3 Milestones and Timeframes

As stated in the Coastal Management Manual, preparation of a CMP follows a five stage process. The CMP Scoping Study completes Stage 1. A summary of what is involved in subsequent Stages 2 to 5, as outlined in the Coastal Management Manual (OEH, 2018a), are provided in **Section 3.1**. The projected steps, timelines and costs for these tasks are shown below in **Table 3-2**.

As shown in **Table 3-2** there are variabilities in the timelines for each element dependent on the level of investigation and assessment to be undertaken in knowledge development and the scope of coordination with relevant government bodies and authorities.

As shown in **Table 3-2** the projected timelines, key tasks and costs are outlined for each phase. These are:

- Stage 2 timing generally per Operational Plan 2021-2022
- Stage 3 timing per Operational Plan 2021-2022
- Stage 4 timing per Operational Plan 2022-2023

Table 3-2 CMP Forward Plan

Item	Recommended Studies / Components	Timing	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
Stage 2: Risks, Vulnerabilities and Opportunities						
S2-1	Coastal Hazard Assessment (2021) – Review and Update (for the entire Byron Shire LGA coastline). <i>A consultant is presently being engaged with the project due to commence in July 2021.</i> <ul style="list-style-type: none"> • Sediment budget and quantified conceptual sand movement model • Probabilistic assessment of beach erosion and shoreline recession • Coastal inundation (dune and seawall wave runup and overtopping) • Tidal inundation • Coastal entrance instability • Cliff instability • Erosion and inundation of foreshores. 	Op. Plan 2021-2022	Project has been funded and is due to commence July 2021.		Council	DPIE - EES NPWS
S2-2	Consider mapping of erosion escarpment as an outcome of Coastal Hazard Assessment (2021).	Op. Plan 2021-2022	\$ 10,000	\$ 20,000	Council	DPIE - EES
S2-3	Audit of Council's coastal planning framework. This would involve identification of all coastal planning controls and processes, and evaluation of the effectiveness of this framework in managing existing and future risk to the coastal zone and ensuring preservation of coastal values. The audit would also consider how Council's coastal planning framework aligns with State Government Agency frameworks and planning controls. This could be undertaken as a desk top assessment only, but would benefit from workshops or other engagement with relevant Council and Agency representatives (e.g. NPWS, Crown Lands). This would inform Stage 3 recommendations for future planning provisions and updates to Council's LEP, DCP and other relevant documents. As part of this study also consider mapping of a coastal vulnerability area for the study 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).	Op. Plan 2021-2022	\$ 10,000	\$ 20,000	Council	DPIE - EES, NPWS, Crown Lands (in principle support) DPI (Marine Parks, Fisheries)
S2-4	Investigate and ground truth discrepancies between Council's mapping of Littoral Rainforest and Coastal Wetlands with the CM SEPP mapping and identify whether a planning proposal to amend the SEPP mapping is required.	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	DPIE - EES (incl NPWS)
S2-5	Identification of water quality pollution sources (e.g. potential sources of bacterial contamination in ICOLLs, acid runoff in the Belongil catchment, consideration of West Byron development, and macro/micro plastics) and composition to inform management strategies developed in Stage 3 of the CMP. It is expected that this assessment would be undertaken largely as a desk top assessment, with some ground truthing. The outcome would include recommendations for detailed water quality monitoring that may be included in CMP options assessed in Stage 3.	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	DPIE - EES
S2-6	Preliminary Aboriginal cultural heritage and values mapping. This would form the preliminary work which would potentially recommend more detailed mapping or known and predicted places of Aboriginal cultural significance, and the connections between these places. This more detailed work would be considered in Stage 3 for inclusion as an action of the CMP. The preliminary work would aim to gather existing known data (e.g. AHIMS sites and other documented resources) and also consider, through engagement with Aboriginal community representatives, landscape characteristics within the context of traditional Aboriginal settlement, resources, pathway, cultural and spiritual practices.	Op. Plan 2021-2022	\$10,000	\$15,000	Council	DPIE - EES BOBBAC
S2-7	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A. The objectives of engagement in Stage 2 will be to communicate the outcomes of the coastal hazard assessment (2021).	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	DPIE - EES

Item	Recommended Studies / Components	Timing	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
S2-8	Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.	Op. Plan 2021-2022	\$ 5,000	\$ 10,000	Council	BOBBAC LALCs
S2-9	Development of an integrated hydrodynamic and water quality model for Tallow Creek as a decision-making tool for Council's use in managing water levels in Tallow Creek whilst maintaining suitable dissolved oxygen concentrations. Study includes: <ul style="list-style-type: none">• Sediment oxygen demand studies (completed by Waddy (2019a and b), refer Appendix D)• Multi-depth water quality monitoring• Development of a hydrodynamic model• Development of a coupled hydrodynamic – biogeochemical model.	Op. Plan 2020-2021	Already funded	Already funded	Council	DPIE - EES
S2-10	Review and update Tallow Estuary entrance opening strategy (EOS) and environmental management plan (EMP) including: <ul style="list-style-type: none">• Ensuring consistency with the understanding of coastal processes (updated in Stage 2, excluding hydraulic modelling of berm scour which could be done as part of future flood studies)• Consideration of findings of the coupled biogeochemical and hydrological model prepared by SCU (refer S2-9) as a decision support tool for Council management of water levels whilst maintaining suitable dissolved oxygen concentrations• Consideration of the risk of nuisance flooding to low lying assets*• Incorporation of cultural knowledge on the processes and management of the estuary and entrance management**• Consideration of inclusion of a clear and adaptable decision support framework for entrance opening for varying scenarios (e.g. of water level, berm height, rainfall, water quality, flood risk and seasonality)• Engagement with key stakeholders• Update the EOS and EMP in line with best practice. <p>* Involves a survey of low lying assets at risk of inundation from several closed entrance water level scenarios. It is noted that the ICOLL opening strategies would undergo further testing and possible updates as part of the Floodplain Risk Management Process (separate to the CMP).</p> <p>** See S2-8 which provides for engagement of Aboriginal cultural knowledge holders.</p>	Op. Plan 2021-2022	\$ 10,000	\$ 30,000	Council	DPIE - EES BOBBAC NPWS
S2-11	Review and update Belongil Estuary opening strategy (including decision support framework) and environmental management plan to ensure consistency with the understanding of coastal processes (updated in Stage 2, excluding hydraulic modelling of berm scour which could be done as part of future flood studies). Further clarification needs to be included, i.e. consideration of: <ul style="list-style-type: none">• Ocean water levels• Forecast rainfall• Water quality parameters• Best practice management to minimise the risk of fish kills• Effectiveness of berm scraping• The alignment and depth of excavation• Lessons learnt under the current arrangements• Outcomes of engagement with key stakeholders. <p>It is noted that the ICOLL opening strategies would undergo further testing and possible updates as part of the Floodplain Risk Management Process (separate to the CMP).</p>	Op. Plan 2021-2022	\$ 2,000	\$ 5,000	Council	DPIE - EES NPWS
Estimate Stage 2 Subtotal			\$ 62,000	\$ 130,000		
Stage 3: Identify and Evaluate Options						

Item	Recommended Studies / Components	Timing	Cost (Low)	Cost (High)	Lead Agency / Organisation	Support Agency / Organisation
S3-1	Following coastal planning framework audit (S2-7) and the Coastal Hazard Assessment (S2-1): develop draft coastal management planning controls for inclusion in the LEP and DCP and update coastal mapping in the DCP, giving consideration to the CM Act and CM SEPP, which Council could implement when updating their LEP and DCP.	Op. Plan 2021 - 2022	\$ 10,000	\$ 20,000	Council	N/A
S3-2	Identify Potential Management Options and evaluate through Multi-Criteria Analysis (MCA) of Options and determine actions for detailed Cost benefit Analysis. This should include a detailed risk assessment to address the complex issues, potentially high and unacceptable risks, significant uncertainty or complex management choices identified in the first-pass risk assessment (Stage 1). If major projects are recommended that require a full scale Cost Benefit Analysis, then this would need to be undertaken as part of Stage 3 (see additional study in Table 9-3).	Op. Plan 2021 - 2022	\$ 30,000	\$ 60,000	Council	DPIE - EES
S3-3	Preparation of a business plan for the CMP. This will outline the full cost of the program, cost-sharing arrangements, funding and financing mechanisms and scheduling of implementation.	Op. Plan 2021 – 2022	\$ 15,000	\$ 30,000	Council	DPIE - EES
S3-4	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A. The objectives of engagement in Stage 3 will be to gain feedback on management potential management options identified. Engagement activities likely to include website updates, online survey, information drop-in sessions, and direct engagement with key stakeholders. Stage 3 engagement could be combined with Stage 2 engagement.	Op. Plan 2021 - 2022	\$ 5,000	\$ 10,000	Council	DPIE - EES
S3-5	Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.	Op. Plan 2021 - 2022	\$ 5,000	\$ 10,000	Council	BOBBAC LALCs
Estimate Stage 3 Subtotal			\$ 65,000	\$ 130,000		
Stage 4: Prepare, exhibit, finalise, certify and adopt the CMP						
S4-1	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.	Op. Plan 2022 - 2023	\$ 30,000	\$ 40,000	Council	DPIE - EES
S4-2	Planning Proposal (only as required) to adopt the coastal vulnerability mapping (see S2-3) 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 community consultation conducted through the course of the CMP can also be conducted in tandem for the planning proposal.	Op. Plan 2022 - 2023	\$ 10,000	\$ 20,000	Council	DPIE - EES DPIE - Planning & Assessment
S4-3	Finalising the CMP (with Community and Stakeholder public exhibition feedback).	Op. Plan 2022 - 2023	\$ 10,000	\$ 20,000	Council	DPIE - EES
S4-4	Ongoing implementation of the Community and Stakeholder Engagement Strategy (CSES) in Appendix A. The key objective of engagement in Stage 4 will be to gain feedback on draft CMP. Engagement activities likely to include website updates, fact sheets, information drop-in sessions, online and hard copy submissions, and direct engagement with key stakeholders.	Op. Plan 2022 - 2023	\$ 5,000	\$ 15,000	Council	DPIE - EES
S4-5	Activities involving engagement of Aboriginal cultural knowledge holders including reimbursement of Aboriginal cultural knowledge holders at stakeholder consultation forums for coastal management, such as workshops like those undertaken for this Stage 1 CMP Scoping Study. This would enable sharing of cultural knowledge by Traditional Owners in coastal management. This was feedback obtained from Traditional Owners during consultation undertaken for this Scoping Study. There would be a budget for Aboriginal engagement for Traditional Owner knowledge holders.	Op. Plan 2022 - 2023	\$ 5,000	\$ 10,000	Council	BOBBAC LALCs
Estimate Stage 4 Subtotal			\$ 60,000	\$ 105,000		
Estimate CMP Stages 2 to 4 Total			\$ 187,000	\$ 365,000		

3.4 Budget and Funding

This business case seeks the release of funding to support ongoing CMP development as outlined within the forward plan. As the CMP develops, the business case will be advanced to seek implementation funding as relevant.

3.4.1 Current expenditure

Currently, Council funding for coastal management actions comes out of general revenue and is allocated on a project-by-project basis, with input from grant funding if available. There is no set funding amount allocated, with funding and budgets to be developed on a yearly basis. It is widely acknowledged that funding is inadequate to address the coastal issues it faces, and that additional funding is required.

Current expenditure for Council on coastal activities includes, but is not limited to:

- Carrying out environmental monitoring associated with permit conditions for ICOLL entrance management, with funding of ~\$90K/year (ongoing) from the Infrastructure Services Directorate with no grant funding mechanism.
- CMP preparation. Council has allocated \$145.5K for 2020/21 financial year for the preparation of this Scoping Study inclusive of 1:1 Coast and Estuary grant and funding of the Coastal and Estuary Officer position.
- Design investigation for the modification of the Jonson Street Protection Works, Main Beach. Council has allocated \$300K for the design component inclusive of 1:1 Coast and Estuary grant funding.
- Collection of surface water quality data in the Belongil and Tallow Creek estuaries based on Environment Protection Licence requirements associated with the Byron Bay STP in the Belongil catchment. Allocated within the utilities budget (not specific to coastal management).
- Maintenance by open spaces: yearly budget of \$25K for maintenance, all of which is spent on reactive maintenance of Council's 65 beach access ways.
- Council management of Crown land as Crown land manager – Minimal funds raised through licensing of commercial activities (e.g. surf school/ kayak tour operators) on Crown Lands. The funds must be spent on management of the same land/reserve.

Previous coastal activities undertaken include:

- Preparation of the draft CZMP for Byron Bay Embayment (total expenditure \$153.5K (47% of which was funded by the Environment Levy).
- Coastal hazard monitoring (yearly expenditure approximately \$4K).
- CMP for New Brighton and South Golden Beach Embayments (i.e. for the northern coastline) Scoping Study Preparation (total expenditure \$65.5K).

Community based groups undertake coastal activities such as:

- Beach clean ups and similar projects e.g. Clean Up Australia day, Positive Change for Marine Life, Tangaroa Blue – mostly voluntary.
- Dunecare and Landcare – very under resourced with minimal funding (typically \$5K grants) and minimal people on ground.

It is understood that DPIE-Crown Lands recently commissioned approximately \$500,000 in emergency protection works to protect a Holiday Park against coastal erosion. It is noted that this location is outside the Southern Byron and Belongil Estuary CMP Stage 1 study area. Other private

businesses/organisations may be willing to contribute to activities that would have a direct benefit to their operations.

3.4.2 Estimated Costs (CMP Development and Delivery) and Funding Request

The estimated costs of preparing the CMP (Stages 2 to 4) are highly variable depending on the funding available and the scope for cost sharing activities. The process and expected costs are shown in **Table 3-2**.

An estimated range for the CMP process for the southern Byron Shire coastline and the Belongil estuary is \$187,000 - \$365,000:

- Stage 2 \$62,000-\$130,000, with timing generally per Op. Plan 2021-2022
- Stage 3 \$65,000-\$130,000 with timing per Op. Plan 2021-2022
- Stage 4 \$60,000-\$105,000 with timing per Op. Plan 2022-2023.

The variability in costs is largely due to the uncertainty of the level of detail required in some studies and the extent at which they will be undertaken, which will dictate cost sharing opportunities (e.g. potential for cost sharing options with other government bodies, such as adjacent councils).

The implementation of any Coastal Management actions recommended within the CMP are impossible to cost at this stage, given the uncertainty over what interventions may be employed. In accordance with relevant funding stream and assurance requirements, interventions will be put through Cost Benefit Analysis and Multi- Criteria Analysis (or similar), as applicable, to demonstrate value for money and assist in identification of the best value option. Ultimately, the costs associated with the CMP development will need to be offset by the benefits realised from implementing the CMP in comparison to a base case scenario in which Council does not pursue a CMP and continues to manage coastal hazards through an ad hoc basis.

3.4.3 Funding Availability

The NSW Government has reformed funding availability for coastal areas, with an \$87 million dollar package available for coastal management and \$46 million available for the marine estate. This funding is available for Council to apply for assistance in the preparation of the CMP and required studies. State funding is available from the NSW Coastal and Estuary Grants Program, with funding expectations that it will match monetary contributions from Council in a 2:1 ratio (State:Council). This requires Council to incorporate relevant elements of the Biodiversity Conservation Strategy (e.g. relating to coastal wetlands, littoral rainforest) into Council's CMPs, to increase potential for funding support through the State Government Coastal and Estuary Grants Program.

Other funding and grant options may be available for further investigation, for example the NSW Environmental Trust. Additional funding may be available through research institutions, partnerships with private groups and through community participation. Emergency funding sources (e.g. 'green bonds') may also represent novel funding sources to be considered into the future.

3.4.4 Value for Money

Given the acknowledged importance of the coastal area to the Byron Shire and the wider state of NSW as a tourist destination and desired place to live there is significant incentive to ensure the responsible management of its coastal environment. While the costs of undertaking the CMP process are substantial, there is clear value in proceeding with the CMP process in comparison to the current, highly constrained management options accessible to Council, which puts both current

and future environmental, social and economic values of this unique area at risk. Quantification of the magnitude of this relative net present value will be undertaken as the CMP development continues.

4 Governance

Council will manage the development and implementation of the CMP. This includes the preparation, development and review of, and the contents of, all 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*.

However, while the responsibility for CMP development and implementation rests with Council, the current coastal management governance framework is complex with many organisations from the Federal, State, Regional to Local level involved in governing the coastline and waters of the study area. The roles and responsibilities therein are largely tied to land tenure, however, in some cases there are multiple governance overlays (e.g. due to the presence of features such as the Cape Byron Marine Park which triggers multiple authorities). **Figure 4-1** provides a summary of the land tenure and governance arrangements with **Figure 4-2** providing the corresponding owners and stakeholders.

The CMP process is structured to be developed such that the relevant organisations are consulted and included in the CMP process led by Council and that their guidelines and frameworks are incorporated in the CMP process.

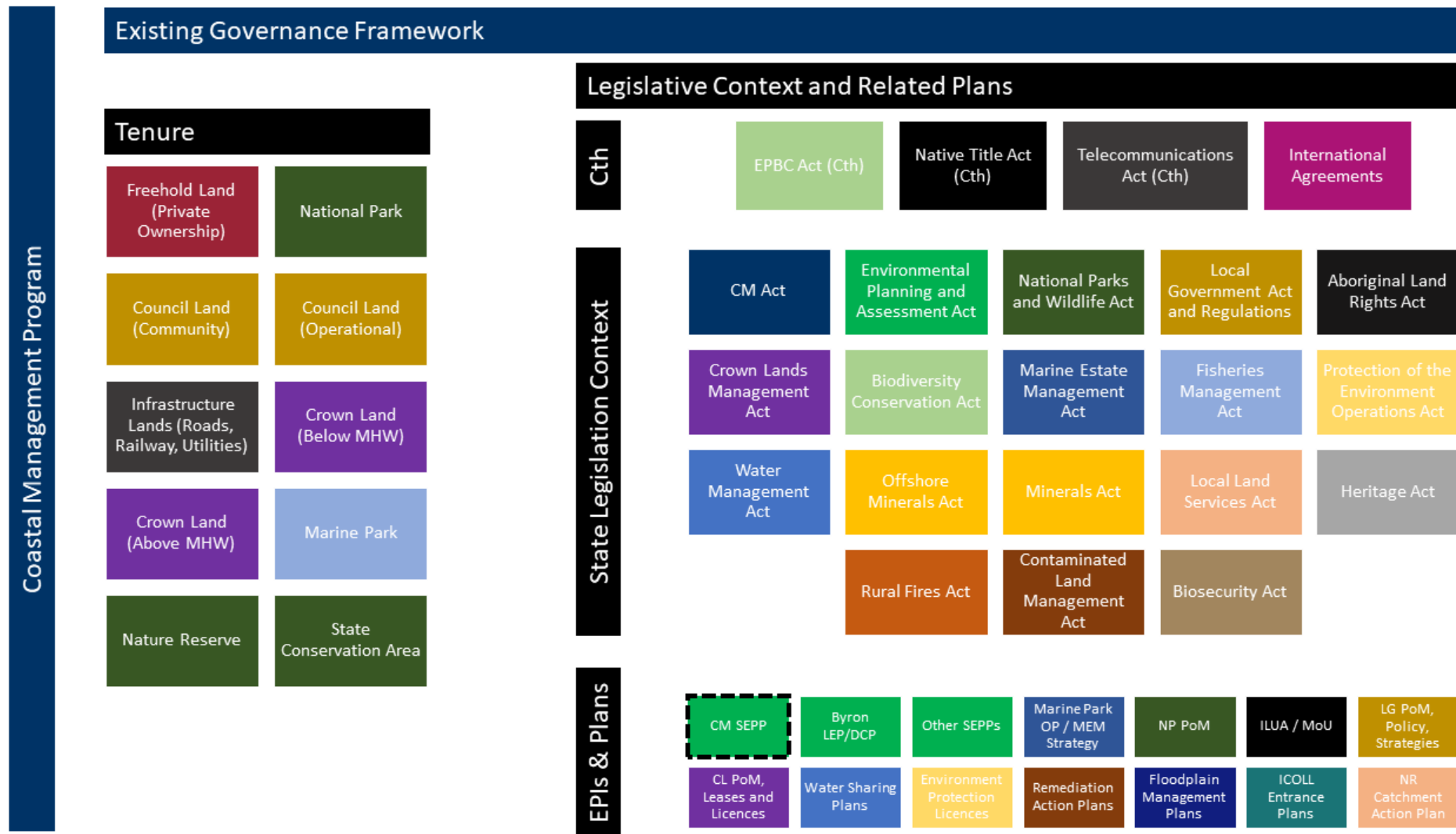


Figure 4-1 Existing Governance Framework

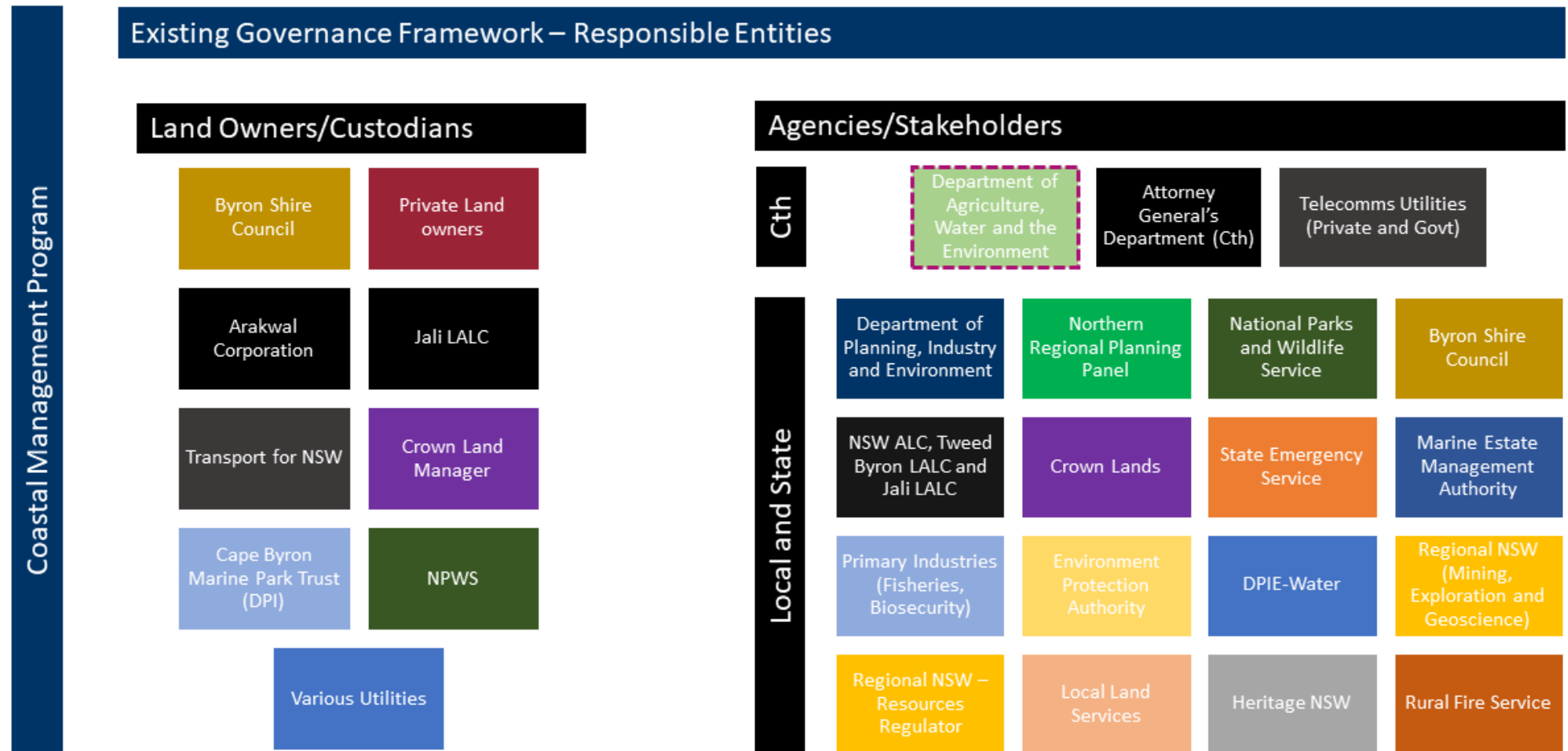


Figure 4-2 Existing Governance Framework – Responsible Entities

4.1.1 CMP Development

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 (BMT, 2020).

Potential governance and management arrangements for the CMP are outlined in **Table 4-1** and align with those presented by BMT (2020), with a few additions such as BOBBAC (Arakwal) and the Jali LALC.

Table 4-1 Potential CMP Governance and Management

Entity	Responsibility
Byron Shire Council	Lead agency for development, coordination and implementation of CMP
State Agencies/Land Managers Department of Planning, Industry and Environment (DPIE) – Environment, Energy and Science DPIE – Water DPIE – Crown Lands DPI – Fisheries (incorporating Marine Parks) National Parks and Wildlife Services (within DPIE) NSW Environment Protection Authority Transport for NSW – Road, Rail, Maritime, and Maritime Infrastructure Delivery Office (MIDO) Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) RNTBC Jali LALC <i>A high level Working Group or Task Force (coordinated by DPIE) of Director level/Senior staff from the various agencies may assist in achieving buy-in to the CMP. This group may advise Ministers during the development of the CMP to ensure adequate cross-collaboration of agencies.</i>	DPIE – Project partner and funding provider; Oversight of development through conditions of funding; Review final draft documents and provide comments in line with coastal management framework requirements to assist in submission for certification to the Minister. All – Collaborate to prepare, provide input and feedback on, and review draft CMP documents. If actions are to be carried out by a public authority, the public authority will either endorse the action or if not endorsed, will request amendments to the action. All – Collaboration/carrying out of actions as endorsed and defined in final CMP document.
Coastal Advisory Committee Byron Shire Council Agencies (above who have direct land ownership and management responsibilities in the CMP study area) Regional Bodies (Local Land Services (LLS), Regional Development Australia (RDA) Northern Rivers, Tweed Byron LALC, etc) RFS, SES and NSW Police (emergency management) (particularly for implementation of the EASP, potentially through Council's Incident Management System Local Emergency Management Committee) 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 Section 355 of the <i>Local Government Act 1993</i>)

4.1.2CMP Implementation

Implementation of the CMP is dictated by the *Coastal Management Act 2016*, specifically Division 4 (22 and 23), as listed in **Table 4-2** which dictate that Council is responsible for implementation of the coastal management program, per the guidelines listed below. The key responsibilities for each stage and element of the future CMP process are shown in the forward plan in the Scoping Study.

Table 4-2 Responsibilities under the CM Act

CM Act Division 4
<p>Councils:</p> <p>(22). Implementation of coastal management program by local councils</p> <p>(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.</p> <p>(2) In particular, without limiting subsection (1), a local council is to give effect to its coastal management program in:</p> <p>(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</p> <p>(b) the preparation of planning proposals and development control plans under the Environmental Planning and Assessment Act 1979.</p>
<p>Public Authorities</p> <p>(23). Other public authorities to have regard to coastal management program and coastal management manual</p> <p>(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.</p> <p>(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.</p>

4.2 Stakeholder and Community Engagement

Given the breadth of agencies with authority or responsibilities of relevance to the CMP, the Stakeholder and Community Engagement planning for the CMP is critical.

A Community and Stakeholder Engagement Strategy was developed for the CMP Scoping Study and is provided as an appendix in the main document. The strategy outlines:

- Which individuals and organisations should be involved in the review, preparation and implementation of the CMP
- How and when they will be offered engagement opportunities
- How their input will be incorporated into the planning process.

Stakeholder and Community engagement is a critical requirement of the CMP process and is intended to facilitate the preparation of a representative CMP and enable the planning process to remain flexible and responsive to changing values, hence active engagement is considered critical to the CMP progress. Community and stakeholder support for the actions included in a CMP will also be beneficial during the implementation phase.

The engagement strategy was developed in accordance with the staged process prescribed by the CMP guidelines as listed below, with the Scoping Study (Rhelm, 2021) being Stage 1.

Stage 1: Identify the scope of the CMP

Stage 2: Determine risks, vulnerabilities and opportunities

Stage 3: Identify and evaluate options

Stage 4: Prepare, exhibit, finalise, certify and adopt the CMP

Stage 5: Implement, monitor, evaluate and report

This engagement strategy was prepared in accordance with the:

- *Coastal Management Act 2016* (CM Act) (specifically Clause 16 Consultation)
- *Our future on the coast – NSW Coastal Management Manual Part B: Stage 1 – Identify the scope of a coastal management program* (OEH, 2018c)
- *Guidelines for Community and Stakeholder Engagement in Coastal Management* (OEH, 2018e) (“the Guidelines”)
- *Quality Assurance Standard for Community and Stakeholder Engagement* (IAP2, 2015)
- Byron Shire Council’s *Policy: Community Engagement 2018* (“the Policy”) (BSC, 2018e)
- Arakwal Memorandum of Understanding 2019-21 Implementation Plan (BSC and BOBBAC, 2019).

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

Although not required, Council placed this scoping study on their website for public comment, welcoming public feedback in the first half of 2021.

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 will be sought on this draft Scoping Study from the relevant state agencies and comments will be considered and incorporated into this Scoping Study.



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