

Draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment



Byron Shire Council recognises the Bundjalung of Byron Bay Aboriginal - Arakwal People as traditional owners and custodians within this local Government area. Byron Shire Council and the Aboriginal community are committed to working together in the process of reconciliation.

Council recognises that the most enduring and relevant legacy the Indigenous people offer, is their understanding of the land and local and deep commitment to place.

Acknowledgments

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Document History



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Definitions

ARI	Average Recurrence Interval - the long-term average number of years between the occurrence of a design storm event.
Beach	The area of unconsolidated or other readily erodable material between the highest level reached by wave action and the place where tidal or lake waters reach a depth of 10 metres below Australian Height Datum.
Beach Erosion	The offshore movement of sand from the sub-aerial beach during storms or an extreme or irregular event that may not involve a storm or severe weather.
Beach nourishment	The artificial supply of sand to supplement the total net quantity of sand within an existing beach system and/or to build up an eroded beach or dune, with sand from another location.
Beach scraping	The transfer of sand from the lower beach to the upper beach (within the beach system), usually by mechanical equipment, to re-distribute the sand to parts of the beach above tide level.
BSC/Council	Byron Shire Council
BSC EASP Internal Support Procedure	BSC EASP internal support procedure provides detailed operational information on the implementation of the EASP.
Buffer zone	An appropriately managed and unalienated zone of unconsolidated land between beach and development, within which coastline fluctuations and hazards can be accommodated to minimise damage to the development.
C&EO	Coastal and Estuary Officer (BSC)
CERT	Coastal Erosion Response Team (internal team – Byron Shire Council)
Coastal area	The land and sea area bordering the shoreline.
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works	activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters and includes seawalls, revetments, groynes and beach nourishment.					
Coastal structures	Structures designed to enhance coastal amenity and use, <u>not</u> necessarily coastal protection works.					
Coastal zone	As per SECT 4 of the CP Act					
	"coastal zone" means:					
	(a) the area within the coastal waters of the State as defined in Part 10 of the Interpretation Act 1987 (including any land within those waters), and					
	(b) the area of land and the waters that lie between the western boundary of the coastal zone (as shown on the maps outlining the coastal zone) and the landward boundary of the coastal waters of the State, and					
	(c) the seabed (if any) and the subsoil beneath, and the airspace above, the areas referred to in paragraphs (a) and (b).					
	Note : The coastal zone consists of the area between the western boundary of the coastal zone shown on the maps outlining the coastal zone and the outermost boundary of the coastal waters of the State. The coastal waters of the State extend, generally, to 3 nautical miles from the coastline of the State.					
	In accordance with SECT 4A of the CP Act:					
	(3) The following principles apply to the determination of the western boundary of the area to be included in the coastal zone:					
	(a) the boundary is to be generally one kilometre landward of the western boundary of the coastal waters of the State,					
	(b) the boundary is to be generally one kilometre landward around any bay, estuary, coastal lake or lagoon,					
	(c) the boundary is to follow the length of any coastal river inland generally at a distance of one kilometre from each bank of the river:					
	(i) to one kilometre beyond the limit of any recognised mangroves on or associated with the river, or					
	(ii) if there are no such recognised mangroves-to one kilometre beyond the tidal limit of the river,					
	(d) the boundary is to be shown to the nearest cadastral boundary or easily recognisable physical boundary (determined in consultation with relevant councils)					
Coastline	The line that forms the boundary between the Coast and the Shore, i.e. the foot of the cliff or the foot of the dunes. Commonly, it is the line that forms the boundary between the land and the water.					
Code of Practice	Code of Practice under the Coastal Protection Act 1979					
Combat Agency	The agency identified in the State Disaster Plan as the agency primarily responsible for responding to a particular emergency.					
CM Act	Coastal Management Act 2016					
CP Act	Coastal Protection Act 1979					
СМР	Coastal Management Program					
СΖМР	Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment					
CZMP BBE	Coastal Zone Management Plan for the Byron Bay Embayment (2016)					



DCP	Development Control Plan				
DCP 2010	Byron Shire Development Control Plan 2010				
DCP 2014	Byron Shire Development Control Plan 2014				
Depth of Closure	The depth beyond which no significant longshore or cross-shore sand transports take place due to littoral transport processes. The closure depth can thus be defined as the depth at the seaward boundary of the littoral zone.				
Design storm bite	The predicted likely maximum storm bite used for planning and design purposes relevant to a particular location.				
Design storm event	1:100 year recurrence interval predicted extreme storm event.				
DIS	Director Infrastructure Services (BSC)				
DPE	Department of Planning and Environment, NSW Government.				
DSEE	Director Sustainable Environment and Economy (BSC).				
Dune	Ridges or mounds of loose wind blown sand at the back of the beach.				
Dune maintenance	Ongoing activities that are aimed at maintaining dunes and associated elements e.g. dune vegetation and dune protective structures, in good physical and/or ecological condition Activities may include weed/pest/fire control, replanting, fertilising, repair of fences and access ways, and publicity.				
Dune management	All activities associated with the restoration, rehabilitation and/or maintenance of the role and values of dune systems. Activities and techniques include planning, dune reconstruction, revegetation, dune maintenance, access management/control, and community involvement.				
EASP	Emergency Action Sub Plan for beach erosion events.				
EASP Guide Note	Coastal zone management guide note Emergency Action Sub Plans (OEH, 2011)				
Eastern Precincts BBE	Beach precincts in the Eastern area of the Byron Bay Embayment (Cape Byron to Main Beach) including Wategos/Little Wategos, The Pass, Clarkes Beach and Main Beach).				
Economic use and non- use values of beaches	<i>Non-use values</i> are those held by people who do not use the beach, and do not intend on using the beach in the future. They may, however, value the fact that it continues to provide a habitat for flora and fauna and that future generations will benefit from its existence.				
	those benefits derived from recreation activities.				
ECPW Guide	Guide to the Statutory Requirements for Emergency Coastal Protection Works (OEH, March 2011)				
Emergency	A situation in which Beach Erosion is imminent, occurring or has occurred, and the Beach Erosion endangers, or threatens to endanger the safety or health of people or destroys or damages, or threatens to destroy or damage any property and which requires a significant and coordinated response ¹				
EMPLAN	Tweed Byron Local Emergency Management Plan (EMPLAN), September 2016				
Erosion escarpment	A natural feature that persists within a dunal system delineating the landward limit of beach erosion. On an eroding coastline, this feature will move landward over time masked by episodes of natural beach recovery, coastal protection works and / or fill. For planning or setback triggers, the top of the erosion escarpment in its most landward position is to be used.				

¹ Source adapted from definition in NSW State Emergency Management Plan, 2012.



Groynes	Low walls built attached and perpendicular to a shoreline to trap longshore sand transport.				
Guidelines	Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013), referred to in section 55D CP Act.				
Hazard Study	Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013)				
ILUA (Indigenous Land Use Agreement)	An agreement between a native title group and others about the use and				
	native title has, or has not yet, been determined to exist. They can be part of a native title determination, or settled separately from a native title claim.				
Intended Emergency Actions	Means the actions in section 4 of this EASP subject to the provisions of this EASP.				
ISR	Infrastructure Services Representative (BSC) for the EASP.				
JSPW	Jonson Street Protection Works, coastal protection works (seawall), located at the seaward limit of Jonson Street, Byron Bay town centre.				
Landowner Temporary Coastal Protection Works	Temporary coastal protection works are defined under section 4C of the <i>Coastal Protection Act 1979</i> and may be placed by or on behalf of a landowner to reduce the impact of beach erosion in compliance with the requirements of that section.				
LEMC	Local Emergency Management Committee (refer EMPLAN)				
LEMO	Local Emergency Management Officer (refer EMPLAN)				
LEOCON	Local Emergency Operations Controller (refer EMPLAN)				
LEP 1988	Byron Local Environment Plan 1988				
LEP 2014	Byron Local Environment Plan 2014				
Littoral drift	As for longshore drift.				
Littoral zone	Area of the coastline in which sediment movement by wave, current and wind action is prevalent. The littoral zone extends from the onshore dune system to the seaward limit of the offshore zone and possibly beyond.				
Local Flood Plan	Byron Shire Local Flood Plan, February 2006 – A Sub-Plan of the Byron Shire Local Disaster Plan				
Longshore currents	Currents flowing parallel to the shore within the inshore and near shore zones. Longshore currents are typically caused by waves approaching the beach at an angle. The 'feeder' currents to rip cells are another example of longshore currents.				
Longshore drift	The net movement of sand carried by the littoral current along the coast. In NSW, the sand is predominantly moved to the north driven by tradewinds. May also be termed littoral drift.				
Management Study	Coastal Hazard Management Study – Byron Bay Embayment (WRL, 2016)				
Nearshore	Relating to or denoting the region of the sea or seabed relatively close to a shore.				
NSW SES	New South Wales State Emergency Service				
OEH	Office of Environment and Heritage (formerly DECCW – Department of Environment, Climate Change and Water), NSW Government.				



Open coast ecosystems	Ecosystems within the open coastal zone such as dunes, sandy beaches, rock platforms.				
Seawalls	Walls built parallel to the shoreline separating land and water areas, mainly designed to limit shoreline erosion, recession and other damage due to wave action.				
SERM Act	State Emergency and Rescue Management Act 1989				
Shoreline recession	A net long-term landward movement of the shoreline caused by a net loss in the sediment budget (OEH, 2013).				
Slope instability	Instability of dune escarpments including the zone of slope readjustment and the zone of reduced bearing capacity inherent landward of the erosion escarpment in dunes during and after storms.				
State Storm Plan 2015	New South Wales State Storm Sub Plan – A sub plan of the New South Wales Storm Plan 2012				
Storm bite	The quantity of sand eroded from a frontal dunal system during an extreme ocean storm event or a series of closely spaced severe events. The "storm bite" or "storm demand" (as it is otherwise known) is usually expressed either as a volumetric quantity (in cubic metres per metre run along the beach above mean sea level) or as a linear measurement from a readily identifiable feature such as an erosion escarpment.				
Storm profile	The profile (cross-section) of a sandy beach that develops in response to storm wave attack. The landward limit of the storm profile is typically defined by a back beach erosion escarpment (dune scarp).				
Storm surge	The increase in coastal water level caused by the effect of storms. It has two components: the increase in water level caused by the reduction in barometric pressure (barometric set-up), and the increase in water level caused by the action of wind blowing over the sea surface (wind set up) (OEH, 2013).				
Storm tide inundation	The inundation of land by tidal action under storm conditions and under any combination of astronomical conditions (OEH, 2013).				
Surf	Waves that break on an ocean / open coast shoreline.				
Temporary coastal protection works	Sand or sandbags placed on a beach to reduce beach erosion impacts in accordance with Part 4C of the CP Act.				
Tidal inundation	The inundation of land by tidal action under average meteorological conditions and under any combination of astronomical conditions (OEH, 2013).				
Training walls	Walls constructed at the entrances of estuaries and rivers to improve navigability.				
Trigger distance (trigger)	Relates to a development consent provision applicable to development within coastal hazard planning precincts, specifying a distance between the development and the erosion escarpment, equal to or less than which, the relevant development consent lapses.				
Wave	Waves initially formed by the action of wind blowing over the sea surface. Wind waves are characterised by a range of heights, periods and wavelengths. As they leave the area of generation (fetch), wind waves develop a more ordered and uniform appearance and are referred to as swell or swell waves.				
Wave height	The vertical distance between a wave trough and a wave crest.				
Wave overtopping	The overtopping of coastal barriers, such as dunes and seawalls, by oceanic waters and waves				



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 (OEH, 2013).			
Zone of reduced foundation capacity	Zone located adjacent to and landward of an erosion escarpment in unconsolidated dunal systems where beach erosion events can undermine unprotected structures.			



Executive Summary



1 General Information

1.1 Background

On 12 October 2011 Byron Shire Council was given a Direction by the Minister to submit a draft Coastal Zone Management Plan (CZMP) in accordance with the requirements under Part 4A of *Coastal Protection Act 1979* (CP Act) for the coastline that is a beach between the south extremity of the beach within Tyagarah Nature Reserve and Cape Byron, including Belongil, Main and Clarkes Beaches, Byron Bay.

Council prepared a draft Coastal Zone Management Plan for the Byron Bay Embayment (CZMP BBE) which was submitted to the former Minister for Planning, the Hon Rob Stokes MP for certification on 30 June 2016. Details of the CZMP BBE are provided at the link below on Councils website:

https://www.byron.nsw.gov.au/Services/Environment/Coast-and-Waterways/Coastal-Planning

On 28 August 2017 Council received a response from the Minister for Environment (the Hon Gabrielle Upton MP) along with comments and advice from the NSW Coastal Panel which acknowledge the complexity and range of issues associated with preparing a CZMP for this part of the coast.

The main detail of the advice includes:

- The CZMP did not meet the requirements for certification under the Act. Key elements of the CZMP dealing with hazard management along Belongil Spit do not meet the requirements for certification.
- The majority of the plan (with the exception of the Belongil Spit Precinct) meets relevant requirements of a CZMP subject to further consideration of funding and community consultation. In particular, Masterplanning for the Jonson Street area (town centre) is considered a high priority for implementation.
- The plan proposes actions or activities to be carried out by public authorities, or on land managed by a public authority without the agreement of those authorities.

Hence, the Minister returned the plan and invited Council to re-submit a CZMP for certification which excludes the Belongil Spit Precinct (i.e. for Cape Byron to Main Beach only) in the hope that a CZMP for this area could be certified within six months of repeal of the CP Act, and commencement of the new *Coastal Management Act 2016* (CM Act).

At the 26 October 2017 meeting, Council resolved (Res 17-521) to develop a newly formed CZMP for the Eastern Precincts of the Byron Bay Embayment which includes the precincts of Wategos/Little Wategos, The Pass, Clarkes Beach and Main Beach.

This CZMP is for the Eastern Precincts of the BBE only.

A plan to address the Western Precincts of the BBE encompassing precincts of Cavvanbah, Belongil and North Beach will likely be developed under the new legislation (CM Act) as a Coastal Management Program (CMP). Until such time that plans for the entire Byron Bay Embayment are certified by the Minister, the Ministerial direction issued to Council in 2011 still stands.



1.2 Process for preparing this CZMP

The process for preparing this CZMP has been the result of a large body of previous studies and investigations. The most recent studies and key stages of developing this CZMP are depicted at Figure 1.



Figure 1 Process for preparing the draft CZMP in response to the Minister's Direction



1.3 CZMP planning area

The Ministers Direction issued to Council was defined as being the 'coastline that is the beach' between the southern extremity of the Tyagarah Nature Reserve and Cape Byron. However, for reasons outlined in Section 1.1 the new scope of this CZMP and the geographic area to be covered has been amended. The planning area for this CZMP is now defined as being the 'coastline that is a beach' between Cape Byron and Main Beach (including the Jonson Street Protection Works) as may be affected by the 2100 year erosion / recession hazard. This stretch of coastline has been termed the 'Eastern Precincts of the BBE'.

Accordingly, the CZMP's approximate planning area is depicted at Figure 2, and is made up of several precincts (from west to east); Main Beach, Clarkes Beach, The Pass, Wategos Beach, and Little Wategos beach to Cape Byron.

The CZMP planning area may also be described using the following terms:

- Western Limit: the western extremity of Main Beach (including the Jonson Street Protection Works to their western limit)
- Eastern Limit: Cape Byron
- Landward limit: as necessary to evaluate and assess the coastal hazard risk to 2100 and the management options to the 2050 planning horizon; therefore the landward boundary of the CZMP's planning area is broadly defined by the 2100 erosion hazard line 'maximum' estimate combination scenario 1 and 2 (BTM WBM, 2013).
- Seaward Limit: as necessary to evaluate and assess the coastal hazard risk to 2100 and the management options to the 2050 planning horizon to the depth of closure.









1.4 Purpose of the CZMP

The purpose of a 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 Eastern Precincts of the BBE which includes the precincts of Main Beach, Clarkes Beach, The Pass, Wategos and Little Wategos Beach out to Cape Byron. The priority management issues relate to:

- 1. Managing risk to public safety and built assets
- 2. Pressures on coastal ecosystems; and
- 3. Community uses in the coastal zone.

1.4.1 CZMP Vision

The Main Beach to Cape Byron section of the Byron Bay coastline is an iconic and internationally regarded part of the NSW coast, with Cape Byron forming the most easterly point of the Australian mainland. Council's goals and aspirations for the future sustainable management of this highly valued coastline are articulated in the following vision statement which has two parts. The Vision was developed in councillor workshops and in consideration of key council regulatory instruments and NSW state legislative instruments:

Vision Statement:

- 1. To manage Main Beach to Wategos Beach in a way that seeks to maintain a natural undisturbed beach and dune system, to minimise impacts to natural coastal processes, and retain a high standard of beach amenity and access, and;
- 2. To retain the Jonson Street Protection Works for the future security of the Byron Bay township, critical public infrastructure and assets, whilst seeking to modify the design of the structure to mitigate coastal hazard risks, improve public safety and amenity, and remove spur groynes.

The CZMP Vision statement sets the intention for management of this coastal area, and should be considered by land owners and managers in deliberating on coastal management issues accordingly.

1.4.2 Legislative and policy framework

This plan has been prepared in accordance with the CP Act and the statutory 'Guidelines for Preparing Coastal Zone Management Plans' ('the Guidelines'; Office of Environment and Heritage, July 2013), adopted by the Minister for the Environment as statutory guidance under section 55D of the CP Act. The CZMP supports the goals and objectives of the NSW Coastal Policy (1997) and aims to implement integrated coastal zone management for the Byron Shire coastline (Refer Appendix 1 – 'CZMP Management Issues, Objectives and Legislative Framework').

1.5 Coastal Management Issues and Strategies

1.5.1 Historical management issues and strategies

The Eastern Precincts of the BBE have endured a long history of large coastal storms and coastal erosion, and has been identified as an area that is undergoing long-term coastal recession (PWD, 1978; WBM Oceanics, 1999; BMT WBM, 2013). As a result of pressures from population growth, development and tourism, concerted effort has been and continues to be required to manage coastal hazards, maintain beach amenity, beach access, the natural environment, social and cultural values.



Three main management strategies have historically been implemented in response to the main management issues in the Eastern Precincts of the BBE, as follows:

- 1. The retention and implementation of coastal protection works at Main Beach (Jonson Street) and Wategos Beach.
- 2. The application of planning and development controls on development in urban coastal hazard risk areas (Part J, controls under Council's Development Control Plan, 2010), providing for specified types of structures until such time as the erosion escarpment recedes to a defined distance to the development, after which time develop consent ceases and the development (or relevant part of it) is to be relocated or removed.
- 3. Dune and public access and safety management.

1.5.2 CZMP Management Issues and Management Objectives

The CZMP Management Issues and Management Objectives have been identified and developed throughout the preparation of the CZMP. They have been identified through completion of technical studies, literature reviews of technical studies and reports, council resolutions, consideration of legislative requirements, and community and stakeholder consultation.

A broad overview of the way in which the CZMP Management Issues and Management Objectives have been developed is provided in Appendix 1 – 'CZMP Management Issues, Objectives and Legislative Framework'.

1.5.3 Overview of proposed Management Strategies

The Guidelines for preparing CZMP's (OEH 2013) identify three key management themes that a CZMP should address being:

- coastal hazard risks;
- community uses of the coastal zone, and;
- coastal ecosystem health.

In general terms, this CZMP proposes to continue with the broad management strategies outlined above in Section 1.5.1 and in accordance with the CZMP Vision outlined in Section 1.4.1. At the forefront of this plan, the highest and most costly priority action is to upgrade the coastal protection works at Main Beach (Jonson Street) to protect the Byron Bay town centre from coastal hazards and improve beach access and amenity (refer Section 2.1.1).

Planning controls, dune management, and the management of social, cultural, and natural environmental values are also key cornerstones to the CZMP management intention.

Coastal hazard risks

Coastal erosion (from large storm events) and underlying long-term shoreline recession continue to threaten coastal values and assets in the management area. Projected sea level rise induced recession is expected to increase associated risks into the future. These risks are addressed in Section 2.1 – 'Coastal Hazards and Risk Management'.

Community uses and coastal ecosystem health

Section 2.2 – 'Community Uses of the Coastal Zone' and Section 2.3 – 'Open Coast Ecosystem Health' addresses social and environmental issues which continue to become more apparent over recent times, and which are largely symptoms of the iconic and popular status of Byron Bay as both a place to live and visit.



1.6 Land ownership and management arrangements

The planning area comprises multiple land tenures and land ownership/management arrangements. Brief descriptions of these arrangements are provided in Appendix 2 – 'Land Ownership and Management Arrangements'. Aboriginal land management arrangements are also detailed in Appendix 2.

Section 2.5 includes management actions which relate to lands managed or owned by, or which have spiritual and cultural value to various public authorities or community members.

Land managers are encouraged to consider the CZMP Vision Statement and management intent when deliberating on coastal management issues relevant to the management area.

1.7 Planning horizon, implementation period and review timeframe

The long-term planning periods for this project are 2050 and 2100. This recognises that the coastal hazard risks considered as part of this project reflect our current understanding for the period from the present to 2050 and 2100 under adopted sea level rise projections of 0.4m and 0.9m for 2050 and 2100 respectively (relative to 1990), or 0.34m and 0.84m for 2050 and 2100 respectively (relative to 2010, WRL, 2016).

The assumed start date for the CZMP implementation is July 2018 with the implementation period for the management actions of 15 years. Therefore the duration of the CZMP implementation period is July 2018 to June 2033. It is intended that the implementation of the CZMP will be monitored and reported upon to the community, at least annually as part of Councils IP&R framework.

Should Council wish to retain a certified plan for the Eastern Precincts of BBE, this CZMP will need to be reviewed and transitioned into a Coastal Management Program (CMP) under the *Coastal Management Act, 2016* prior to 31 December 2021 (refer Schedule 3(6) of CM Act). To achieve this outcome the process for review and transitioning of the CZMP should commence no later than January 2021.



1.8 Consultation

Various forms of stakeholder consultation have been conducted during the development of this CZMP. An extensive consultation process was undertaken during 2016 for preparation of the CZMP BBE, with further consultation undertaken by Council in 2018 on the newly formed plan for the Eastern Precincts of the BBE.

1.8.1 Community engagement

A Community Engagement Plan, 2018 developed by Council guided the community engagement activities in 2018 and comprised activities including Website updates, Media Releases, Newspaper Alerts and Workshops. A workshop was undertaken with public agencies on 24 January 2018 where feedback and comments were sought on the plan, along with Councillor workshops and updates throughout the development of the plan.

1.8.2 Exhibition of draft CZMP

The draft CZMP was publicly exhibited under section 55E of the *Coastal Protection Act 1979* from XXXX to XXXX for a period of 4-5 weeks. The statutory advertisement for public exhibition was placed in the Byron Shire News and The Echo on XXXX.

1.8.3 Public submissions

Public submissions have been considered in accordance with section 55F of the *Coastal Protection Act 1979.* Copies of all public submissions received during the exhibition period were provided to Councillors for their consideration during the exhibition period.

XXXX submissions were received.

1.8.4 Feedback from public authorities

Council engaged with relevant agencies throughout the development of the plan. An informal workshop was held with public agencies on the 24 January 2018 to discuss the plan and seek preliminary feedback and comments. Secondary comments were requested on the finalised draft plan prior to finalising the CZMP for Councils consideration.

For more detail on public consultation, refer to Appendix 3 – 'Engagement, Public Exhibition and Agency Support'.



2 Management Issues and Strategies

Management issues and strategies/actions for implementation are outlined in the following sections:

- Section 2.1 Coastal Hazards
- Section 2.2 Community Uses
- Section 2.3 Open Ecosystem Health
- Section 2.5 Implementation Schedule

2.1 Coastal Hazards

Coastal hazard risk management is a high priority management issue as coastal hazards (erosion and long term recession) pose an immediate and future risk to coastal values and assets. Projected sea level rise induced recession is expected to increase associated risks into the future.

The Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013), referred to herein as the 'Hazard Study', re-assessed and updated the coastal hazard risks for the Byron Shire coastline including current and future risks from coastal erosion, shoreline recession, coastal inundation and tidal inundation. A description of the Hazard Study and assessment of coastal risks as they pertain to the planning area is provided in Appendix 4 – 'Coastal Hazards and Risk Management'.

Following on from the Hazard Study, a large study entitled the Coastal Hazard Management Study – Byron Bay Embayment (WRL, 2016) was completed by Council in 2016 (the 'Management Study') to look at risks and options for management of those risks. As part of the Management Study, an audit was undertaken of the 'properties', 'structures' and 'significant infrastructure' at risk from the coastal hazards beach erosion and shoreline recession including projected climate change induced sea level rise impacts. A description of assets at risk from coastal hazards is provided in Appendix 4 – 'Coastal Hazards and Risk Management'.

The Management Study made a number of recommendations for managing coastal hazards within the Eastern Precincts of the BBE. After consideration of the Management Study recommendations, Council resolved (Res 16-169, refer Appendix 8 – 'Council Resolutions') to adopt a number of coastal hazard risk management strategies for inclusion in the CZMP. These strategies are outlined below.

- 1. Jonson Street Protection Works upgrade works, remove spur groynes and improve beach access and amenity.
- Revise and update coastal hazard land use and development planning controls for development at The Pass to Clarkes Beach, Main Beach, providing for adaptation of development.
- 3. Dune revegetation and 'soft' dune stabilisation for all precincts, as a 'supporting' coastal hazard risk management strategy.
- 4. Emergency action sub plan for coastal erosion emergencies applicable to all precincts, as a 'supporting' coastal hazard risk management strategy.
- 5. Coastal hazard investigation Lighthouse Road and Captain Cook Car Park investigation of future coastal hazard risks and bedrock levels at and adjacent to Lighthouse Road and Captain Cook Car Park.



6. Coastal hazard investigation Marine Parade, Wategos Beach - investigation of future coastal hazard risks (inundation) and integrity of existing ad hoc coastal protection works at, Wategos Beach.

As these management strategies have been resolved by Council for inclusion in the plan, some have been progressed to a more detailed stage, defining tasks with estimated costs for each strategy. The upgrade of the Jonson Street Protection Works being the highest and most costly priority action is outlined in greater detail with justification for the works provided in Section 2.1.1 below.

2.1.1 Upgrade of the Jonson Street Protection Works

Background

The Jonson Street Protection Works (JSPW) are a public asset that provide a significant role in protecting the Byron Bay town centre from coastal erosion and recession. The JSPW protect the town from the First Sun Caravan Park to the Byron Bay Surf Life Saving Club.

The land area adjacent the works is widely regarded as an "iconic" Australian coastal location. The existing works have been identified by previous studies as being degraded and do not comply with contemporary coastal engineering standards. The JSPW is largely comprised of undersized rock armour which is hydraulically unstable and of insufficient crest level to prevent wave overtopping in storm events > 1 year ARI (WorleyParsons 2014). There exists an immediate threat to the structural integrity of the JSPW and therefore, the integrity of the Byron Bay Memorial Pool, adjacent lands, development and infrastructure.

Upgrading the works will result in increased public benefit due to improved public safety, amenity and aesthetics, reduction in the footprint of the structure and improved stability to mitigate risk from large storm events. Removal of the spur groynes is expected to have a positive impact on the adjacent and down-drift coastline through release of unencumbered sand transported east to west around the JSPW, from the area in front of the Surf Lifesaving Club to the area in front of First Sun Caravan Park.

The upgrade of the JSPW is a positive action for the town of Byron Bay with strong public benefit to be gained for the community, businesses and visitors. The large capital works project is not primarily focussed on fortifying the centre of town, but improving the precinct of Main Beach. The project will be delivered holistically through alignment of the works with the community endorsed Byron Bay Town Centre Masterplan.

Masterplanning

A Masterplanning process has been completed for the Byron Bay town centre incorporating the Main Beach and Clarkes Beach precincts. The Byron Bay Town Centre Masterplan ('Masterplan') was prepared through a five stage process comprising:

- 1. Project Understanding established through community and stakeholder consultation.
- 2. Vision and Place Principles form the foundation for the town centre strategies moving forward.
- 3. Strategy Development actions that respond to the first two stages that integrates social, economic and environmental processes.
- 4. Draft Masterplan refinement of the previous stages that forms a visual illustration of the town centre.
- 5. Final Masterplan refinement of initiatives, public exhibition and finalisation of the Final Masterplan and Implementation Plan.

The Masterplan received two State awards for the robust community consultation process that was implemented throughout delivery of the project. Through the use of a committed community



group, numerous conversations and workshops, the Masterplan has been developed by capturing local voices, ideas and values to create a sense of community ownership.

The Masterplanning process highlighted the value that Byron Shire locals associate with their natural environment and their connection to the coast. The relationship between the town centre to the foreshore setting of Main Beach and Clarkes Beach was identified as a critical component to the natural environment strategy, with overwhelming feedback on solutions to manage the foreshore of Main Beach as multifunctional with provisions for recreation and habitat and amenity opportunities where possible.

As outlined in the Masterplan, the Main Beach precinct should be "celebrated as a natural foreshore environment that supports both active and passive recreational uses, strengthening Main Beach's role as Byron Bay's most popular asset".

Key priorities for the Main Beach precinct as outlined in the Masterplan include:

- Recognising the history and community support for the Byron Bay Pool facility
- Retaining the car park area as a meeting place and a place to check the surf
- Upgrade of the Surf Lifesaving Club into a modern facility
- Upgrade of the foreshore to create a more visually appealing space, pedestrian paths, amenities and recreational space
- Upgrade of the foreshore through a new Main Beach boardwalk which forms an east to west connection
- Sensitive integration of the foreshore and coastal protection works with recreation, nature and pedestrian movement.

Figure 3 (Masterplan Figure 5.11) and Figure 4 (Masterplan Figure 5.13) provide illustration of conceptual designs of the Main Beach precinct.

Full details of the Byron Bay Town Centre Masterplan can be found on Councils website at the link below:

https://www.byron.nsw.gov.au/Community/Place-planning/Byron-Bay-Masterplan





Figure 6.11 - Short Term Plan: Main Beach Precinct

Figure 3 Main Beach precinct conceptual foreshore design outlined in the Masterplan.



Figure 4 Main Beach perspective outlined in the Masterplan.

Draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment





Extended park for both passive and active recreational use Boardwalk integrating coastal protection and pedestrian mov





Sea wall doubles as seating to create a meeting place

Reduced and enhanced Main Beach car park with permeable surfaces

<u>Objective</u>

The project is underpinned by the following objectives.

- 1. To provide adequate protection to the Byron Bay town centre against coastal hazards
- 2. To mitigate adverse impacts on coastal process (e.g. down-drift effects)
- 3. To improve the structural integrity of the existing JSPW
- 4. To improve public safety
- 5. To enhance recreational amenity of the foreshore around the JSPW.

On 27 February 2014, Council confirmed its commitment to protecting the Byron Bay town centre through the provision of coastal protection works at Jonson Street (Res 14-66), with reconfirmation of this commitment resolved on 7 April 2016 (Res 16-169) to the inclusion of the upgrade of the Jonson Street Protection Works as a management strategy in the CZMP BBE (Appendix 8 – 'Council Resolutions'). As such, being a large capital works project, this strategy and the upgrade of the JSPW is at the forefront of this CZMP.

Various options have been investigated and assessed in previous studies (WorleyParsons, 2014 & WRL, 2009). A concept design exists for the upgrade of the JSPW, as presented in the WorleyParsons, 2014 report, however further work is required to refine a preferred concept after other alternatives have been re-considered. At the 22 February 2018 meeting Council resolved (Res 18-104) that further options for the upgrade be canvassed, evaluated and costed (Appendix 8 – 'Council Resolutions'). Hence, the first stage in the delivery of the project will be to reconsider the various design options available, undertake a contemporary assessment of the options and refine a preferred concept design that meets the project objectives (as outlined above) in consultation with the community.

Description of Task

Upgrade of the JSPW is a large capital works project that will require the following sub-actions delivered in two project stages as presented below. General preliminary cost estimates of each sub-action are provided, however, costs are not to be relied upon or considered definite.

STAGE ONE – PRE CONSTRUCTION

Sub-actions:

- Refine Preliminary Concept Design Undertake a review of the WorleyParsons (2014) report, reconsider alternative options available, assess options and refine preferred concept design. Estimated cost, \$10,000.
- 2. Detailed Concept Design and Costing Develop detailed concept design(s) and costing(s) based on preferred concept from Action # 1. Detailed concept design(s) assessment shall also consider any potential impacts to surfing amenity. The detailed concept design(s) shall consider the final Masterplan for the Byron Bay town centre which is now in implementation phase. As outlined in the final Masterplan, upgrade of the JSPW should try to explore additional options and opportunities for erosion protection that enhance the re-design of the Jonson Street coastline protection works and maximise the opportunities for habitat creation, recreation and general amenity through a considered approach to the design. Estimated costs \$40,000
- 3. **Modelling and Evaluation** Undertake physical wave tank modelling testing on the detailed concept design(s) using design nearshore wave and water level scenarios to gain an understanding of the expected functioning of the structure. Estimated cost, \$50,000.
- 4. **Detailed Design and Costs** Determine a preferred design for upgrade of the JSPW using results of Action # 3. Prepare a detailed design and costing for the upgrade of the structure. Estimated cost, \$100,000.



- 5. Cost Benefit and Distributional Analysis For any large capital works it is good practice to complete a financial appraisal of the merits of undertaking the works. Using the detailed design and costing a cost-benefit analysis (CBA) will be undertaken to evaluate costs and benefits over the intended life of the upgraded structure. Understanding the benefit to cost ratio of Councils resolution to protect the town centre and upgrade the structure is an important step in the delivery of the project with completion of a distributional analysis a requirement for State funding through the Coastal and Estuary Grants Program. Completion of a distributional analysis helps gain an understanding of the distribution of the costs and benefits and implications to those different parties affected (local community, visitors, business and government). The CBA and distributional analysis needs to be undertaken in accordance with the Draft NSW Coastal Management Manual. These provisions provide the impetus to the development of a funding model (Action #6) which recognises different stakeholders that may be affected by the works and the benefits that flow accordingly. Estimated cost, \$40,000.
- 6. Funding Model Using results of the CBA and the distributional analysis investigate and confirm funding mechanisms to construct and maintain the works, including identifying and confirming Council funding source and commitment, as well as grant funding sources. Any funding assistance through the Coastal and Estuary Grants Program will be guided by the distributional analysis completed as per Action #5 and the determined public benefit. Estimated cost, \$5,000.
- 7. **Easement Acquisition** Enter in discussion with Department of Industry Crown Lands & Water regarding acquisition of easement within the Crown land reserve, including completion of land survey. Estimated cost, \$10,000.
- 8. **Planning and Approvals** Determine the planning pathway and develop the approvals required. Estimated cost, \$15,000.

STAGE TWO – CONSTRUCTION

The below construction costs are based on the concept design outlined in the WorleyParsons, 2014 report and are provided as an illustration of the cost estimate of such an upgrade may be. These costs are not to be relied upon or considered definite.

- 9. **Construction** Construction works, noting this may occur in stages.
 - (a) Site establishment and di-establishment. Estimated cost, \$90,000.
 - (b) Rock revetment. Estimated costs, \$3,000,000.
 - (c) Concrete stepped seawall. Estimated costs, \$1,500,000.
 - (d) Rock revetment toe protection. Estimated costs, \$500, 000.
 - (e) Contingency. Estimated costs, \$1,500,000.
- 10. **Monitoring of impacts** Develop and implement a yearly monitoring program for the works. The aim of the program will be to compare the coastline before and after the upgrade to determine any changes. Methods may involve the use of historical aerial data/photogrammetry, land surveys and/or Lidar data. Estimated costs, \$20,000.
- 11. **Maintenance** Develop a maintenance plan for the annual maintenance of the works which recognises when or if (such as after a storm event) assets are replaced. Estimated costs (per year), \$100,000 (dependent on storm activity).

Refer to Section 2.5 for management strategies in a prioritised implementation schedule.



2.1.2 Land use and development planning controls

Background

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

The Byron LEP1988 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 moulded, has abandoned this format. As such there are presently no dedicated coastal land use zones in the SI LEP. Council has been unable to logically translate Council's established planning controls that have been in place for over twenty (20) years to the current Byron LEP. Hence, urban coastal lands are a deferred matter in Byron LEP 2014 and the provisions of Byron LEP 1988 are currently in force.

The LEP 1988 contains two zones applying to land that are likely to be influenced by coastal processes ("7(f)" zones). Broadly, the coastal zones follow the alignment of Planning Precincts 1 and 2 in 'Part J' of Byron DCP 2010. The Part J Planning Precincts were based on the PWD Study (Gordon, Lord & Nolan, 1978). Council, having recently completed the Hazard Study to inform this CZMP now has a more contemporary coastal hazard assessment to inform land use and development at the Pass through to Main Beach.

Council is committed to having contemporary planning controls to manage areas susceptible to coastal hazards. In addition contemporary controls would assist in achieving the CZMPs Vision for the coastline, addressing issues such as beach amenity, foreshore access, and protection of the natural environment. It is noted, however, that until such a time as new planning controls and coastal hazard mapping is adopted, the Part J (DCP 1988) planning precincts and associated development controls will apply.

Objective

To review and update Council's existing coastal planning and management framework with the view to appropriately restrict the intensification of development in hazard areas and to facilitate the adaptation of development providing for potential relocation and/or removal.

Description of Task

For development at The Pass through to Main Beach the existing coastal hazard planning controls and planning framework will be reviewed and updated providing for the minimisation of coastal hazard risks through the potential adaptation of development.

The review and update will consider:

- Land ownership and tenure
- The current development controls and conditions with respect to coastal hazards
- State government coastal management and planning framework, i.e. the new coastal legalisation (the CM Act and SEPP for Coastal Management)
- Contemporary coastal hazard assessment including the Hazard Study update (BMT WBM, 2013)
- Provisions and controls that provide for the adaptation of development.



In this context, adaptation of development shall mean providing for the potential relocation and/or removal of development in response to risk or damage from coastal hazards and dynamic physical/environmental conditions e.g. the landward movement of the erosion escarpment, or, where relevant, the severe damage, loss or removal of approved coastal protection works.

Actions:

- 1) Review relevant legislation, State planning policies and directions, current Council planning controls and framework, State Government coastal management and planning framework and 'best practice' elsewhere.
- Investigate the introduction of new land use zones into the SI LEP to address areas susceptible to coastal hazards (e.g. *Coastal Hazard Zones*), similar to the "7(f)" coastal zones.
- Develop and prepare new controls that appropriately restrict the intensification of development in hazard areas and that facilitate the adaptation of development through consideration of elements such as structure design, materials and spatial dimensions.
- 4) Report to Council and/or State Government, undertake public consultation.
- 5) Engage with key stakeholders e.g. NSW Crown Holiday Parks Trust and National Park and Wildlife Service on draft controls where relating to their land or assets.
- 6) Make necessary amendments to Environmental Planning Instruments (EPIs) and other documents.
- 7) Brief / train relevant Council staff.

Refer to Section 2.5 for management strategies in a prioritised implementation schedule.

2.1.3 Dune revegetation and dune stabilisation

Background

The Eastern Precinct beaches of the BBE are very popular among locals and visitors to Byron Shire. Recreational activities and other human disturbances, such as illegal camping and informal access through dunes leads to negative impacts on dune formation and stability, and damage or other negative impacts on native, coastal vegetation/fauna and habitat values.

Recognising that sand dunes are an integral part of the coastal environment and provide a reserve supply of sand for the action of waves during storms, this action aims to maintain, revegetate and restore the sand dune ecosystems of the Eastern Precincts of the BBE, using the methods and techniques described in the 'Coastal Dune Management Manual' (Department of Land and Water Conservation, 2001). 'Soft' dune stabilisation methods based on best practice coastal dune management are advocated in this CZMP and may include: dune reforming or rebuilding using earth moving equipment (such as 'beach scraping'); dune-forming fencing; restoration and revegetation of plant communities; weed removal; protective fencing to limit pedestrian access; construction and maintenance of beach access ways; and signage/education.

Note: In essence the CZMP does not support or advocate any new 'hard' coastal protection works (seawalls) however, it does include the option for small scale armouring works to protect significant Aboriginal middens should the Arakwal people and NPWS seek to do so, subject to adequate assessment and gaining consent. These works may consist of structures such as low crest cobble berm (refer Appendix 4 – 'Coastal Hazards and Risk Management').

Objective

This action specifically applies to Council managed areas only from The Pass through to Main Beach, however measures will be encouraged on coastal land under other land ownership arrangements. This strategy is in alignment with the CZMPs Vision which seeks to maintain a natural undisturbed beach and dune system in parallel with the management objective to conserve cultural heritage values (MO10). As such, it is hoped that public land managers and



owners, and traditional owners, uphold as best as possible the CZMP Vision and Management Objectives.

Description of Task

Dune revegetation and stabilisation will require the following sub-actions for implementation:

- 1) Consult with stakeholders.
- 2) Review current practices including updating relevant Council Vegetation Management Plans.
- 3) Implement works on an ongoing basis.

Refer to Section 2.5 for management strategies in a prioritised implementation schedule.

2.1.4 Emergency Management

Background

In accordance with the CP Act, a CZMP must make provision for emergency actions carried out during periods of beach erosion, including the carrying out of related works where beach erosion occurs through storm activity or an extreme or irregular event (section 55C 1(b) of the CP Act). Council has developed an Emergency Action Sub Plan (EASP) that details intended emergency actions to be carried out by Council in response to an emergency. The EASP applies to the entire Byron Shire coastline which is broken down into four management areas.

Objective

The EASP outlines Council's intended actions before, during and after an emergency and shall be reviewed regularly to ensure its consistency with other State emergency plans.

Description of Task

Implement Councils responsibilities outlined in the EASP.

Refer to the EASP for detailed information on roles, responsibilities and actions during an emergency.

2.1.5 Coastal hazard investigation

Background

The Hazard Study noted that "the erosion hazard at The Pass extends to bedrock". The erosion hazard lines extend into the Captain Cook Car Park and Lighthouse Road for 2100, however, bedrock levels there are uncertain. Due to the requirement for road access to Wategos Beach, additional geotechnical works to retain Lighthouse Road may be required. Given the proximity to bedrock, these would not displace substantial portions of sandy beach and would not be required prior to 2050 (WRL, 2016). As outlined in the Management Study, options for the Captain Cook Car Park are minor retreat or similar works to those suggested for Lighthouse Road. However, these would not be required immediately.

Hence, the Management Study recommended that further investigation of the future coastal hazard risks and bedrock levels at and adjacent Lighthouse Road and the Captain Cook Car Park is completed as a starting point. The Hazard Study did not identify any specific erosion issues at Wategos Beach due to its sheltered location in the lee of Cape Byron, the expected constraint of bedrock as well as limited protection works along Marine Parade. However a detailed assessment of coastal hazard risks at the Wategos Beach was not undertaken in the Management Study.



Further investigation is therefore also warranted to determine the substrate composition of the Wategos sub-aerial foreshore with regard to its likely resistance to storm induced erosion events, and to assess the coastal inundation risk to the lower part of Marine Parade.

Objective

This investigation aims to gain greater understanding of the coastal hazard vulnerability of Lighthouse Road, Captain Cook Car Park, and Marine Parade to help facilitate appropriate management response/s for the assets in the future.

Description of Tasks

1. Coastal hazard investigation of future coastal hazard s risks and bedrock levels at and adjacent to Lighthouse Road and Captain Cook Car Park

The investigations will require the following sub-actions for implementation:

- Source and confirm funding for geotechnical investigation and hazard assessment.
- Investigate bedrock surface using ground penetrating radar technique or similar.
- Investigate potential coastal erosion hazard.
- Consider management options, develop management recommendation and costing's and incorporate into CZMP when next reviewed.
- 2. Coastal hazard investigation of future coastal hazard risk (inundation) and integrity of existing ad hoc coastal protection works at Marine Parade, Wategos Beach

The investigation will require the following sub-actions for implementation:

- Source and confirm funding for geotechnical investigation and hazard assessment.
- Investigate bedrock surface using ground penetrating radar technique or similar.
- Investigate structural integrity of seawall / protective structures.
- Investigate potential coastal hazard threats (inundation).
- Consider management options, develop management recommendation and costing's.

Refer to Section 2.5 for management strategies in a prioritised implementation schedule.

2.2 Community Uses of the Coastal Zone

Community uses of the coastal zone addresses the cultural and heritage significance of the area, how the community accesses and uses the coast, and the amenity and recreational values of the coast.

Byron Shire is rich with Aboriginal and non-Aboriginal cultural heritage values. The Arakwal people have lived and moved through the coastal landscape of the BBE finding shelter and camping in the dunes, and obtaining food from the beaches and the coastal creeks (NPWS, 2012). Important Aboriginal cultural sites are located around the shorelines of Byron Bay, with significant middens located at The Pass and Clarkes Beach. Aboriginal cultural resources located in the coastal zone have been significantly impacted by coastal erosion and sand mining (WBM Oceanics, 2003), along with the more recent issue of stormwater run-off at Clarkes Beach.

Cape Byron received its name from Captain James Cook in May 1770, when sailing the Endeavour along the far north coast of NSW, with the first documented European settlement in Byron Shire was the Brunswick River cedar camp in 1849 (BSC, 2006). Perhaps the most significant European heritage site in Byron Shire is the Cape Byron lighthouse and keepers' cottages, opened in 1901.

The recreation and amenity values of the planning area are significant by virtue of the outstanding scenic and natural beauty of the BBE, the relatively sheltered nature of the embayment, a variety



of surf breaks, the relatively pristine and ecologically diverse nature of the coastal waters of the BBE, and the relatively undeveloped, unhurried and uncrowded nature of the beaches and foreshores.

There are numerous beach accesses in the planning area which provide pedestrian access on to the beach or along the beach, emergency access on to and along the beach, and access for boats and vessels. Consideration of coastal hazards and the projected impact of hazards in the future on these accesses is an important consideration of this CZMP.

Threats or management issues relevant to community uses of the coastal zone include pressures such as population growth, ongoing development pressure and increasing tourist visitation, as well as the risks arising from coastal hazards. These management issues have been identified through the development of the CZMP, desktop literature review of existing studies, plans and reports and community consultation. Maintaining the cultural heritage of the area, recreation, amenity and access in the context of these threats is an important objective of this CZMP.

The way in which the proposed management strategies have been identified have been largely informed through the development of the CZMP, desktop literature review of existing studies and reports and community consultation. A full description on community uses of the coastal zone, community values within the planning area, management issues to be addressed and how management actions were developed is provided in Appendix 5 – 'Community Uses of the Coastal Zone'.

Management strategies for community uses of the coastal zone and the appropriate timeframes for implementation are presented in Section 2.5. Table 1 proposes actions in the implementation schedule that aim to protect and promote cultural heritage, preserve beach environments and amenity and ensure continuing and undiminished public access to beaches and headlands.

2.3 Open Coast Ecosystem Health

The BBE is located at the southern and northern distributional extreme of a variety of marine and terrestrial fauna, and supports a rich diversity of vertebrates and invertebrates, as well as fish and marine mammals, exhibiting tropical, sub-tropical and temperate affinities (BSC, 2004, Marine Parks Authority, 2010).

Although many parts of the 'open coast' of the BBE have been impacted by human disturbance, there are a number of areas that retain significant ecological values, supporting a range of native vegetation communities, habitats and fauna populations (BSC, 2004). Many of these values are recognised and managed within the system of conservation reserves located in the planning area, as described in Appendix 2 – 'Land Ownership and Management Arrangements'. Of importance is the Cape Byron State Conservation Area protecting terrestrial flora and fauna, and the Cape Byron Marine Park which protects key marine habitat through marine park zones.

Threats or management issues to open coast ecosystems include pollution/littering and degradation of water quality, vegetation clearing and modification, introduced flora and fauna (weeds/pests), informal access through dunes and climate change. These management issues were identified as being relevant to this CZMP during the literature review and issues identification stage of development of the CZMP BBE (2016).

The way in which the proposed management actions have been identified have been largely informed through the development of the CZMP, desktop literature review of existing studies and reports and community consultation. A full description on community uses of the coastal zone, community values within the planning area, management issues to be addressed and how



management actions were developed is provided in Appendix 5 – 'Community Uses of the Coastal Zone'.

Management actions to address the management issues and the appropriate timeframes for implementation is presented in Section 2.5 – Implementation Schedule. The implementation schedule details the proposed management actions to be implemented over the CZMP's implementation period with respect to open coast ecosystem health. These actions aim to protect and preserve flora, flora and ecosystems of the open coast.

2.4 Management Actions

The Implementation Schedule (Section 2.5) includes a list of actions which have been developed to address the identified management issues and align with the desired management objectives for the CZMP.

Actions consist of a combination of studies, investigation and on-ground works. Management strategies/actions have been developed for a 15 year implementation period. The CZMP and the progress of the management actions should be reviewed to ensure the actions remain relevant and the implementation of the plan is being achieved.

2.4.1 Responsibilities

Responsibilities for implementation of the management strategies and actions have been assigned to the relevant agencies. In addition to the listed organisations, support from various local non-government organisations and groups, including industry bodies, private landholders and community groups, will be essential in the implementation of the plan.

The Lead Organisation assigned to the management action is the agency which is best placed to undertake or facilitate the action. This is required to focus future management effort and provide direction in seeking funding through grants or providing the necessary resources. The actions also identify Support Organisations which may be required and/or requested to assist in implementation of the action, either through their regulatory role or land management function or as a potential funding or information source.

Public authorities with "Lead Organisation" responsibilities under the draft CZMP have provided formal concurrence and agreement to submitting the CZMP to the Minister for certification (refer Appendix – 'Engagement, Public Exhibition and Agency Support'.

2.4.2 Time frame

Implementation of management strategies and actions is expected to commence from the start of 2018/19 financial year according to the following timeframes:

- Immediate within 1 year
- Short within 2 5 years
- Medium within 6 10 years
- Long 10 to 15 years
- Ongoing
 - g required on a regular basis
- As needed required on an 'as needs' basis

2.4.3 Cost

Management strategies that show 'budgeted' are considered fully funded under BSC's IP&R processes. Many 'budgeted' actions are delivered through Council staff and their regular work



duties. Partially budgeted or unbudgeted projects will require external funding and/or an additional allocation from BSC that is currently unbudgeted.

The coastal hazard management strategies have been resolved by Council for inclusion in this plan (refer Section 2.1) and have been costed in more detail as they have progressed to a more detailed stage.

Cost estimates for all other actions are as per the below:

<\$49,999
\$50,000 - \$149,999
\$150,000 - \$299,999
>\$300,000
Unable to be determined without further study

2.5 Implementation Schedule

Management strategies and actions to address management issues related to coastal hazards, community uses in the coastal zone and open coast ecosystem health are outlined in Table 1 below.



Implementation schedule of management strategies and actions Table 1

lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)
Coastal H	lazards and Risk Management								
	1.1 Dune and public access and safety management								
C4	1.1.1 Upgrade of the Jonson Street Protection Works, remove spur groynes and improve beach access and amenity. * <i>Refer Section 2.1.1 for more detail.</i>	Main Beach (Jonson Street)	High	Actions: 1-2: Immediate 3-8: Short 9 Medium 10-11 Ongoing	Byron Shire Council	Dol Crown Lands & Water	Partially budgeted* \$270,000 (Actions 1 to 8) Cost estimate 5 (Actions 9 to 11) *Also refer to Section 4 on Funding and Financing.	Concept design(s) and costing's completed Detailed design(s), modelling and costing's completed CBA and Distributional Analysis completed Funding and approvals obtained Upgrade constructed Monitoring and maintenance	MO1 MO2 MO5 MO6
C1 C2 C6	1.1.2 Dune revegetation and dune stabilisation	All	High	Ongoing	Byron Shire Council	Dune Care Groups (volunteer)	Partially budgeted Cost estimate 1 (\$20,000 p.a)	Consultation undertaken. Review and updates undertaken Implementation	MO9 MO10 MO11
C1 C2 C3	1.1.3 Implementation of Councils responsibilities outlined in the Emergency Action Sub Plan (EASP).	All	High	Ongoing	Byron Shire Council	NSW State Emergency Services	Budgeted Cost estimate 1 (\$20,000 p.a)	Consultation undertaken Review and updates undertaken Implementation	MO1 MO7 MO8 MO11
C1 C2 C5	1.1.4 Revise and update coastal hazard land use and development planning controls providing for adaption of development.	The Pass, Clarkes and Main Beach	High	Immediate	Byron Shire Council	NSW Government (Department of Planning)	Partially budgeted \$30,000	Review undertaken. Consultation undertaken. New controls and provisions incorporated into EPIs. Staff apply provisions correctly. Provisions are minimising coastal hazard risk and providing for the adaptation of development.	MO1 MO2 MO3 MO5 MO6 MO7
	1.2 Hazard investigation								
C7	1.2.1 Coastal hazard investigation of future coastal hazard risks and bedrock levels at and adjacent to Lighthouse Road and Captain Cook Car Park	The Pass (Lighthouse Road and Captain Cook Car Park)	Low	Medium	Byron Shire Council	National Parks and Wildlife Service OEH Regional Operations	Unbudgeted \$40,000	Investigation undertaken Management recommendation and costing's prepared. Management recommendation and associated budget endorsed by Council.	MO8



Performance measure	Perf	ormance	e measure
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lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)	
C7	1.2.2 Coastal hazard investigation of future coastal hazard risk (inundation) and integrity of existing ad hoc coastal protection works at Marine Parade, Wategos Beach	Wategos Beach	Low	Short	Byron Shire Council	National Parks and Wildlife Service	Unbudgeted \$40,000	Investigation undertaken Management recommendation and costing's prepared. Management recommendation and associated budget endorsed by Council.	MO8	
Commun	Community Uses of the Coastal Zone									
	2.1 Cultural heritage									
H7 C8	2.1.1 Investigate options to mitigate erosion and stormwater impact to gully and Aboriginal midden, with preferred option(s) determined.	Clarkes Beach	High	Immediate	Crown Holiday Parks Trust	National Parks and Wildlife Service Byron Shire Council	Budgeted Cost estimate 2	Options investigated and preferred option(s) agreed.	MO10	
H2 H6	2.1.2 Ensure that correct protocols are followed regarding indigenous cultural heritage sites / values in the coastal zone (refer AHIMS).	All	High	Ongoing	Byron Shire Council		Budgeted Cost estimate 1	Correct protocols are implemented and indigenous cultural heritage is protected and preserved.	MO10	
H3 H5 H6	2.1.3 Incorporate cultural heritage impact assessment when planning / seeking approvals for works to be carried out in coastal areas, avoiding impacts where possible (i.e. beach accesses, coastal protection works).	All	High	Ongoing	Byron Shire Council		Budgeted Cost estimate 1	Indigenous cultural heritage is protected and preserved.	MO10	
H1	2.1.4 Abide by the Byron Shire Council and Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) Memorandum of Understanding (2013).	All	High	Ongoing	Byron Shire Council	Arakwal Corporation	Budgeted Cost estimate 1	MoU is abided by.	MO10	
H1 H4	2.1.5 Ensure compliance with the Byron Shire LEP 2014 concerning heritage matters and items listed.	All	High	Medium and ongoing	Byron Shire Council		Budgeted Cost estimate 1	LEP is abided in terms of cultural matters.	MO10	
H1	2.1.6 Liaise with indigenous community and support the identification and mapping of cultural heritage sites.	All	Medium	Ongoing	Byron Shire Council	Arakwal Corporation	Budgeted Cost estimate 1	Indigenous cultural heritage sites / values are identified and mapped.	MO10	
H4	2.1.7 Liaise with indigenous community and support the development and implementation of plans of management for indigenous cultural heritage sites in the coastal zone.	All	Medium	Ongoing	Byron Shire Council	Arakwal Corporation	Budgeted Cost estimate 1	Indigenous cultural heritage sites / values are managed appropriately.	MO10	
H1	2.1.8 Ensure compliance with relevant legislation regarding marine cultural heritage.	All	Medium	Ongoing	Byron Shire Council		Budgeted Cost estimate 1	Relevant legislation is abided by.	MO10	
	2.2 Recreation and Amenity									
R7 B2	2.2.1 (also 3.1.4 Open Coast Ecosystem Health) Ensure compliance with BSC Policy 13/007 concerning no recreational vehicular access to beaches and no commercial fishers vehicular access to beaches.	All	High	Ongoing	Byron Shire Council	DPI Fisheries (Cape Byron Marine Park)	Budgeted Cost estimate 1	Policy is complied with and there are no recreational vehicles or commercial fisher vehicles on the beaches.	MO6 MO9	
R1	2.2.2 Ensure illegal camping is reduced in the coastal reserves and dune systems, through both education and compliance activities, as well as working on homelessness issues with the relevant authorities.	All	High	Ongoing	Byron Shire Council	Dol Crown Lands & Water	Budgeted Cost estimate 1	Incidence of illegal campers is reduced.	MO6 MO9	



lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)
R10	2.2.3 Provide support, where considered appropriate, to State government initiatives concerning shark activity.	All	High	Immediate and ongoing	Byron Shire Council		Budgeted Cost estimate 1	State government research and initiatives are supported, where considered appropriate.	MO9
R1 R2 R3	2.2.4 Public amenities review should be undertaken for coastal areas in accordance with NSW Coastal Policy 1997 Strategic Action 7.1.2.	All	Medium	Short	Byron Shire Council		Unbudgeted Cost estimate 1	Public amenities review undertaken. Recommendations of investigation implemented.	MO6
R1	2.2.5 (also 3.1.8 'Open Coast Ecosystem Health) Audit current signage and potentially erect new 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, no camping.	All	Medium	Short	Byron Shire Council	Dol Crown Lands & Water	Unbudgeted Cost estimate 1	Audit conducted, signage erected where necessary.	MO6
B3 B4 B5 B6 B7	2.2.6 Implementation of relevant actions in the Byron Bay Town Centre Masterplan as relevant to the provision of beach access, walkways, and other foreshore infrastructure.	Main Beach Clarkes Beach	Medium	Short	Byron Shire Council		Unbudgeted Cost estimate 2	Improved recreational amenity of the foreshore area.	MO6
R5 R6 B6	2.2.7 Implement Byron Drainage Strategy (SMEC, 2010) and upgrade stormwater outlet at Clarkes Beach (Cowper Street).	Clarkes Beach	Medium	Medium	Byron Shire Council		Unbudgeted Cost estimate 4	Stormwater is treated before discharge to Clarkes Beach.	MO6 MO9
R6 B6	2.2.8 Monitor and manage discharge of stormwater at stormwater outlets, implement minor scraping works when necessary to ensure beach access remains safe.	Clarkes Beach The Pass	Medium	As needed	Byron Shire Council	Crown Holiday Parks Trust National Parks and Wildlife Service	Unbudgeted Cost estimate 2	Beach access remains safe.	MO6 MO9
R9	2.2.9 Monitor, repair and investigate potential upgrade of stormwater outlets at Wategos Beach to minimise impacts on recreational amenity (subject to NPWS approval).	Wategos	Medium	Medium	Byron Shire Council	National Parks and Wildlife Service	Unbudgeted Cost estimate 1	Amenity impacts from stormwater drains are minimised.	MO6
	2.3 Beach Access								
C4 B3 B4	2.3.1 (Also 1.1.1 Dune and public access and safety management) Progress the design and construction of upgraded Jonson Street Protection Works, which will address a number of beach access and amenity issues (e.g. may include incorporating formal pathways/boardwalks and access on to the beach in front of the First Sun Caravan Park, improving structural resilience, removal of spur groynes, vehicle and disabled access, viewing and meeting platform). * <i>Refer Section 2.1.1 for more detail.</i>	Main Beach	High	Actions: 1-2: Immediate 3-8: Short 9 Medium 10-11 Ongoing	Byron Shire Council		Partially budgeted* \$270,000 (Actions 1 to 8) Cost estimate 5 (Actions 9 to 11) *Refer to Section 4 on Funding and Financing.	JSPW upgrade is progressed and provides for improved beach access and amenity.	MO1 MO5 MO6 MO8
B7	2.3.2Re-design of access (#19) and retaining walls to reduce sand blow and provide better conditions for wheelchair access.Improved signage and publicity concerning the provision of this wheelchair access.	Clarkes Beach	High	Immediate	Byron Shire Council		Budgeted Cost estimate 1	Wheelchair access improved.	MO6
B4	2.3.3 Improve the foundation of the concrete ramp component of the JSPW (#9) to prevent further failure.	Main Beach	High	Immediate	Byron Shire Council		Partially budgeted* \$270,000 (Actions 1 to 8) Cost estimate 5 (Actions 9 to 11) * <i>Refer to Section 4 on</i>	Concrete ramp is repaired.	MO6



lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)
							Funding and Financing.		
B3	2.3.4 Formal beach access and other associated infrastructure (e.g. viewing platforms) to be monitored and maintained in a safe condition, suitable for public use.	All	High	Immediate and ongoing	Byron Shire Council Crown Holiday Parks Trust National Parks and Wildlife		Budgeted Cost estimate 1	Formal access is in a safe and appropriate condition suitable for public use.	MO6 MO7 MO8
C3 B1 B3 B5 B8	2.3.5 The relevant actions in the EASP are implemented before, during and after a coastal erosion event, refer EASP. * <i>Refer Emergency Action Sub Plan</i>	All	High	As needed	Byron Shire Council	NSW State Emergency Services	Budgeted Cost estimate 1	Refer EASP	MO7
B3	2.3.9 Investigate use of Section 94 Open Space contributions to fund beach access improvements due to increase usage associated with population growth.	All	High	Short	Byron Shire Council		Budgeted Cost estimate 1	Investigation into contributions complete. Actions from investigation implemented.	MO6
B2	2.3.6 Rationalise the informal beach accesses and formalise identified beach accesses. This may involve closing off the informal accesses and revegetation works, and erecting signs outlining that it is a revegetation site.	All	Medium	Short	Byron Shire Council	Dol Crown Lands & Water	Unbudgeted Cost estimate 2 (Capital works) Cost estimate 1 per year (maintenance)	All informal accesses closed and successfully revegetated. Formalised accesses maintained in a safe and appropriate condition suitable for public use.	MO6 MO7
C6 B2	2.3.7 Review Council's relevant 'Vegetation Management Plans' in terms of the provision of beach access and management.	All	Medium	Short	Byron Shire Council		Unbudgeted Cost estimate 1	Vegetation Management plans updated in terms of beach access provision and a strategic approach to beach access and dune management undertaken.	MO6
B1 B2 B3	2.3.8 Cooperate with NPWS to determine joint management issues and responses associated with the maintenance of vegetation integrity, water quality, visitor safety and general provision of access.	All	Medium	Short to medium	Byron Shire Council	National Parks and Wildlife Service	Budgeted Cost estimate 1	Investigation into joint management issues complete. Management actions from investigation implemented.	MO6 MO9
	2.4 Coastal Walkways								
R3 R8	2.4.1 Provide for a continuous walkway along Marine Parade including resolving pedestrian / vehicle conflicts at Marine Parade.	Wategos	Medium	Short	Byron Shire Council		Unbudgeted Cost estimate 5	Continuous walkway constructed.	MO6
R3	2.4.2 Provide for an improved and Australian Standard walkway from Cavvanbah (northern side of JSPW), Main Beach through to Clarkes.	Main Beach, Clarkes	Medium	Short	Byron Shire Council		Unbudgeted Cost estimate 5	Walkway is improved	MO6
	2.5 Governance								
	2.5.1 Consider establishment of a coastal management group to assist with implementation of relevant actions in this CZMP.	All	Medium	Immediate	Byron Shire Council		Budgeted Cost estimate 1	Management action considered	MO11
Open Coast Ecosystem Health									
lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)
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	3.1 Flora and fauna management								
E8 E12 E16 E17	3.1.1 Assess and repair beach signage when necessary, and as per Emergency Action Sub Plan.	All	High	As needed	Byron Shire Council	Dol Crown Lands & Water	Budgeted Cost estimate 1	Beach management signage permanently displayed in required locations.	MO9
C6 E8 E9 E11 E16	3.1.2 Implement priority dune management actions as per the BSC Vegetation Management Plans to increase dune volume, height and health by restoring vegetation (incl. weed removal) and carrying out dune maintenance works.	All	High	Immediate and ongoing	Byron Shire Council	Dol Crown Lands & Water Community Dunecare groups	Partially budgeted Cost estimate 2	Actions are carried out and maintenance activities continued.	MO9
E7	3.1.3 Develop guidelines and implement relevant processes to ensure that Council and other agencies consider the affect of artificial lighting on the dunal system or beach adjacent coastline on nesting marine turtles and emerging hatchlings.	All	High	Immediate and ongoing	Byron Shire Council	DPI Fisheries (Cape Byron Marine Park)	Unbudgeted Cost estimate 1	Appropriate processes are implemented to control transmittance of artificial light onto turtle nesting beaches.	MO9
E12 E15	3.1.4 Enforce BSC Policy no. 13/007 which regulates the driving of vehicles on the beach.	All	High	Immediate and ongoing	Byron Shire Council		Budgeted Cost estimate 1	BSC Policy no. 13/007 is implemented and there are no unregulated vehicles driving on the beach.	MO9
E1 E2 E12	3.1.5 Council to contact and cooperate with NPWS and ORCA in the instance of whale/ dolphin stranding.	All	High	Immediate and ongoing	Byron Shire Council	National Parks and Wildlife Service	Budgeted Cost estimate 1	Whale/dolphin strandings reported and acted upon in accordance with NPWS and ORCA procedures.	MO9
E4 E17	3.1.6 Regularly remove dumped materials from coastal crown lands and nature reserves, including supporting participatory, community led rubbish removal events.	All	High	Immediate and ongoing	Byron Shire Council		Budgeted Cost estimate 1	Pollution in the coastal and marine environment is managed and reduced.	MO9
E14	3.1.7 (Also 3.4.3 Monitoring and evaluation, information sharing and governance) Ensure that where coastal protection works are proposed for Main Beach appropriate investigations and monitoring occurs in relation to the potential impacts of the works on coastal ecological communities. * <i>Refer Section 2.1.1 for more detail.</i>	Main Beach	High	Ongoing	Byron Shire Council		Unbudgeted Cost estimate 5	Potential impacts on ecological communities are monitored	MO1 MO9
E8 E12 E16 E17	3.1.8 (also 2.2.5 'Community Uses of the Coastal Zone') Audit current signage and potentially erect new 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.	All	Medium	Short	Byron Shire Council		Budgeted Cost estimate 1	Audit conducted, signage erected where necessary.	MO9
E8 E9 E11 E16	3.1.9 Review and potentially update BSC Vegetation Management Plans to reflect the recommendations of this CZMP.	Main Beach and Wategos Beach	Medium	Short	Byron Shire Council		Unbudgeted Cost estimate 1	Management plans updated and reviewed to align with this CZMP.	MO9
E6 E8 E9 E10 E12	3.1.10 Review the Byron Biodiversity Conservation Strategy (BSC, 2004).	All	Immediate	Short	Byron Shire Council		Budgeted Cost estimate 1	Strategy reviewed and updated.	MO9
E9 E12	3.1.11 Develop guidelines for the planting and management of vegetation in public coastal parks by replacing senescent trees as necessary and encouraging new, native species plantings.	All	Medium	Short	Byron Shire Council		Budgeted Cost estimate 1	Guidelines developed Actions to replace senescent trees implemented	MO9



lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)
E4 E7 E10 E12 E17	3.1.12 Undertake a study 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.	All	Medium	Medium	Byron Shire Council	National Parks and Wildlife Service DPI Fisheries (Cape Byron Marine Park)	Unbudgeted Cost estimate 2	Study completed.	MO9
E12 E15	3.1.13 Develop a management plan that aims to increase the resilience of ecological habitats and communities in the context of the affects of climate change.	All	Low	Long	Byron Shire Council	National Parks and Wildlife Service DPI Fisheries (Cape Byron Marine Park)	Unbudgeted Cost estimate 2	Management plan prepared.	MO9
E8 E9 E12	3.1.14 Investigate open space and land with conservation value for potential as community land or greater conservation classification.	All	Low	Medium	Byron Shire Council		Unbudgeted Cost estimate 1	Land with conservation value identified and investigated for potential as community land.	MO9 MO11
	3.2 Water quality								
E1 E5	3.2.1 Byron Bay Drainage Strategy (SMEC, 2010) implemented, which includes an objective to reduce stormwater pollution at Clarkes Beach (as per the objectives of the NSW Coastal Policy 1997 Strategic Action 1.3.8).	Clarkes Beach	Medium	Medium	Byron Shire Council		Unbudgeted Cost estimate 4	Relevant actions are funded and implemented.	MO9
	3.3 Community involvement						L		
E4 E5 E17	3.3.1 Implement a community education program to increase awareness of marine and stormwater pollutants and to change behaviours that may lead to estuarine and marine pollution and water quality degradation.	All	High	Immediate and ongoing	Byron Shire Council	National Parks and Wildlife Service DPI Fisheries (Cape Byron Marine Park)	Unbudgeted Cost estimate 2	Education program implemented, increased awareness, behavioural change.	MO9 MO11
E17	3.3.2 Develop and implement community education strategy to promote self- regulated public avoidance of beaches during periods of key wildlife usage e.g. media releases.	All	High	Immediate and ongoing	Byron Shire Council	National Parks and Wildlife Service DPI Fisheries (Cape Byron Marine Park)	Unbudgeted Cost estimate 1	Avoidance of beaches is promoted before and during key wildlife usage periods.	MO9 MO11
E1 E8 E9 E11 E12	3.3.3 BSC and other agencies, in liaison with Dunecare and other community groups, collaborate and continue to apply for funding and assistance to carry out ecological restoration activities through grant schemes such as, EnviroTrust, LLS etc.	All	High	Immediate and ongoing	Byron Shire Council	Community Dunecare Groups	Unbudgeted Cost estimate 1	Collaboration between agencies and community groups is improved and ongoing. Applications for funding and assistance are submitted and are successful. On ground ecological projects are implemented in liaison with community groups.	MO9 MO11
E1 E4 E8 E9 E11 E12	3.3.4 Involve and support the community through programs such as Landcare and Dunecare in implementing measures to protect and rehabilitate natural areas with support from the BSC Bush Regeneration Team.	All	High	Immediate and ongoing	Byron Shire Council	Community Dunecare Groups	Partially budgeted Cost estimate 1	Community groups are engaged and supported by Council.	MO9 MO11
E1 E8 E9	3.3.5 Council and State Government Agencies to provide advice/support to Byron community groups involved in local ecosystem protection and	All	High	Immediate and ongoing	Byron Shire Council	Community Dunecare Groups	Budgeted Cost estimate 1	Best practice advice is provided. Positive ecological outcomes	MO9 MO11



lssue Number	Management actions	Management area	Priority	Timeframe	Lead Agency	Support Agency	Cost (budgeted/ partially budgeted / unbudgeted)	Performance measure	Most relevant Management Objective(s)
E11 E12	rehabilitation to facilitate best practice management.					OEH Regional Operations		are achieved.	
E8 E9 E11 E12 E17	3.3.6 Develop and implement a community awareness program, with the aim of encouraging residents and local schools to increase volunteer participation in activities such as rubbish removal, weed removal, vegetation restoration and maintenance.	All	Medium	Short	Byron Shire Council	Community Dunecare Groups	Unbudgeted Cost estimate 1	Community awareness program implemented and there is increased participation in ecological volunteering activities. Through increased volunteer activity, positive ecological outcomes are achieved.	MO9 MO11
	3.4 Monitoring and evaluation, information sharing and governance								
E1 E12 E17	3.4.1 Maintain records of ecological restoration and maintenance activities, including outcomes achieved, share and provide relevant data for evaluation, for example through State of the Environment (SOE) reporting processes.	All	High	Immediate and ongoing	Byron Shire Council		Unbudgeted Cost estimate 1	Accurate records maintained and outcomes evaluated. Data is used to inform future projects and activities.	MO9 MO11
E1	3.4.2 Agencies and organisations collaborate with and support each other in the management of coastal and marine ecosystems, including the implementation of the various plans of management that apply to the coastal ecosystems of the BBE.	All	High	Immediate and ongoing	All Agencies		Budgeted Cost estimate 1	Coastal zone management is integrated	MO9 MO11
E14	3.4.3 (Also 3.1.7 - Flora and fauna management) Ensure that where coastal protection works are proposed for Main Beach appropriate investigations and monitoring occurs in relation to the potential impacts of the works on coastal ecological communities.	Main Beach	High	Ongoing	Byron Shire Council		Unbudgeted Cost estimate 5	Potential impacts on ecological communities are monitored	MO1 MO9
E1 E4 E5	3.4.4 In cooperation with State government agencies, establish water quality monitoring program and studies for the purpose of understanding water quality and responding to impacts.	All	Medium	Ongoing	Byron Shire Council	OEH Regional Operations	Unbudgeted Cost estimate 5	Water quality monitoring program is implemented. Water quality data is used to inform water quality and catchment management.	MO9



3 Funding and Financing

The upgrade of the Jonson Street Protection Works is a significant capital works project and Council will require a significant funding source/s for implementation of the project.

Funding for works can be in the following forms:

- Pre-emptive where the project is planned and funded well ahead;
- Adaptive where smaller steps and lead times are involved, with flexibility retained; and
- Reactive which is usually an unplanned situation or extreme event.

It is also necessary to consider the amount of funding likely to be available over the design life of the works. This includes both the initial cost to implement the works and the ongoing cost of maintaining the works. Funding for the pre-construction stage of the project has been considered by Council early on in the project planning phase, i.e. 'pre-emptive'.

At the 14 December 2017 meeting Council resolved (Res 17-64, Appendix 8 – 'Council Resolutions') to consider an allocation of \$150,000 (50% of project costs) for the Jonson Street Protection Works pre-construction phase over the 2018/19 and 2019/20 financial years. The pre-construction phase of the project comprises sub-actions 1-6 as detailed in Management Action #1 (refer Table 1).

There are various sources of funding to implement the strategies and actions outlined in this CZMP including:

- 1. Commonwealth government;
- 2. State government; and
- 3. Local government (BSC), including
 - Local business contributions; and
 - Regulatory conditions on future developments.

3.1 Commonwealth Funding

Limited funding may be available from the Commonwealth government on the basis of national heritage value protection. Since, constitutional responsibility for disaster prevention, preparedness, response and recovery rests primarily with the State government, the Commonwealth government would only provide additional funding through the Natural Disaster Relief and Recovery Arrangements (NDRRA) to help pay for relief and recovery costs in the event of an extreme storm event.

The Commonwealth have schemes available through the Department of Infrastructure and Regional Development that match this project. These include Stronger National Regions Fund; Building Better Regions Fund and Commonwealth Regional Growth Fund. The drivers for these schemes are regional economic development, and as such the strategic approach should incorporate the impacts of the project on the local and regional economy. This could be the visitor economy, but a case could also be made for supporting the recreational and work-life balance needs of new workers associated with West Byron residential and employment land, and/or the introduction of digital economy workers to the Shire (digital content production workers for example).

A request for grant funds to the Commonwealth Government will be strengthened by a partnership between Council and NSW Office of Environment and Heritage or other NSW government commitment.



3.2 NSW Government Funding

The NSW Office of Environment and Heritage provides funding to local government on a dollarfor-dollar basis to investigate, design and implement works identified in CZMPs or estuary management plans through the Coastal and Estuary Grants Program. As part of the NSW coastal reforms a funding package of \$83.6 million was announced for Coastal Management from 2016-17 to 2020-21, and the Coastal and Estuary Grants Program is part of this package.

There are currently 5 streams under the Coastal and Estuary Grants Program: 1 for planning and studies, which includes investigation and design, and cost-benefit analysis; and 4 for implementing works identified in certified coastal zone or estuary management plans.

For implementing a project on the scale of the Jonson Street Protection Works – Upgrade considered to be "*large capital works projects*", a distributional analysis is required as part of the Cost Benefit Analysis. According to the beneficiary pays principle, the proportion of funding for the works will be dependent on the results of the distributional analysis in relation to state benefits. For example, should the distributional analysis show that the proportion of state benefit derived by upgrading the Jonson Street Protection Works is 20%, then 20% of the capital project costs may be obtained through the funding program. However, funding is only available through the 'implementation stream' of the program should the CZMP be certified by the Minister.

NSW Government is currently delivering multiple grants schemes under the Regional Growth Fund. Two of these, Regional Environment and Tourism Fund and Growing Local Economies Fund are a good match to this project. These schemes are similar to Commonwealth, in that they require lateral thinking and a strategic approach that considers the project's impact on economic growth and productivity.

3.3 Council Funding

Potential available funds for Council include:

- Loans for capital works;
- Sale of Council owned land;
- General rates income;
- Special rates levies for benefiting parties (which may include the entire community);
- Parking revenue; and
- Special purpose grants.

As outlined above, funding is available through numerous grants programs, and Council may be able to drastically reduce its cash commitment if it sources and secures such funds available at the time.



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Appendix 1

CZMP Management Issues, Objectives and Legislative Framework CZMP management issues and management objectives have been developed throughout the preparation of the CZMP. They have been identified through a process including literature review of technical studies and reports, consideration of legislative requirement and community and stakeholder consultation.

The CZMP addresses seven (7) main themes and priority management issues and considerations associated with each theme, with eleven (11) management objectives identified that link to the management issues (Table 1).

Theme	Priority management issues / considerations	Management Objective number	Management objective (MO)
Coastal hazard risk management Coastal hazards pose an immediate and future risk to public assets in several precincts. The historic approach taken towards the management of coastal hazard risks has included works, as well as the application of planning and development controls to provide for the adaptation and retreat of private development.	MO1.	To achieve a 'balance' between maintaining natural coastal processes and enabling use and occupation of the coastal zone.	
	MO2.	To manage legacy issues and at 'immediate risk' coastal development, through an adaptive approach.	
	MO3.	To provide for resilient coastal development using planning controls and setbacks to minimise consequences and allow for adaptation to future coastal hazard risks and climate change.	
	MO4.	To ensure property owners, current and prospective, are aware of immediate and future risks to property, and understand the implications of the coastal hazard risk management strategy in this CZMP.	
		MO5.	To prioritise public expenditure for public benefit and apply principles of equity in determining who will fund the implementation of management strategies / actions.

Table 1 CZMP Themes and Considerations

Theme	Priority management issues / considerations	Management Objective number	Management objective (MO)
Community uses of the coastal zone	Beach access, recreational amenity and public safety are high priorities and are important to the economic, social and cultural well- being of the community.	MO6.	To maintain and improve, safe and appropriate public access and recreational use of the coastal zone.
Emergency Management	Beach access, recreational amenity and public safety may be compromised during periods of coastal erosion.	MO7.	Improved knowledge of coastal processes, hazards and risk management, and use data and evidence to base decision making. Improve knowledge communication to stakeholders and the general community.
Capacity building, monitoring and evaluation	Improved knowledge of coastal processes, hazards and risk management, using data and evidence to base decision making. Improved knowledge communication to stakeholders and the general community.	MO8.	To monitor the coastal zone and analyse and share information, enabling strategic and adaptable coastal zone planning and management.
Coastal environmental / ecological values	There are areas of high ecological value in the planning area and these values may be under threat as a result of human use and settlement within the coastal zone. Protecting / maintaining coastal ecological values is a high priority of the community.	MO9.	To mitigate and manage human impacts on coastal ecological values and processes in accordance with ecologically sustainable development principles and evidence based best practice.
Cultural heritage values	The EP BBE has significant cultural heritage value and these are important to the local indigenous community, as well as the broader general public. There may be negative impacts on cultural heritage as a result of: coastal processes, development and /or other human activities.	MO10.	To acknowledge, conserve and promote cultural heritage values, where appropriate.
Land ownership and management	Coastal land ownership and management arrangements are complex, involving a number of	MO11.	To work together and provide for integrated planning and management

Theme	Priority management issues / considerations	Management Objective number	Management objective (MO)
	public authorities and land managers.		of the coastal zone.

Table 2 outlines the alignment of the CZMP management objectives with the CZMP 'heads of consideration' – being the objectives of the *Coastal Protection Act 1979* (CP Act), the *NSW Coastal Policy (1997)* - and the OEH Coastal Management Principles (CMPs; refer Table 3). As per the CP Act, a CZMP is to have regard to the OEH CMPs, which are reproduced at Figure 1.

The OEH CMPs include reference to the *NSW Coastal Policy 1997*, for which a summary is provided in Figure 2.

Most relevant part of the CZMP	Priority management issues / considerations relevant to the plan's area, as identified through literature review and / or stakeholder engagement	CZMP Management Objective (MO)	Most relevant <i>NSW</i> <i>Coastal Policy 1997</i> goals (CPG) and objectives (CPO) and / or <i>CP Act</i> or OEH CMP
Section 2.1 and Appendix 4 - Coastal hazards risk management Coastal hazards pose an immediate and future risk to public and private assets in several precincts. The historic approach taken towards the management of coastal hazard risks has included works, as well as the application of planning and development controls to provide for the adaptation and retreat of private development.	MO 1. To achieve a 'balance' between maintaining natural, coastal processes and enabling use and occupation of the coastal zone.	CP Act Part1 (3)(b) CPG 1 CPG 5 - CPO 5.1 OEH CMP 8	
	MO 2. To manage legacy issues and at 'immediate risk' coastal development, through an adaptive approach.	CP Act Part1 (3)(b) CPG 5 - CPO 5.3 CPG 9 - CPO 9.2 OEH CMP 4	
		MO 3. To provide for resilient coastal development using planning controls and setbacks to minimise consequences and allow for adaptation to future coastal hazard risks and climate change.	CP Act Part1 (3)(b) CP Act 55C(1)(f) CPG 2 - CPO 2.2 CPG 5 - CPO 5.2 CPG 6 - CPO 6.1 CPG 9 - CPO 9.2 OEH CMP 7
	MO 4. To ensure property owners, current and prospective, are aware of immediate and future risks to property, and understand the implications of the	CPG 7 - CPO 7.2 OEH CMP 2	

 Table 2
 CZMP Management Issues and Objectives

Most relevant part of the CZMP	Priority management issues / considerations relevant to the plan's area, as identified through literature review and / or stakeholder engagement	CZMP Management Objective (MO)	Most relevant <i>NSW</i> <i>Coastal Policy 1997</i> goals (CPG) and objectives (CPO) and / or <i>CP Act</i> or OEH CMP
		coastal hazard risk management strategy in this CZMP.	
		MO 5. To prioritise public expenditure for public benefit and apply principles of equity in determining who will fund the implementation of management actions.	CP Act Part1 (3)(f) CPG 1 - CPO 1.5 OEH CMP 2 OEH CMP 5
Section 2.2 and Appendix 5 - Community uses of the coastal zone	Beach access, recreational amenity and public safety are high priorities and are important to the economic, social and cultural well-being of the community.	MO 6. To maintain and improve, safe and appropriate public access and recreational use of the coastal zone.	CP Act Part1 (3)(d) CP Act Part1 (3)(i) CP Act 55C(1)(a) CP Act 55C(1)(c) CPG 3 - CPO 3.1 CPG 7 - CPO 7.1 OEH CMP 9 OEH CMP 10
Emergency Action Sub Plan (EASP)	Beach access, recreational amenity and public safety may be compromised during periods of coastal erosion.	MO 7. 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.	CP Act Part1 (3)(d) CP Act 55C (1)(a) CP Act 55C (1)(b) CP Act 55C (1)(c) CPG 7 - CPO 7.2 OEH CMP 9
Section 2.1 and Appendix 4 - Coastal hazards risk management, and Emergency Action Sub Plan (EASP)	Improved knowledge of coastal processes, hazards and risk management, using data and evidence to base decision making. Improved knowledge communication to stakeholders and the general community.	MO 8. To monitor the coastal zone and analyse and share information, enabling strategic and adaptable coastal zone planning and management.	CP Act 55C(1)(d) CPG 2 - CPO 2.1 CPG 5 CPG 9 OEH CMP 4 OEH CMP 6 OEH CMP 7

Most relevant part of the CZMP	Priority management issues / considerations relevant to the plan's area, as identified through literature review and / or stakeholder engagement	CZMP Management Objective (MO)	Most relevant <i>NSW</i> <i>Coastal Policy 1997</i> goals (CPG) and objectives (CPO) and / or <i>CP Act</i> or OEH CMP
Section 2.3 and Appendix 6 - Open Coast Ecosystem Health	There are areas of high ecological value in the BBE and these values may be under threat as a result of human use and settlement within the coastal zone. Protecting / maintaining coastal ecological values is a high priority of the community.	MO 9. To mitigate and manage human impacts on coastal ecological values and processes in accordance with ecologically sustainable development principles and evidence based best practice.	CP Act Part1 (3)(a) CPG 5 - CPO 5.3 OEH CMP 4
Section 2.2 and Appendix 5 - Community uses of the coastal zone	Cultural heritage values are important to the local indigenous community as well as the broader general public. There may be negative impacts on cultural heritage as a result of: coastal processes, development and /or other human activities.	MO 10. To acknowledge, conserve and promote cultural heritage values, where appropriate.	CP Act Part1 (3)(c) CPG 4 - CPO 4.1 OEH CMP 3
Section 2.1 and Appendix 4 - Coastal hazards risk management, and Emergency Action Sub Plan (EASP)	Coastal land ownership and management arrangement are complex and public authorities and land managers need to adopt a strategic, integrated approach to managing the coastal zone.	MO 11. To work together and provide for integrated planning and management of the coastal zone.	CP Act 55C(1)(g) CPG 9

Table 3 Coastal management principles (OEH 2013), consideration and incorporation

Principle #	Coastal Management Principle (CMP)	Consideration and incorporation of CMP (e.g. most relevant MO and 'Part' of this CZMP)
Principle 1	Consider the objectives of <i>the Coastal</i> <i>Protection Act 1979</i> and the goals, objectives and principles of the <i>NSW Coastal Policy</i> <i>1997</i>	Refer Table 1, Appendix 1 (above)
Principle 2	Optimise links between plans relating to the management of the coastal zone	MO11 - All
Principle 3	Involve the community in decision-making and make coastal information publicly available	WRL (2016) inc. App M (consultation) Section 1.8 (CZMP) MO8 – Appendix 4, 5 and 6. MO10 – Appendix 5
Principle 4	Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach	BMT WBM (2013) Hazard Study WRL (2016) – Management Study MO2 – Appendix 4, 5 and 6. MO3 – Appendix 4, 5 and 6. MO8 – Appendix 4, 5 and 6 and EASP
Principle 5	The priority for public expenditure is public benefit; public expenditure should cost effectively achieve the best practical long- term outcomes	MO5 Section 2.1 (CZMP) Appendix 4
Principle 6	Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risk where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented.	MO2 MO3 Appendix 4
Principle 7	Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions.	MO2 MO3 Appendix 4
Principle 8	Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems.	MO9 – Appendix 6.
Principle 9	Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy	MO6 – Appendix 7 MO7 – EASP
Principle 10	Support recreational activities consistent with the goals of the NSW Coastal Policy	MO6 – Appendix 5





Figure 2 NSW Coastal Policy 1997 summary (NSW Government, 1997)

Appendix 2

Land ownership and management arrangements

The planning area comprises multiple land tenures and land ownership/management arrangements. Brief descriptions of these arrangements are provided below and depicted at Figure 1.

1.1.1 Cape Byron State Conservation Area

Cape Byron State Conservation Area is located 3km east of the town of Byron Bay and is denoted as 'Cape Byron SCA' on Figure 1.

Covering 98.5 hectares, the reserve takes in the most easterly point on the Australian mainland and the Cape Byron Lighthouse. The reserve extends to the low water mark and contains a complex mosaic of vegetation communities supporting a number of threatened and rare plant and animal species (Cape Byron Trust, 2002) and the endangered ecological communities littoral rainforest and headland grassland. The Reserve is part of the NSW National Parks and Wildlife Estate and is managed by the Cape Byron Trust and the National Parks and Wildlife Service (NPWS). The Trust consists of representatives from the community, local and state government and the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal). The park was created under a deed of agreement on 3 April 1997 between the Arakwal People, the Tweed Byron Local Aboriginal Land Council, and the NSW Government as part of resolving a native title claim.

The following Plan of Management applies to this area:

Cape Byron Headland Reserve Plan of Management (Cape Byron Trust, 2002)

1.1.2 Cape Byron Marine Park

All areas below the level of mean high tide are included within the Cape Byron Marine Park and are managed under the *Marine Estate Management Act 2014*. The Cape Byron Marine Park water adjacent the CZMP planning area are either Sanctuary Zone or Habitat Protection Zone.

The Cape Byron Marine Park Zoning Plan outlines the types of activities that can be undertaken in theese different areas/zones of the marine park having regard to the degree of potential impact they may have to plants, animals and habitats (Maine Parks Authority, 2010).

In conjunction with the Zoning Plan, the Marine Parks Authority has developed an operational plan detailing the strategies and actions to be undertaken in managing the marine park:

Cape Byron Marine Park Operational Plan (Marine Parks Authority, 2010).

1.1.3 Crown Reserves – No Trust

There is a Crown Reserve – no trust within the planning area which extends inland from Clarkes Beach. This reserve does not have a trust and therefore is managed by the NSW Department of Industry - Crown Lands and Water (Dol Crown Lands & Water) head office. There is no Plan of Management that applies to the reserve.

Reserve 1011268 for future public requirements notified 3 February 2006 covers all Crown land below MHWM.

Reserve 1012196 for the public purpose of access and public requirements, rural services, tourism purposes and environmental and heritage conservation gazetted 1 September 2006 (Byron Coast Regional Crown Reserve).

The Regional Crown Reserve covers all terrestrial coastal Crown land within the Byron LGA as well as submerged lands to the 3 nautical mile State territorial limit, beds of tidal waterways and the intertidal zone (NB: excludes Cape Byron Marine Park below MLWM – includes the intertidal zone that is within both the Marine Park & the Regional Crown Reserve).

Byron Coast Reserve Trust

This area of land is classified as 'Council managed Crown Reserve' and is managed through the Byron Coast Reserve Trust. It includes much of the foreshore area extending Main Beach through to and including Clarkes Beach. Byron Shire Council is the manager of this trust. There is no Plan of Management in place. The *Crown Lands Management Act 2016* requires all land under the Council as Reserve Trust to be managed as Community Land with the Crown still as the land owner.

Reserve 82000 for public recreation notified 30 October 1959. Byron Shire Council is corporate manager of the *Byron Coast Reserve Trust* responsible for managing the reserve.

• Lot 10 DP 1049827 – Main Beach, and Clarkes Beach

NSW Crown Holiday Parks Trust

The NSW Crown Holiday Parks Trust is the appointed trustee of several Crown Reserves in Byron Shire, including 'North Coast Holiday Parks Clarkes Beach' which is located within the plan's area. A Plan of Management for the North Coast Holiday Parks Clarkes Beach was adopted 10 November 2009 (*Clarkes Beach Holiday Park Plan of Management, 2009*).

Reserve 1013529 for tourist facilities and services gazetted 25 May 2007 (Clarkes Beach Holiday Park.)

- Part Lot 410 DP 729062
- Part Lot 306 DP 755695
- Part Lot 159 DP 755695
- Part Lot 10 DP 1049827

Reserve 49122 for preservation of native flora and public recreation notified 30 July 1913. (Adjoins Clarkes Beach Holiday Park.)

- Part Lot 410 DP 729062
- Part Lot 306 DP 755695
- Part Lot 159 DP 755695

Byron Shire Council 'community land'

Council land classified as 'community land' is managed in accordance with the *Local Government Act 1993.* There are several parcels of 'community land' classified as 'natural area' within the plan's area. Community land classified as 'natural area' is managed in accordance with the adopted:

Generic Plan of Management for Community Land Categorised as a Natural Area (Byron Shire Council, 2015, #DM599743)



Figure 1 Land ownership and management arrangements for the Eastern Precincts of the Byron Bay Embaymen

1.1.4 Arakwal People Native Title Claim

In 1994 the Arakwal Elders lodged a Native Title Claim over areas of Crown Land that included beaches and coastal waters between Belongil Creek at Byron Bay and Jews Point near Broken Head in the south. The Arakwal people lodged further claims in 1997 and 2001 over additional land in the Byron Shire. The Arakwal Native Title claims are depicted at Figure 2. To check for an updated status of native title claims, refer to the National Native Title website at http://www.nntt.gov.au/Pages/Home-Page.aspx.

1.1.5 Indigenous Land Use Agreement

In August 2001 a historic Indigenous Land Use Agreement (ILUA 1), between the Australian Government and the Bundjalung Arakwal People of Byron Bay was registered to implement part of the first and second Native Title Claims. ILUA 1 recognised the Arakwal People as the Traditional Owners of the area of the Arakwal National Park. Accordingly, the Arakwal National Park is jointly managed by the Bundjalung People of Byron Bay (Arakwal) and the National Parks and Wildlife Service (NPWS). This joint management agreement has subsequently been strengthened with ILUA 2.

1.1.6 Heads of Agreement with Byron Shire Council

In October 1998, Byron Shire Council became the first Council in New South Wales to establish a formal relationship with Native Title Claimants. A Heads of Agreement with the Arakwal people was established, resulting in the creation of an Aboriginal Consultative Committee. The Heads of Agreement document sets out a framework for ongoing consultation, ensuring the Arakwal People are involved in the management and protection of culturally significant places within the native title claim area and the Byron Shire.

This formal relationship has now evolved into a 'Memorandum of Understanding' between Council and the BOBBAC. The Memorandum of Understanding, signed in 2013, is based around five key priorities.

- 1. Culture and Heritage
- 2. Participation in Governance
- 3. Cultural and Economic Development
- 4. Caring for Country
- 5. Social Justice and Community Development.

A timeline of key recent events in the formal involvement of the Arakwal people in land management, protection and governance of the Byron Bay Embayment is detailed below:

- 1997 Cape Byron Headland Reserve Trust Agreement between the Arakwal people and the NSW Government.
- 1998 Heads of Agreement with Byron Shire Council.
- 2001 –ILUA Stage 1 entered onto the ILUA register of the National Native Title Tribunal. Celebration at Cape Byron Lighthouse with Premier and Minister for the Environment, 1 November 2001. Arakwal National Park gazetted on 28 October 2001, co-management agreement established.
- 2007 ILUA 2 and 3 entered onto the ILUA register of the National Native Title Tribunal. Celebration at Cape Byron Lighthouse with Premier and Minister for the Environment, 8 February 2007.

• 2010 – ILUA Stage 2 additions to Arakwal National Park, Broken Head Nature Reserve and Cumbebin Swamp Nature Reserve gazetted.

In summary, there are two significant ways that Arakwal people care for country, as relevant to the Byron Bay Embayment:

- 1. As a key member of and participating in Joint Management Committees (including Cape Byron Reserve Trust, Arakwal National Park, Byron Coast Area Committee).
- 2. Through the operation of the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal).



Figure 2 Arakwal Native Title Claims, Byron Shire (Arakwal, 2014)

Appendix 3

Engagement, Public Exhibition and Agency Support

1.1 Consultation Activities

Consultation activities undertaken in 2018 are outlined below in Table 1.

Table 1 – Consultation activities undertaken

Action (Method)	Who	How and When
Email to specific parties	All Public Agencies	Informative email sent to public agencies advising of Councils resolution to make a newly formed plan and inviting them to attend a Workshop at Council Chambers to discuss the preliminary draft CZMP. On-going email communication throughout development of the CZMP.
Stakeholder meeting (by invitation)	All Public Agencies	Workshop held at Council Chambers.
Website notice	General Community	Update of Coastal Management page on the Website to inform community of development and progress of the project.
Strategic Planning Workshop	Councillors	2 X Presentations at the Strategic Planning Workshop
Fact Sheet + FAQs	All community	Fact Sheet developed for email updates and all other engagement.
Council report	Councillors	Regular updates to Councillors on the development of the CZMP and comments received.
Public Exhibition	All community	4-5 weeks
Public notice advert (BSN & Echo Advert)	All community	Advert to notify and inform the community when CZMP goes to Public Exhibition
E-news general	All community	When CZMP goes to Public Exhibition
Media release	All community	When CZMP goes to Public Exhibition
Social Media	All community	Update on the development of the plan and how to stay informed in the progress of the delivery of the project, i.e. when it may go to Public Exhibition.
Enquiries	All community	Staff available to respond to public enquiries.
Landowners and Business Community	Landowners and Business Community	Letters to nearby landowners to notify them of the exhibition.
Community Drop in Stand	All Community	Staff available at set times and location in Byron Bay for community to discuss the plan.
Farmers Market stand	All community	Stand at the Byron Bay Farmers Market presenting the finalised (adopted) CZMP during Public Exhibition period.

Online discussion forum	All community	Provide community an email address and on-line
through BTT		discussion platform to ask questions with 1-2 day response time.

1.2 Exhibition of draft CZMP

The draft Coastal Zone Management Plan for the Eastern Precincts of the Byron Bay Embayment (draft CZMP EP BBE) was publicly exhibited under section 55E of the *Coastal Protection Act 1979* from XXXX to XXXX for a period of 4-5 weeks. The statutory advertisement for public exhibition was placed in the Northern Star on XXXX.

1.3 Public submissions

Public submissions have been considered in accordance with section 55F of the *Coastal Protection Act 1979.* Copies of all public submissions received during the exhibition period were provided to Councillors for their consideration during the exhibition period. XXXX submissions were received. Table 2 outlines public submissions received, key issues raised and staff's response.

Submission	Key Issues	Staff Response

Table 2 Submissions, key issues raised and staff response

1.4 Feedback from public authorities

An informal workshop was held with public agencies on the 24 January 2018 to discuss the plan and seek preliminary feedback and comments. Secondary comments were requested on the finalised draft plan prior to finalising the CZMP for Councils consideration. Letters of support are attached below.

1.5 Public Agency letters of support

Appendix 4

Coastal Hazards and Risk Management

1.1 Coastal hazards

The Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013), referred to herein as the 'Hazard Study', re-assessed and updated the coastal hazard risks for the Byron Shire coastline.

Relevant to this CZMP, the following hazards were assessed:

- coastal erosion from an extreme storm or a series of very large storms,
- long-term shoreline recession (including as affected by projected sea level rise), and
- coastal inundation (wave overtopping).

The assessment updated the Byron Coastline Hazard Definition Study (WBM Oceanics Australia 2000) in relation to:

- Changes to the CP Act and the new 'Guidelines for Preparing Coastal Zone Management Plans' (OEH, 2013) which advocates a risk based approach to coastal hazards management;
- Adoption of sea level rise benchmarks for 2050 and 2100 by Council; and
- New and updated data on coastal processes and new analytical techniques for assessing coastal hazards.

The Hazard Study was endorsed by Council on 10 October 2013 (Res 13-542). The project was completed with technical and funding assistance from the NSW State Government Office of Environment and Heritage (OEH) under the Coastal and Estuary Grants Program. The Hazard Study Update can be accessed via Council's website, at:

https://www.byron.nsw.gov.au/Services/Environment/Coast-and-Waterways/Coastal-Planning#section-4

1.1.1 Coastal erosion and recession hazard

The coastal erosion and recession hazard was assessed as follows, for the three CZMP planning timeframes:

- 1. **Immediate erosion hazard** Design storm bite (100 year ARI), and provision for the effects of wave climate variability (baseline shoreline position).
- 2. **2050** Design storm bite, underlying shoreline recession and sea level rise of 0.4m relative to 1990 (0.34m relative to 2010).
- 3. **2100** Design storm bite, underlying shoreline recession, and sea level rise 0.9m relative to 1990 (0.84m relative to 2010).

Two coastal erosion hazard scenarios were assessed for the Byron Bay Embayment (BBE):

Scenario 1: Retention and ongoing maintenance of all existing coastal erosion protection works and interim beach access stabilisation works along the entire BBE (i.e. Jonson Street protection works and continuous Belongil Beach works in place);

Scenario 2: Retention of only the Jonson Street protection works and removal of all other coastal erosion protection works and interim beach access stabilisation works along the BBE.

Note: The assessment of the two different scenarios undertaken in the Hazards Study is not relevant to this CZMP as the coastal erosion and recession hazard for the beaches east of the Jonson Street protection works remain the same, regardless of the scenario. In either scenario the Jonson Street Protection Works are retained and maintained.

A summary table of the major findings from the Hazard Study, including projected sea level rise impacts over the CZMP planning timeframes, is provided at Table 1.

Table 1BMT WBM (2013) coastal erosion hazard summary table, adapted from WRL (Table
5.1, 2016)

Beach	Storm demand (SD) 100yr/ARI		Dune stabilit y (DS)*	Rec	ession ((R)	SL reces (SL	-R ssion -R)	Hazard distance (SD+DS+R+SLR)			
	m ³ /m above AHD	(m) for 7m AHD dune	(m) for 7m AHD dune	(m/yr)	2050 (m)	2100 (m)	2050 (m)	2100 (m)	Pres (m)	2050 (m)	2100 (m)	
Clarkes Beach	150	21	14	0.20	8	18	35	73	35	78	126	
Main Beach	150	21	14	0.09	4	8	15	28	35	54	71	

4. * Dune stability (zone of reduced foundation capacity) not included in BMT WBM (2013) hazard lines, WRL (2016) adopted value of 7m AHD dune.

The calculated Immediate, 2050 and 2100 hazard lines for the planning area are provided in Figure 1.







Figure 1 - Erosion Hazard Zones – Eastern Precincts – Main, Clarkes Beach and The Pass

1.1.2 Coastal inundation (wave overtopping) hazard

The severity of inundation depends on the extent to which the run-up level of waves exceeds the crest level of the dune of coastal barrier (i.e. seawall). Potential wave run-up levels along the embayment are higher on seawalls than on natural sand beach profiles. The Hazard Study adopted design deep water wave conditions for assessment of wave run-up and overtopping potential in the embayment as follows:

- 100 year ARI significant wave height of 7.5m from direction just north of east; and
- 100 year ARI storm tide level of 1.84m AHD.

Based on the above design parameters, design nearshore wave heights are calculated as listed in Table 2. Due to wave refraction to the BBE, the nearshore wave heights and corresponding run-up levels were found to be significantly lower than occur along the other exposed open coastline parts of the Byron Shire (BMT WBM 2013).

As outlined in Table 2, potential wave run-up levels are higher on seawalls than on natural sand beach profiles.

Table 2	Calculated design 100 year ARI 'Immediate' wave run-up levels on 1.84m (AHD)
	storm tide (BMT WBM, 2013)

Location	Incident Local Significant Wave Height (m)	Seabed Level Seaward of Seawall (m AHD)	Run-up C (r	omponent n)	Run-uj on Stoi (n	o Level rm Tide n)
			No seawall		No seawall	Seawall
Main Beach	2.85	N/A	2.43	N/A	4.27	N/A
Jonson Street Protection Works	3.00	-2.0	2.49	3.1	4.33	4.94

As relevant to the coastline of the Eastern Precinct beaches of the BBE and this CZMP, the Hazard Study indicates the existing 'immediate' wave run-up and overtopping hazards (for a design 100 year ARI event) are:

- No potential for overtopping along Main Beach where dune heights are in excess of 6m AHD, significantly higher than potential run-up levels.
- Minor overtopping potential at the eastern end of the Jonson Street Protection Works.

Table 3 provides calculated wave run-up levels when projected sea level rise is incorporated. As projected future shoreline recession proceeds and with projected future sea level rise, the potential for overtopping will further increase due to the higher sea levels relative to the existing dune and seawall crest levels.

Table 3 Calculated future wave run-up levels: with sea level rise

Location	20 (m A	50 AHD)	21 (m 4	00 AHD)
	No seawall	Seawall	No seawall	Seawall
Main Beach	4.6	N/A	5.1	N/A
Jonson Street Protection Works	N/A	5.3	N/A	5.8

1.2 Coastal Hazards Risk Assessment

1.2.1 Audit of assets at risk (WRL, 2016)

As part of the Coastal Hazard Management Study – Byron Bay Embayment (WRL, 2016), herein referred to as the 'Management Study', an audit was undertaken of the 'properties', 'structures' and 'significant infrastructure' at risk from the coastal hazards beach erosion and shoreline recession including projected climate change induced sea level rise impacts. The risks were assessed with reference to the 'best estimate' erosion hazard lines as prepared in the Hazard Study for the immediate, 2050 and 2100 timeframes. The calculated Immediate, 2050 and 2100 'best' estimate hazard lines for the planning area are provided below in Figures 2 to 5.

The Management Study can be accessed via Council's website, at: <u>http://www.byron.nsw.gov.au/publications/coastal-hazard-management-study-byron-bay-embayment-wrl-2016</u>

In the context of the audit, the main asset classes were as follows:

- Properties 'rateable addresses containing single or multiple cadastre parcels'
- Structures any type of building and sub categorised into 'houses' and 'cabins and amenities'
- Significant infrastructure assets such as water, stormwater and sewer infrastructure, public assets such as streets, footpaths, amenity blocks, car parks, playgrounds and picnic areas

A summary table of the audit by coastal precinct is provided in Table 4, whilst Table 5 outlines 'best estimate' recession and hazard to significant infrastructure on Crown, Council and National Park estate potentially at risk.

These tables reflect on audit data from the Management Study as well as desk-top analysis of the hazard lines from the Hazard Study. The data presented does not reflect on data analysed for the 'probabilistic assessment' of planned retreat (refer Section 2.5 of WRL, 2016).

Appendix H of the Management Study provides a more detailed audit of assets potentially at risk from the assessed coastal hazards.

Residential Development

For the Eastern Precincts being Main Beach, Clarkes Beach, The Pass, Wategos/Little Wategos there are no residential houses at risk from 'immediate' coastal erosion hazard or from projected shoreline recession out to 2100 using the 'best estimate' hazard lines (refer Table 4).

Commercial Development

There are some commercial structures at The Pass and Clarkes Beach which are at risk now and into the future over the 2100 planning timeframe as outlined in Table 4 being:

- A cabin at the most eastern end of The Pass owned and managed by the National Parks and Wildlife Service (NPWS) that lies seaward of the 'best estimate' immediate hazard line.
- Two cabins at The Pass owned and managed by NPWS that are seaward of the 2050 hazard line using 'best estimate' hazard lines.
- 15 cabins within the Clarkes Beach Holiday Park that are seaward of the 2050 hazard line using 'best estimate' hazard lines.
- 35 cabins within the Clarkes Beach Holiday Park that area seaward of the 2100 hazard line using 'best estimate' hazard lines.
- Commercial structure (Clarkes Beach Café) located seaward of the 2050 hazard line using 'best estimate' hazard lines.

Table 4Property and development threatened by coastal erosion and projected shoreline
recession in combination with projected sea level rise using 'best estimate' hazard
lines (BMT WBM, 2013), adapted from WRL (2016)

Planning horizon	Resid	lential ho	ouses	Comme	ercial stru	uctures	Total affected cadastres			
	The Pass	Clarkes Beach	Main Beach	The Pass	Clarkes Beach	Main Beach	The Pass	Clarkes Beach	Main Beach	
Immediate	-	-	-	1	-	-	4	2	1	
2050	-	-	-	2	16	-	4	2	1	
2100	-	-	-	-	36	-	5	4	1	

Notes:

- Commercial structures include short and long term accommodation such as backpackers, caravan parks, cafe and strata title premises providing holiday lettings.
- Structures, such as houses and accommodation venues may spread over multiple lots / cadastre parcels.
- Cadastre affected at Main Beach relates to the land that is classified as 'Council managed Crown Reserve' and is managed through the Byron Coast Reserve Trust.

Infrastructure

There is significant infrastructure at The Pass and Clarkes Beach which is at risk now and into the future over the 2100 planning timeframe as outlined in Table 5. Significant infrastructure at risk from immediate coastal erosion using 'best estimate' hazard lines includes:

• Stormwater outlet adjacent the BBQ shelter of the Clarkes Beach Holiday Park.

• Stormwater outlet adjacent Lighthouse Road to the east of the Captain Cook staircase (The Pass).

Significant infrastructure at risk from coastal erosion and projected long-term recession to 2050 using 'best estimate' hazard lines includes:

- Stormwater outlet adjacent the eastern property boundary of the Clarkes Beach Holiday Park.
- Stormwater outlet (Cowper Street) at Clarkes Beach.
- Shelter /toilet at Clarkes Beach (shower near Middleton St).

Significant infrastructure at risk from coastal erosion and projected long-term recession to 2100 using 'best estimate' hazard lines includes:

- Captain Cook Car park (Lighthouse Rd)
- Footpath (pedestrian footbridge off Lighthouse Rd)
- Road (Lighthouse Rd)
- Shelter/toilet off Lighthouse Rd
- Car park at Massinger St
- Footpath at Massinger St
- Road (Massinger St)
- Structures at Clarkes Beach BBQ and bins; Shelter; Toilet block and Shower (Massinger St).

Table 5 Significant infrastructure (Council, Crown Land and National Park estate) at risk from coastal erosion and projected long-term recession in combination with projected sea level rise, using 'best estimate' hazard lines (BMT WBM, 2013), adapted from WRL (2016)

	Car parks			Footpaths			Roads			Shelters / Toilets			Stormwater Outlets		
Planning horizon	The Pass	Clarkes Beach	Main Beach	The Pass	Clarkes Beach	Main Beach	The Pass	Clarkes Beach	Main Beach	The Pass	Clarkes Beach	Main Beach	The Pass	Clarkes Beach	Main Beach
Immediate	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
2050	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-
2100	1	1	-	1	1	-	1	1	-	1	5	-	-	-	-



 Disclaimer : While all reasonable care has been taken to ensure the information contained on this map is up to date, no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of the information prior to using it. Note : The information shown on this map is a copyright of the Byron Shire Council and the NSW Department of Lands.
 Notes

 Figure 2
 Erosion Hazard Zones – Eastern Precincts – Main, Clarkes Beach and The Pass, showing 'best estimate' lines only.
 Interval



Legend

Land Parcels

- Locality Names Road Names
- 601 Erosion Hazard Immediate
- 001 2050 Encelon -Dest estimate 001 2100 Encelon - Dest estimate





Figure 3 Erosion hazard zones at Clarkes Beach showing 'best estimate' lines only.


Figure 4 Erosion hazard zones at Main Beach showing 'best estimate' lines only.



Figure 5 Erosion hazard zones at The Pass showing 'best estimate' lines only.

1.2.2 Other assets at risk from coastal hazards

Cultural assets

The midden in the south west of the Cape Byron State Conservation Area located adjacent to the stormwater outlet at the eastern property boundary of the Clarkes Beach Holiday Park is being impacted by stormwater discharge and tidal and wave impacts, particularly in periods of low beach volume. High velocity stormwater discharges lower the beach profile around the midden increasing its susceptibility to tidal and wave impacts.

Middens are protected under the *National Parks & Wildlife Act 1974*. The management of middens needs to be guided by the Aboriginal community as custodians of their cultural heritage. In the context of the Aboriginal community providing guidance about management of their cultural heritage, works such as small scale armouring works (e.g. low crest cobble berm) to protect significant Aboriginal middens should the Arakwal people and NPWS seek to do so, subject to adequate assessment and gaining consent.

Wategos Beach assets

The Management Study did not audit the assets at risk in the Wategos Beach precinct from coastal hazards for the reasons articulated below.

WBM Oceanics (2000), noted that the sheltered beaches in the lee of Cape Byron, such as Little Wategos and Wategos, are not fully exposed to storms from south of east, and that the shallow offshore profile to Julian Rocks reduces the storm intensity from the east and north. Hence, the measured short term changes to the dunes at Wategos are significantly less than the more exposed beaches of the Shire.

In addition, the erosion risk at Wategos Beach is expected to be constrained by bedrock (WBM Oceanics, 2000), as well as limited protection works along Marine Parade (BMT WBM, 2013). According to WBM Oceanics (p 3-14, 2003):

...there are no specific beach erosion issues apart from some potential damage to the Marine Parade foreshore during major storm events. Such events may result in inundation of the lower sections of Marine Parade.

In terms of the potential inundation risk referred to by WBM Oceanics, further investigation was not undertaken as part of the Hazard Study. For these reasons the Management Study did not undertake a detailed assessment of coastal hazard risks at the Wategos Beach.

As shown in Figure 6, the elevation of Marine Parade is in the order of 5 to 10 m AHD for much of the road, increasing in height towards the east. Further investigation is warranted to determine the substrate composition of the Wategos sub-aerial foreshore with regard to its likely resistance to storm induced erosion events, and to assess the coastal inundation risk to the lower part of Marine Parade.



Figure 6 Elevations at Wategos Beach (elevation derived from NSW Land and Property Information, LiDAR data captured 28/08/10)

1.3 Coastal Hazards Risk Management

A summary of proposed coastal hazard risk management actions for each precinct is outlined at Table 6, which is adapted from Table 3 of the Guidelines.

In accordance with the Guidelines, all private property subject to coastal erosion and recession hazard (Immediate, 2050 and 2100 timeframes), is to be categorised according to the degree of the hazard and the category of Council's intended response (as per Table 5 and 6 of the Guidelines). This categorisation is provided at Table 7. As outlined in Table 7, the response categories for private property (being commercial structures) in the Eastern Precincts 'D'.

The intended response categories chosen are in line with the CZMP Vision and Management Objectives, along with the CZMP 'heads of consideration' – being the objectives of the *Coastal Protection Act 1979* (CP Act), the *NSW Coastal Policy (1997)* - and the OEH Coastal Management Principles (refer Appendix 1 – 'CZMP Management Issues, Objectives and Legislative Framework').

 Supporting action 								
Option category	Avoiding the risk		Changing the likelihood			Changing the consequence	Managing residual risks by informed decision ¹	Managing residual risks, including impacts from coastal protection works, through informed decision making
Option	Building and infrastructure setbacks (planning and development controls) ¹	Building design criteria (adaptive)	Coastal or flood protection works (short term or long term) Seawalls	Revegetation programs (e.g. dunes)	Compliance action relating to illegal work on beaches	Building and infrastructure relocation or modification	Emergency management ² Refer EASP	Monitoring / analysis and technical investigations
Main Beach	1	1	~	1	1	1	1	√
Clarkes Beach	 Image: A start of the start of	1		 Image: A set of the set of the	 Image: A set of the set of the	1	1	1
The Pass	 Image: A set of the set of the	1		 Image: A start of the start of	 Image: A set of the set of the	 ✓ 	1	 Image: A second s
Wategos				1	1		1	1

Table 6 Summary of coastal hazard risk management actions for the Eastern Precinct (Adapted from Table 3, OEH, 2013)

² including monitoring and warning

Primary action

1

Table 7Private property coastal hazard response category, as per Guidelines (adapted
from Table 5 and 6, OEH, 2013)

Timeframe of	Hazard vulnerability/ risk category	Commercial structures		Tota	I affected cadas	stres
risk		The Pass	Clarkes Beach	The Pass	Clarkes Beach	Main Beach
Immediate	1	1	-	4	2	1
2050	2	2	16	4	2	1
2100	3	-	36	5	4	1

Key: Response Categories

Α	Coastal protection works are considered technically feasible and potentially cost-effective and funding is being sought for implementation. Coastal protection works at Main Beach refer to the upgrade of the existing Jonson Street Protection Works protecting the Byron Bay Town Centre.
В	Coastal protection works are considered technically feasible but not cost-effective for public funding – unlikely to be implemented by a public authority
с	Coastal protection works are not considered technically feasible – no intended public authority works
	Coastal protection works including rock, concrete or other like 'hard' materials are not considered feasible based on the current limited knowledge of dune substrate and the impact that construction of such works may have on coastal processes into the future.
D	Coastal protection works including sand (or temporary sandbags) and small scale armouring works (such as a low crest cobble berm) to mitigate erosion impacts to significant cultural assets (e.g. Clarkes Beach midden) may be considered feasible subject to assessment and relevant approvals.
E	For a variety of reasons, the categories at Table 6 of the guidelines (OEH, 2013) are not applicable or sufficient information / certainty is not available.

Notes:

- Commercial structures include short and long term accommodation such as backpackers, caravan parks and strata title premises providing holiday lettings.
- Cadastre parcel affected at Main Beach relates to the land that is classified as 'Council managed Crown Reserve' and is managed through the Byron Coast Reserve Trust. This includes the Jonson Street Protection Works.
- Response Category 'D' If a geotechnical study shows an asset to be underlain by bedrock, then installing 'hard' protection works to protect these assets may have significantly less impact on coastal processes when compared to installing on an unconsolidated sedimentary shoreline such as a dune/beach system.

1.4 Coastal Hazards Management Issues

Management issues have been identified through the development of the CZMP, desktop literature review of existing studies (Hazard Study and Management Study), plans and reports and community consultation. Each management issues aligns with the most relevant CZMP Management Objective/s as presented in Appendix 1 – 'CZMP Management Issues and Legislative Framework'.

Management issues related to coastal hazards are outlined in Table 8 below.

I able o							
Issue Number	CZMP Management Objective	Threat / Management Issue	Location	Source(s)			
Coastal Haza	Coastal Hazards						
C1	MO4	Coastal hazards pose an immediate and future risk to commercial development.	Clarkes Beach The Pass	WRL (2016) BMT WBM, (2013) BSC (2016b)			
C2	MO4	Coastal hazards pose an immediate and future risk to significant infrastructure.	All	WRL (2016) BMT WBM, (2013) BSC (2016b)			
C3	MO7 MO8 MO11	Coastal hazards pose risk to beach access and public safety during coastal erosion emergencies	All	WRL (2016) BSC (2016b)			
C4	MO5 MO6	Existing protection works are not adequate to withstand design storm events.	Main Beach (Jonson St)	WorleyParsons (2013)			
C5	MO3 MO4	Planning controls need to reflect current knowledge of coastal hazards and provide for adaptation of development.	The Pass through to Main Beach	WRL (2016)			
C6	MO1	Sand dunes provide a buffer to waves during storms and need to be protected and restored.	The Pass through to Main Beach	WRL (2016) BSC (2016b)			
C7	MO8	Coastal hazards pose uncertain risk where bedrock levels are unknown.	Wategos The Pass	WRL (2016) BSC (2016b)			
C8	MO10	Coastal hazards in combination with stormwater discharge pose an immediate and future risk to cultural assets (e.g. Clarkes Beach midden).	Clarkes Beach The Pass	Public agency comments and site visits.			

 Table 8
 Coastal Hazards Management Issues

Appendix 5

Community Uses of the Coastal Zone

1.1 Aboriginal cultural heritage

The Bundjalung of Byron Bay, Arakwal people, herein referred to as 'Arakwal people', have lived in the coastal landscape of Byron Bay for at least 22,000 years (Arakwal, 2014). Arakwal Country extends from Seven Mile Beach south of Broken Head, north to the Brunswick River, to the escarpment west of Byron Bay, and east into the Tasman Sea (Arakwal, 2014).

The Bundjalung of Byron Bay Aboriginal Corporation (Arakwal), herein referred to as BOBBAC, was established in 1996, and primarily works for the betterment of the Arakwal people, land and waters, initially established through native title negotiations.

It is important to the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) people that their cultural traditions and associations are maintained. Maintenance of cultural traditions and associations contributes to identity and well-being and shows respect to their ancestors. (NPWS, 2012:9)

1.1.1 Aboriginal cultural heritage values and resources

The Arakwal people have lived and moved through the coastal landscape of the Byron Bay Embayment (BBE) finding shelter and camping in the dunes, and obtaining food from the beaches and the coastal creeks (NPWS, 2012). Favoured food of the Arakwal people include fish, pipis, crabs, prawns, cobras (wood borers) and ducks, as well as the berries and fruits of coastal plants (NPWS, 2012). Coastal animals and plants are also important for totemic, wild resources and other values (NPWS, 2012).

There are a variety of culturally significant areas located in the general BBE study area, including pathways, middens (physical remains of food and materials), stone arrangements, stone resource sites, ceremonial sites and burials (Stewart, Y. pers. comm. in NPWS, 2012 and WBM Oceanics, 2003).

Three open camp / midden sites have been recorded in the Cape Byron State Conservation Area (SCA), and The Pass midden is the oldest (circa 1,440) and only large and substantially undisturbed pippi midden between Ballina and the Queensland border (Wildsite Ecological Services, 2002). The Pass midden was a fishing camp comprising of fish e.g. bream and shellfish), animals and plants nearby were also prepared here (Wildsite Ecological Services, 2002).

A search of the Aboriginal Heritage Information Management Service (AHIMS) website indicates that there may be at least 8 'Aboriginal sites' within the geographic scope of the entire BBE – these sites record Aboriginal objects and declared Aboriginal places. Box 1 contains a description of significant coastal sites within or adjacent the Eastern Precincts of BBE study area.

Box 1 Significant coastal sites located within or adjacent to the Eastern Precincts of the BBE study area (Arakwal website, 2014)

Currenba (Palm Valley) - Currenba is located at The Pass. The Arakwal, as well as other tribes of the Bundjalung Nation, camped in this area and ate pipis, fish and other abundant sea tucker, which they caught at The Pass and Wategos. The surviving midden and campsite at Palm Valley is the oldest of its type in the region, estimated to be approximately 1,440 years old.

Nguthungulli (Julian Rocks) - This group of small islets out in the Bay are very significant to the Arakwal. It is also an important habitat area for Binguing (turtle) and many species of fish, some of which are endangered such as the Grey Nurse shark. There are several important Dreaming stories associated with Julian Rocks.

Walgun (Cape Byron) - Walgun plays an important role in many Dreaming stories, and was a special place for ceremony, learning and spiritual inspiration. Due to its elevation and panoramic views, Walgun, which means 'the Shoulder' also played an important strategic role as a lookout point. A 'dancing circle' is believed to have once been located on the crest of the headland which was used in initiation ceremonies for boys.

1.1.2 Impacts on Aboriginal cultural heritage values and resources

Aboriginal cultural resources located in the coastal zone have been significantly impacted by coastal erosion and sand mining (WBM Oceanics, 2003). For example wind and wave action can affect the survival and integrity of archaeological sites, whilst sand mining, which began along the Byron coastline in the 1930s, undoubtedly resulted '...in the destruction of numerous sites' (WBM Oceanics, 2003).

Despite these losses, it is likely that undiscovered and important Aboriginal cultural sites are located around the shorelines of Byron Bay, especially near freshwater springs at Cosy Corner, Tallow Beach and Clarkes Beach (Wildsite Ecological Services, 2002). This may include Aboriginal burials lying undetected beneath the foredunes, as noted by Collins in a comprehensive study of Aboriginal cultural heritage in the area (Collins, 1991) who also made the following recommendation with respect to development within coastal areas:

Because it is likely that those sites recorded within the Coastline Zone already represent but a small sample of those originally present, it is recommended that complete conservation of the archaeological resource be effected wherever possible. All designated developments which will affect this Zone should be preceded by archaeological surveys and developers should be required to retain all undisturbed sites located and implement appropriate management procedures (e.g. the revegetation and stabilisation of exposed sites. (Collins, 1995:56)

The midden in the south west of the Cape Byron SCA located adjacent to the stormwater outlet at the eastern property boundary of the Clarkes Beach Holiday Park is being impacted by stormwater discharge and tidal and wave impacts, particularly in periods of low beach volume. High velocity stormwater discharges lower the beach profile around the midden increasing its susceptibility to tidal and wave impacts.

Preliminary investigation of the Clarkes Beach midden has confirmed that it contains the remains of macropods, in addition to pipis and other molluscs. The midden may be highly significant in view of the age of The Pass midden which is acknowledged as being circa 1,440.

Middens are protected under the *National Parks & Wildlife Act 1974*. The management of The Pass and Clarkes Beach middens needs to be guided by the Aboriginal community as custodians of their cultural heritage. In the context of the Aboriginal community providing guidance about management of their cultural heritage, works such as small scale armouring works (e.g. low crest cobble berm) to protect significant Aboriginal middens should the Arakwal people and NPWS seek to do so subject to adequate assessment and gaining consent.

1.2 Non-Aboriginal cultural heritage

Cape Byron received its name from Captain James Cook in May 1770, when sailing the Endeavour along the far north coast of NSW. It was named after Cook's friend, Captain John Byron, father of George Gordon (Lord) Byron. Several decades later, William Johns created a plan of Cape Byron Bay (Figure 1) while on voyage with the HMS Rainbow in 1828.

The first documented European settlement in Byron Shire was the Brunswick River cedar camp in 1849 (BSC, 2006), by 1857 the area contained squatters with 150,000 head of cattle (1978).

Since European settlement, the uses of the coastal zone in Byron Shire have been many and varied. The following themes reflect these uses (BSC, 2006):

- Discovery and exploration
- Transport and communication
- Forest industry and forest conservation
- Fishing and whaling
- Quarrying, mining, and mineral processing
- Leisure and tourism

Perhaps the most significant European heritage site in Byron Shire is the Cape Byron lighthouse and keepers' cottages. The lighthouse opened in late 1901 and still remains today as an aid for ships travelling along the Australian east coast, with the lights visible from 27 nautical miles offshore (Marine Parks Authority, 2003). The lighthouse attracts many visitors and lies within the Cape Byron SCA. During the whale migration season it is a popular viewing point.

The keepers' cottages and buildings are listed as being of local heritage significance (BSC, 2007), and are used for a number of purposes, including:

- Tourist information and kiosk
- Events, for example weddings and ceremonies
- Premium holiday accommodation (Assistant Lighthouse Keeper's Cottage).



Figure 1 William Johns' plan of Cape Byron Bay, from a voyage in 1828 (BSC 2006)

1.2.1 Non-Aboriginal cultural heritage sites

There are a number of shipwrecks within the Cape Byron Marine Park area, with 15 vessels known to have been wrecked or grounded in and around Byron Bay (WBM Oceanics, 2003). The *Wollongbar* and *Tassie III* are the most prominent, being located offshore from Jonson Street and Main Beach (Marine Parks Authority, 2003). In the present day under certain conditions, these wrecks are popular surf breaks and snorkel/swim sites.

1.3 Byron Shire Community Values

A number of consultation activities have been carried out over the past fifteen years concerning the community values associated with the BBE / Byron Shire Coastline and how these may translate into perspectives on managing the coastal zone.

The most recent consultation activities are:

- Stakeholder workshop carried out in 2007 as part of the preparation of the draft CZMP for the Byron Shire Coastline (2010);
- Stakeholder Engagement Strategy (Umwelt in WRL, 2016), which was part of the larger project to prepare a Management Study for the BBE (WRL, 2016); and the
- Master planning process carried out in 2015 for the Byron Bay Town Centre Masterplan (BSC, 2017a).

From the recent stakeholder engagement activity associated with the draft CZMP for the BBE (Umwelt in WRL, 2016) the following values are consistently viewed as the most important drivers for managing the coastal zone of the entire BBE:

- natural, ecological values and a healthy coastal environment
- access to beaches
- recreational and aesthetic amenity

This finding aligns other coastal studies and the master planning process which found that the natural environment and landscape amenity were particularly important values with respect to the Byron Shire coastline (BSC, 2000; WBM Oceanics, 2003; BSC, 2010).

The values analysis has been used to inform the preparation of this CZMP, for example to assist with developing the CZMP management objectives, identifying and prioritising management issues, and with assessing potential management options.

1.4 Recreation and Amenity Values

The recreation and amenity values of the planning area are significant by virtue of:

- The outstanding scenic and natural beauty of the BBE; for example the iconic vista as observed from Cape Byron, composed of sweeping beaches, Julian Rocks in mid view, and topographic features such as Wollumbin (Mount Warning) in the background.
- The relatively sheltered nature of the embayment and generally calm coastal conditions experienced at Wategos and Main Beach, providing for excellent swimming, surfing and other water based activities.
- A variety of surf breaks including the world class point break at The Pass.
- The relatively pristine and ecologically diverse nature of the coastal waters of the BBE.
- The relatively undeveloped, unhurried and uncrowded nature of the beaches and foreshores of the BBE.

Maintaining this diversity of coastal landscapes in the context of threats and pressures such as population growth, ongoing development pressure and increasing tourist visitation, as well as the risks arising from coastal hazards, is an important objective of this CZMP.

1.4.1 Recreational activities

Popular coastal recreational activities in the BBE include: walking, picnicking, whale watching, sea kayaking, surfing, swimming, snorkelling, scuba diving, stand up paddle boarding, kite surfing, hang gliding, beach volleyball, yoga, fitness classes, fishing (where permitted) and bird watching. Other activities include water based sporting activities and organised events such as the Winter Whales Ocean Swim, Byron Bay Triathlon, surfing and surf life saving carnivals.

In foreshore areas including Apex Park (adjacent Main Beach), activities such as wedding ceremonies, beachside markets and musical performances are also common. Some of these events may be scheduled for only certain times of the year or for the purpose of special celebrations e.g. New Years Eve, schoolies week.

The community survey, conducted as part of preparing the Management Study (WRL, 2016), included a question on the recreational activities most important to survey participants. The results of this question are presented below at Table 1.

Table 1	Community responses regarding important features of the Byron Bay Embayment
	as per community survey 2013/14 (Umwelt in WRL, 2016)

Activity	Main activity I do (identified as 1or 2), %	An activity I do, but less important/frequent (nominated as 4 or 5), %
Use the beach by myself (run, walk or other exercise	65	20
Use the beach with a friend/family/group or team, for exercise or relaxation	71	16
Use the beach with my pet	41	46
Use the foreshore reserve for picnics	57	37
Use the foreshore reserve for exercise	62	37
Go for a surf	62	27
Go for swim	79	12
Go fishing	30	52
Go boating/kayaking	33	52
Practice Yoga	14	66
Surfclub Activities	18	64
Socialize with friends	48	29
Commercial activities (e.g. operating a business)	7	87
Community activities (e.g. Triathlon)	18	70
Conservation activities (e.g. Dunecare)	51	32

From Table 1, the most frequently nominated 'main' activities across all respondents were:

- going for a swim
- using the beach with family or friends or groups for exercise and relaxation
- using the beach by myself run, walk or other exercise
- going for a surf
- using the foreshore reserve for exercise and
- conservation activities.

1.4.2 Tourism

Byron Shire has a history of over 100 years as a tourism destination. Daytrip visitors were first attracted to the area from the early 1900s and camping and caravanning holidays became popular from the 1930s. From the 1960s, surfers were attracted to the area for the excellent surfing conditions. From the 1980s to mid 1990s tourism and development activity within the Shire, in particular Byron Bay, increased rapidly. This followed the decline of other industries that had supported the local economy including timber, dairying, agriculture, whaling and meat processing. It was also during this time that international backpackers discovered Byron Bay (BSC, 2006).

Today, tourism is recognised as an important contributor to the Shire's economic development with tourism recognised as the principal driver of the Shire's economy (BSC website, undated).

It is estimated that in 2015/16, the annual total tourism spend for the Byron LGA was \$418 M (National Institute of Economic and Industry Research (NIEIR), 2016). During the same period, employment arising from tourism expenditure was around 2,142 full time jobs (NIEIR, 2016).

With reference to data collected by National Visitor Survey (Tourism Research Australia (TRA), 2017), 'going to the beach' is in the most popular activity (70%) for both domestic overnight and daytrip tourists to the Byron LGA, alongside 'eating out at restaurants' (70%). The majority of domestic visitors travel from Brisbane (26%) and Sydney (23% - TRA, 2017). The largest age group of domestic travellers (40%) are 15-29 years of age and are travelling with their partner (35%). With regards to the 214,000 international visitors to Byron Shire per annum (TRA, 2017), the largest source market of visitors are from the United Kingdom (23%), followed by Germany (15%) and the United States of America (11%). The majority of international tourists visiting Byron Shire (64%) are in the 15-29 year old age group. Interestingly, 55% of international travellers travel to Byron Shire unaccompanied (TRA, 2017).

From the cost benefit analysis undertaken as part of the Management Study (Appendix N of WRL, 2016), beach related tourism expenditure was estimated to amount to over \$115 million annually. Noting this figure assumes that 50 per cent of daily tourism expenditure is spent on beach related activities (WRL, 2016 with data from Tourism Research Australia).

1.4.3 Surf safety and life saving services

Council, in conjunction with Cape Byron Headland Trust and the Australian Lifeguard Service, provides beach surf life saving services to specific beaches within Byron Shire during the NSW and Queensland School Holidays. Beach patrols are also provided by Surf Life Saving volunteers at Main Beach on weekends and Public Holidays during specified periods.

In addition to beach patrols, signage erected at beach accesses provides information related to risks such as rips and currents, as well as dangerous conditions brought about by coastal storms and erosion. Recently Council sought to improve this information with the placement of targeted signage on recognising and avoiding rips. In 2013, Council also embarked on a community education program concerning the risks associated with coastal storms and hazards, co-funded through the Natural Disaster Resilience Grants Scheme.

In response to increased shark activity and associated incidents in the vicinity of the BBE and the North Coast generally, in 2014/15 Council funded a trial of aerial shark patrols during the school holidays of September / October 2015. The patrols were conducted by a Gyrocopter and were designed to provide instant shark sighting reports, radioed back to local life guards.

The State Government also announced a suite of measures focused on the North Coast, including a program of shark tagging and monitoring, a review of shark management technologies, and a targeted community awareness campaign.

1.4.4 Water quality

During the period November 2009 to September 2013, Byron Shire participated in the State Government's 'Beachwatch' water quality monitoring program. The program provided regular and reliable information on beach water quality via a website, enabling people to make informed decisions about where and when to swim, particularly after rain events. Analysis and subsequent ratings were based on microbial assessments (enterococci cfu) for total counts, in response to rainfall and trends through time. Main Beach and Clarkes Beach were included in the program.

The monitoring program revealed that water quality at these beaches rated as 'very good'. This was in spite of higher than average rainfall events within this La Nina period. The Beach Suitability grade of Very Good indicates that the water quality is considered safe for swimming almost all of the time, with very few potential sources of faecal contamination (<u>http://www.environment.nsw.gov.au/resources/beach/bwar13/13757bwar13Byron.pdf</u>).

In October 2013, the Beachwatch program was discontinued.

Stormwater Outlets

There are four piped stormwater outfalls within the planning area which divert untreated stormwater to outlets at Clarkes Beach and The Pass.

- 1. Stormwater outlet (Cowper Street) at Clarkes Beach.
- 2. Stormwater outlet adjacent the BBQ shelter of the Clarkes Beach Holiday Park.
- 3. Stormwater outlet adjacent the eastern property boundary of the Clarkes Beach Holiday Park.
- 4. Stormwater outlet adjacent Lighthouse Road to the east of the Captain Cook staircase (The Pass).

The outfalls are important for reducing flood flows yet are somewhat undesirable given untreated urban stormwater can present a health risk to beach users as well as transport litter to the beach (SMEC, 2010). Sometimes, when sand is actively accreting to Clarkes Beach, stormwater cannot flow directly to the ocean and the water pools on the beach behind the sand berm that builds up and a channel through the berm has to be dug to allow the stormwater to escape. As part of the recently adopted Belongil Creek Floodplain Risk Management Plan (BMT WBM, 2014), an upgrade of the Clarkes Beach outfall is planned but is currently unfunded. This includes substantially increasing the current capacity of the drain and incorporating stormwater treatment into the system (detention basin wetland adjacent the drain) to improve the water quality of stormwater exiting the outfall.

There are several stormwater outlets at Wategos Beach. These outlets may impact on water quality and general amenity at Wategos Beach however the size of the urban stormwater catchment is relatively small (WBM Oceanics, 2003).

1.4.5 Companion animals

Council has a 'Companion Animal Exercise Areas Policy' which makes provision for companion animal off-lead and on-lead exercise areas (currently Policy 5.31, last reviewed October 2011). Within the Eastern Precincts of the BBE there are no designated 'Companion animal off leash areas'.

Hence, dogs and other domestic animals, with the exception of 'registered assistance animals', are not permitted at the beaches within the Eastern Precincts of the BBE, or in the Cape Byron SCA. Further information regarding companion animals is available on the Byron Shire Council website at https://www.byron.nsw.gov.au/Community/Pets/Off-leash-exercise-areas.

1.4.6 Commercial activities

There are a number of recreational and cultural activities which frequently take place on coastal reserves and foreshore areas of a commercial nature. For example, mobile food kiosks, weddings, commercial diving, surf school and sea kayak operators.

In order to ensure that commercial activities are managed appropriately and do not result in negative environmental impacts, conflict between users, or diminish the recreational amenity of beaches and adjoining reserves, Council has in place a policy entitled 'Commercial Activities on Coastal and Riparian Crown Reserves' (currently Policy 5.52, last reviewed and adopted by Council on 22 June 2017, Res 17-262 (BSC, 2017b). This policy sets out licensing and operational requirements for commercial activities and restricts the number of licenses issued to commercial operators. Operators starting up commercial activities without an appropriate license are an ongoing compliance issue.

1.4.7 Vehicular access on beaches

Within the Byron Bay Embayment, recreational and commercial vehicles are prohibited from driving on the beaches (BSC Policy 13/007).

1.4.8 Wheelchair access on beaches

A 'Sandcruiser' beach wheelchair is available at Clarkes Beach for use by persons with a disability. It may be accessed through Pacific Apartments at Clarkes Beach, Byron Bay. There is scope for improving beach access for people with a disability and this objective has been considered as part of the re-design / upgrade of the JSPW.

1.4.9 Camping and holiday parks

Council manages the First Sun Holiday Park located in the Byron Bay town centre whilst the Dol Crown Lands & Water, through the NSW Crown Holiday Parks Trust, manage the Clarkes Beach Holiday Park. These parks provide beach front accommodation including cabins, camping and caravan sites.

'Illegal camping' throughout the road and crown reserves of the BBE is an ongoing issue, often resulting in negative impacts on the environment as well as social and behavioural problems. Compliance activity often increases during summer and other peak holiday seasons, in an effort to manage this issue.

1.5 Beach access and coastal walkways

Public access to the beaches and foreshores within the BBE may be categorised as:

- pedestrian access on to the beach for swimming, fishing, walking and other recreational activities
- pedestrian access along the beach or foreshore for swimming, fishing, walking and other recreational activities
- emergency access on to and along the beach
- access for boats / vessels
- contiguous walkways that facilitate pedestrian access on to and along the coastline i.e. 'coastal walkways'

1.5.1 Current beach access arrangements

An extensive investigation and audit of public beach access arrangements in the BBE was undertaken by Council in 2015 (BSC 2016a) which describes a total of 33 access and walkway arrangements. This report has been amended for this CZMP to be relevant to the Eastern

Precincts only and is provided at Appendix 7 – 'Public beach access and walkways of the Eastern Precincts of the Byron Bay Embayment'.

The current beach accesses and coastal walkways relevant to the Eastern Precincts of the BBE are depicted at Figure 2 and numbered 8 to 33. Details with respect to the ownership or management of beach access assets are also provided, noting that public beach accesses and walkways may be owned or managed by a number of agencies, including: Byron Shire Council, NPWS (Office of Environment and Heritage), NSW Crown Holiday Parks Trust (a Reserve Trust for Crown Reserve) and Department of Industry Crown Lands & Water. These ownership arrangements have implications for the development and implementation of actions in the CZMP.

1.5.2 Beach access and coastal hazards

Coastal hazards currently impact beach accesses and are projected to increase impacts to accesses and walkways into the future. The coastal hazard lines prepared by BMT WBM (2013), and their positions relative to current public beach access arrangements, are depicted at Figure 2. The hazard lines represent the location of the shoreline for the immediate, 2050 year and 2100 timeframes. The hazard lines represent the projected "immediate" beach erosion hazard (from 100 year ARI storm event) and shoreline recession incorporating climate change induced sea level rise impacts.



Figure 2 Coastal erosion hazard impact (BMT WBM, 2013) on beach access and walkways of the Eastern Precincts of the BBE (#8 to #33).

1.6 Community Uses Management Issues

Management issues have been identified through the development of the CZMP, desktop literature review of existing studies, plans and reports and community consultation. Each management issues aligns with the most relevant CZMP Management Objective/s as presented in Appendix 1 – 'CZMP Management Issues and Legislative Framework'.

Management issues related to community uses of the coastal zone are outlined in Table Table 2 below.

lssue Number	CZMP Management Objective	Threat / Management Issue	Location	Source(s)
Cultural her	itage			
H1.	MO10	Cultural and heritage resources (i.e. places, material items and landscapes) may not be identified, mapped or managed appropriately.	All	NPWS (2012) Wildsite Ecological Services (2002)
H2.	MO10	Coastal processes such as coastal erosion and recession have impacted or may impact in the future upon cultural heritage resources and sites.	All	Collins (1991) Wildsite Ecological Services (2002)
H3.	MO10	Development and recreational usage may impact on cultural heritage resources through e.g. disturbance of The Pass midden.	All	Collins (1991) Wildsite Ecological Services (2002)
H4.	MO10	The construction and implementation of development including coastal infrastructure or coastal protection works may impact on cultural heritage resources.	All	Collins (1991) Wildsite Ecological Services (2002)
H5.	MO10	Coastal processes such as coastal erosion and recession have impacted or may impact upon non-Aboriginal cultural heritage sites of significance.	All	WorleyParsons (2013) WBM Oceanics (2003)
H6.	MO10	Human impacts and activities, for example sandmining and residential development have resulted in the loss of cultural heritage sites.	All	Collins (1991) WBM Oceanics (2003)
H7.	MO10	Stormwater discharge in combination with coastal processes may impact on cultural heritage resources e.g. disturbance of Clarkes Beach midden.	Clarkes Beach	Site Visits and Public Agency comment
Recreation	and amenity			

 Table 2 –
 Identified management issues related to community uses of the coastal zone

lssue Number	CZMP Management Objective	Threat / Management Issue	Location	Source(s)			
R1.	MO6 MO9	Socially and environmentally undesirable behaviours in beach and dune areas e.g. illegal camping, lighting of fires, alcohol and drug consumption, leading to environmental damage, habitat disturbance, negative impacts on amenity and public safety.	All (notably Clarkes Beach)	BSC (2010)			
R2.	MO6 MO9	Terrestrial and marine pollution / littering (e.g. cigarette butts, plastic bags, fishing tackle and bait bags) negatively affecting beach amenity and the environment.	All	BSC (2010)			
R3.	MO9	Unregulated commercial activities on the beaches and foreshores may impact negatively on environmental, social and amenity values.	Main Beach to The Pass	Regular site inspections			
R4.	MO9	Recreational activities and other human disturbances, such as informal access through dunes disposal of garden debris, leading to: negative impacts on dune formation and stability damage or other negative impacts on native, coastal vegetation and habitat values negative impacts on native fauna	All	BSC (2010)			
R5.	MO6	Beach access may be restricted / undercut by stormwater outlets under certain conditions.	Clarkes Beach The Pass	BSC (2016b) Appendix 3			
R6.	MO9	Stormwater outlets may result in water quality and amenity issues.	Clarkes Beach The Pass	SMEC, 2010			
R7.	MO9	Potential for oil/fuel leaks and spills from vehicles and vessels.	The Pass	-			
R8.	MO6	Potential conflicts between surfers, swimmers and boats / vessels.	The Pass	Wildsite Ecological Services, 2002			
R9.	MO9	Stormwater drains at Wategos may result in water quality and amenity issues, erosion between road and beach.	Wategos	WBM Oceanics, 2003			
R10.	MO6	Increased shark activity and associated conflicts with water based recreation activities.	All	-			
Beach acce	Beach access and coastal walkways						

lssue Number	CZMP Management Objective	Threat / Management Issue	Location	Source(s)
R11.	MO 6 MO 7	Accesses may be damaged and become unsafe as a result of coastal processes e.g. storm waves, beach erosion, dune scarping and slumping.	All	BSC (2010) Appendix 3 (BSC 2016b)
R12.	MO 6	Informal access through dunes may lead to negative impacts on dune formation and stability, thus causing damage or other negative impacts on native, coastal vegetation and habitat values.	All	BSC (2010)
R13.	MO 6 MO 7	JSPW in front of car park rated as 'poor' for access on to the beach as there is no safe, formal access, and there are informal, potentially hazardous pathways over rock revetment. JSPW in front of car park rated as 'poor' for access along the beach, the rock protection and groyne restricts access along the beach under most conditions. Rock protection in front of reserve, and adjacent western side of car park, rated as an 'extreme' and 'high' risk in terms of structure resilience, potential for major injuries as a result of wave overtopping and/or erosion of the structures. Rock protection in front of western side of Jonson St car park rated as a 'high' risk re structure resilience, potential for public safety risks as a result of wave overtopping or erosion of the structure. There is no provision for disabled access at Main Beach; the only wheelchair access is at Clarke's Beach.	Main Beach JSPW	WorleyParsons (2013)
R14.	MO 6	Concrete ramp at Main Beach has been undermined by large cavities under the ramp, and there are cracks in the slab.	Main Beach #9	WorleyParsons (2013)
R15.	MO 7	Access at may become damaged and / or unviable as a result of coastal erosion and long term recession.	The Pass through to Main Beach	Hazard maps at BMT WBM, 2013 (refer Figure 2)

lssue Number	CZMP Management Objective	Threat / Management Issue	Location	Source(s)
R16.	MO 7	Access may be restricted / undercut by stormwater outlets under certain conditions.	Clarkes Beach (#17 and #18) The Pass (#23)	Regular site inspections
R17.	MO 6	Retaining walls tend to funnel sand into access, making it difficult to negotiate by wheelchair users. Wheelchair users may not be aware of access.	Clarkes Beach #19	Regular site inspections
R18.	MO 7	Accesses may become damaged and / or unviable as a result of coastal erosion and long term recession, subject to presence/absence bedrock.	The Pass #23 to #25	Hazard maps at BMT WBM, 2013 (refer Figure 2)
R19.	MO6	Coastal protection works at Main Beach have a generally fair to poor rating in terms of impact on beach width. Coastal protection works may affect the beach profile and width of the beach over time (up and downdrift), as assessed in WorleyParsons (2013).	Main Beach	WorleyParsons (2013) (refer Table 2, App 2) WorleyParsons (2013) (refer Chapter 4)

Appendix 6 Open Coast Ecosystem Health

1.1 Open coast habitat types

Byron Shire is centred in a wet subtropics bioregion and is an area of significant ecological value supporting a rich and diverse biota (BSC, 2004 and BSC, 2007). This includes many endemic species and a disproportionately large number of threatened species (Benson, 1999). The embayment is located at the southern and northern distributional extreme of a variety of marine and terrestrial fauna, and supports a rich diversity of vertebrates and invertebrates, as well as fish and marine mammals, exhibiting tropical, sub-tropical and temperate affinities(BSC, 2004, Marine Parks Authority, 2010).

Although many parts of the 'open coast' of the BBE have been impacted by human disturbance, there are a number of areas that retain significant ecological values, supporting a range of native vegetation communities, habitats and fauna populations (BSC, 2004). Many of these values are recognised and managed within the system of conservation reserves located in the planning area, as described in Appendix 2 – 'Land Ownership and Management Arrangements'.

Of specific relevance to this CZMP, are the flora and fauna supported by the habitat types of the BBE's 'open coast'. The meaning of the 'open coast' may be inferred from the Guidelines, as follows:

open coast ecosystems such as dunes, sandy beaches, rock platforms

(p20, OEH, 2013)

The general habitat types of the 'open coast' of the BBE include:

- inter-tidal sandy beaches and shores,
- inter-tidal rocky reefs and shores, and
- coastal dunes and associated vegetation communities.

A summary of the open coast habitat types relevant to the Eastern Precincts of the BBE is provided below.

Inter-tidal sandy beaches

From Main Beach to Clarkes Beach the inter-tidal areas are dominated by sandy beaches. They are relatively sheltered as a result of Cape Byron, however wave exposure increases towards to the northwest away from the Eastern Precincts. Small, sandy embayments occur at Wategos and Little Wategos.

Inter-tidal rocky shores

There are sections of the plan's area that are comprised of rocky inter-tidal habitat including rock outcroppings at The Pass, Wategos, Little Wategos and Cape Byron. In addition there are intermittent inter-tidal rocky outcroppings south of The Pass and towards Clarkes Beach. It should be noted that the extent of these intermittent outcroppings vary depending on the volume of sand within the beach profile at any given time; for example they may only be apparent after a series of coastal erosion events. After severe storms, outcroppings of coffee rock may become visible at The Pass and Clarkes Beach.

The rock revetment works at Jonson Street have provided for artificial, inter-tidal rocky shore habitat along an otherwise expansive stretch of sandy beach, and for a reasonably consistent amount of time (WorleyParsons, 2013).

Coastal dune systems

Much of the coastline within the plan's area is fringed by coastal dune systems, which, in an undisturbed state, are characterised by a series of sand dunes and swales formed by aeolian (wind) driven sand transport. This series generally begins with an incipient dune at or beyond the spring tide line, followed by a foredune and series of swales and hind dunes.

There are remnant Pleistocene sand dune and swale formations running parallel to the coast from the Tyagarah Nature Reserve towards Byron Bay (PWD, 1978). In an undisturbed state, these coastal dune and swale systems support a mosaic of vegetation communities including littoral rainforest, heath and grasslands. In the BBE, many of these systems have been extensively modified by sand mining and other human activities.

There are some areas of sand dunes within the planning area (Clarkes Beach) where stormwater flow via outlets to the beach is causing erosion of the sand dune. Over recent years more intense development within the catchments has resulted in greater stormwater flows at the outlets. Of particular concern is an outlet at Clarkes Beach at the eastern boundary of Clarkes Beach Holiday Park where a significant erosion gully caused by stormwater threatens a midden (Refer Section 1.1.2 and 1.4.4 of Appendix 5 – 'Community Uses of the Coastal Zone').

Descriptions of flora and fauna values associated with the open coast ecosystems of the Eastern Precincts of the BBE are provided in Sections 1.1.1 and 1.1.2. More information can be found at the various Plans of Management prepared by relevant land managers and authorities, including:

- Cape Byron Headland Reserve Plan of Management (Cape Byron Trust, 2002)
- The Byron Coastal Group of Nature Reserves Plan of Management (Incorporating Brunswick Heads, Tyagarah and Broken Head Nature Reserves) (NPWS, 1998).

The Cape Byron Marine Park Zoning Map provides a description of key marine habitat and marine park zones relevant to the coastal waters of the BBE (Figure 1).

1.1.1 Open coast flora

Inter-tidal rocky shores from the Pass to Cape Byron generally display relatively low floral diversity and are generally dominated by algal communities, this is due to the lack of platforms and frequent smothering by sand (Smith & James, 2003). Deeper inter-tidal rock pools at The Pass support a higher diversity and more complex community structure including macroalgal species that are not generally found elsewhere in the area (Smith & James, 2003).

Inter-tidal sandy beach habitats support microscopic flora such as diatoms, a type of unicellular phytoplankton (WorleyParsons, 2013).

Coastal dune systems in the study area provide for a diversity of vegetation species and communities. Where significant urbanisation or other disturbances have not occurred, these may reflect a succession of coastal vegetation, from dunal grasses growing on the incipient dune, to herbs, shrubs and small trees on foredune areas, to heathlands and littoral rainforest in the relatively protected, hind dune areas.

The system of nature reserves and conservation areas in the BBE provide important refugia for native plants and animals, many of which are listed as threatened species or of conservation significance (Wildsite Ecological Services, 2002). The Cape Byron State Conservation Area, for example, supports 25 different vegetation communities including 'littoral rainforest', an endangered ecological community (EEC) which occupies approximately 50 per cent of the Reserve. Over 270 species of flowering plants and ferns have been identified in the Reserve, with more than 10 per cent of these classified as '... of regional, state or national significance' (Wildsite Ecological Services, 2002).

In 2014/2015 Council undertook a vegetation mapping program to inform planning and management of vegetation communities and associated ecological habitats in coastal and hinterland areas. The program was undertaken using both remote sensing and on-ground survey. The program did not include vegetation mapping of national parks or crown reserves. The location and extent of identified coastal vegetation communities in the BBE, is depicted at Figure 2.

Plant community types and their relationships to vegetation formations and classes are detailed in the Vegetation Information System (VIS) Classification database on the NSW Office of Environment and Heritage website. Further classification information is available at http://www.environment.nsw.gov.au/research/Visclassification.htm.

Council has a Vegetation Management Plan in place for the coastal reserve managed by Council at Main Beach. The report was prepared by EnviTE in 2003. The plan has largely been carried out, where they are active, by local Dunecare groups, with assistance from both Council and EnviTE.



Figure 1 Cape Byron Marine Park (BBE) showing the zoning plan (GIS data from Marine Parks Authority, 2010)



Figure 2 Coastal vegetation types within the Eastern Precincts of the Byron Bay Embayment, 2017

1.1.2 Open coast fauna

The waters of the BBE are located in what is known as the 'Eastern Overlap Zone' where warm waters from the north converge with cooler waters from the south (Wilson and Allen, 1987 in Marine Parks Authority, 2010). As a result of being located in this zone, there is a diverse mix of tropical, subtropical and temperate marine species, for example, over 500 fish species have been recorded in the Cape Byron Marine Park, of which approximately 76% have tropical affinities,18% have temperate affinities and 6% have subtropical affinities (Marine Parks Authority, 2010).

The high biodiversity of the marine waters of the BBE is also supported by the upwelling of cooler nutrient rich water from beyond the continental shelf (Oke and Middleton, 2000). The geomorphology of the Cape results in a part of the southward flowing, nutrient poor East Australian Current (EAC) moving off the shelf, resulting in deeper water moving in to replace it. This upwelling leads to increased food web support and rich marine biodiversity (Roughan and Middleton, 2002).

Iconic marine fauna are frequently observed in the BBE, including dolphins, manta rays, marine turtles such as Loggerhead and Green Turtles, and Humpback Whales. The Humpback Whale makes an annual migration from the Antarctic to the waters of the Great Barrier Reef in the north to calve and they are frequently observed on their return journey south during October to November when the mothers and their calves rest and nurse in the calm waters off Byron Bay (Marine Parks Authority, 2010).

With reference to Council's data base and the NSW Wildlife Atlas, there are no recorded marine turtles nesting on the beaches of the BBE. There are however records of nesting in the northern NSW region, including records of Loggerhead, Leatherback and Green Turtle nestings (DECCW, 2011) at Tallow Beach and near Lennox Head and Ballina (NPWS database in DECCW, 2011).

The main commercial fish species found inshore of the BBE is sea mullet. Common recreational fishing species are bream, sand whiting, dusky flathead, jewfish and tailor (Byron Shire Council, 2000).

The walls and edges of nearshore reefs are typically populated by sponges and invertebrates, especially in deeper areas (CRC for Coastal Zone Estuary and Waterway Management, 2004). These reefs also provide habitat and food resources that attract reef fishes, turtles and other marine organisms (WorleyParsons, 2013).

Inter-tidal rocky shores in the BBE are generally relatively steep and lacking a suitable platform for supporting a diverse inter-tidal fauna community (Smith & James, 2003). In addition, sand inundation from adjacent beaches constrains community development (Smith & James, 2003). Shallow pools are generally populated with common gastropod molluscs and anemones, whilst deeper pools at the Pass support a greater diversity of biota including sponges, ascidians and crabs (Smith & James, 2003).

It has been observed that the Johnson Street Protection Works (JSPW) provide a hard substrate for the attachment of a variety of sessile marine invertebrates such as barnacles, limpets, siphon shells, gastropods and tube worms (WorleyParsons, 2013).

Inter-tidal sandy beach habitats generally provide habitat for a diversity of micro and meiofauna including bacteria, protozoans and microalgae which inhabit the small spaces between sand grains (WorleyParsons, 2013). Larger macroinvertebrate fauna that have been found at New Brighton Beach, some 12 kilometres to the north, include: crustaceans such as

sand bubbler crabs, soldier crabs and ghost crabs, amphipods, isopods and decapods; bivalve and gastropod molluscs such as pipis, moon snails, and polycheate worms, Coleopteran larvae and nematodes (WorleyParsons, 2013 and Smith *et al.*, 2011).

A variety of migratory and resident shorebirds reside within or are seasonal visitors to the area. Some species such as the Little tern (*Sternula albifrons*) resides within the Marine Park and planning area for part of the year to breed or feed before undertaking their return migration (Marine Parks Authority, 2003). Significant resident shorebirds such as Pied Oyster Catchers and Sooty Oyster Catchers are also known to feed and forage at low tide with a small number of breeding pairs found in the area.

1.2 Community involvement

Community involvement in the conservation and protection of the ecosystems of the BBE is an important and essential element of managing the coastal zone.

Groups such as Landcare, Dunecare, Green and Clean Awareness Team and Byron Bird Buddies provide invaluable services and support for the study, protection and enhancement of terrestrial and marine flora and fauna.

Community groups active within the BBE and with a coastal or marine environmental focus include:

- Arakwalhttp://arakwal.com.au/
- Brunswick Valley Landcare<u>http://www.brunswickvalleylandcare.org.au/</u>
- Byron Bird Buddies http://www.byronbirdbuddies.com.au/
- Byron Community College http://www.byroncollege.org.au/
- Byron Underwater Research Group http://www.burg.org.au/
- EnviTE<u>www.envite.org.au</u>
- Friends of the Koala <u>www.friendsofthekoala.org</u>
- North Coast nature http://www.northcoastnature.org.au/
- Positive Change for Marine Life http://www.positivechangeformarinelife.org/
- Richmond Landcare Inc. <u>http://www.richmondlandcare.org/</u>
- Suffolk Park Dunedare (BVL) <u>www.landcare.nsw.gov.au/groups/suffolk-park-dunecare-group</u>
- Wetlandcare Australia <u>http://www.wetlandcare.com.au</u>

1.3 Open Coast Management Issues

Management issues were identified as being relevant to this CZMP during the literature review and issues identification stage of development of the CZMP BBE (2016). The consultation activities undertaken as part of the 2016 CZMP and now this CZMP for the Eastern Precincts have verified that these issues are current and worthy of accompanying management actions where relevant. The issues have been informed by a variety of information sources, as documented in Table 1. Table 1 provides a summary of key management issues associated with the ecological values of the plan's area and the most relevant CZMP Management Objective.

Table 1Open coast ecosystem health management issues and objectives cross referenced
to the study or plan from which they were identified

lssue #	CZMP Management Objective	Threat / Management Issue	Description	Source(s)
E1.	MO 11	Complex land ownership and management arrangements	Complex land ownership and management arrangement may lead to inefficiencies and lack of integration between land managers.	BSC, 2010
E2.	MO 9	Inappropriate use of coastal and marine resources	Illegal fishing/collecting in sanctuary zones by commercial or recreational fishers, may reduce the effectiveness of protected habitats. Non-extractive commercial activity such as marine mammal viewing charters and scuba diving may alter animal behaviour or impact on long term population dynamics.	Marine Parks Authority, 2010
E3.	MO 9	Marine biosecurity	While there have not been any outbreaks of marine pests to date, increased numbers of cruising ships, yachts and recreational vessels present a potential threat. Marine pests have the potential to upset or destroy ecological balance within biotic communities.	Marine Parks Authority, 2010
E4.	MO 6 MO 9	Marine pollution	Litter, garbage wastes and lost fishing gear have the potential to entangle, choke, or damage coastal and marine fauna, while also negatively affecting the amenity of coastal areas.	Marine Parks Authority, 2010
E5.	MO 9 MO 3	Altered / degraded water quality	Inappropriate development or land-use practices adjacent to the coastal zone may result in alteration to hydrological and physicochemical regimes. Runoff from urban or agricultural land may be rich in sediment, nutrients, microbes, hydrocarbons or other pollutants. These impacts may affect water quality and the ecological health of the marine environment. Land-use practices may include drainage works within the catchment, uncontrolled access of livestock to waterways, native vegetation clearing and stormwater runoff from urbanisation.	Marine Parks Authority, 2010 BSC, 2004 SMEC, 2010
E6.	MO 9	Introduced fauna	Introduced fauna such as goats (now eradicated Cape Byron), rats, mice, cane toads, cats, dogs and birds may cause vegetation modification and erosion, while altering native populations through competition and predation.	Wildsite Ecological Services, 2002 Stratcorp Consulting, 2005

lssue #	CZMP Management Objective	Threat / Management Issue	Description	Source(s)
	Chjeenve	10000		
E7.	MO 9	Artificial lighting	Nesting marine turtles, such as the endangered loggerhead turtle, may be impacted by artificial lighting.	Wildsite Ecological Services, 2002
E8.	MO 9	Vegetation clearing and modification	For many locations, coastal dune vegetation has been removed, modified or significantly fragmented and degraded as a result of human activities. These include pastoral activities, drainage works, timber cutting, sand mining, urban development, provision of recreational parklands and associated infrastructure, informal tracks and damage caused by unauthorised car parking and illegal camping.	Wildsite Ecological Services, 2002 Stratcorp Consulting, 2005 BSC, 2004
E9.	MO 2 MO 9	Poor connectivity between vegetation communities	Fragmentation and poor connectivity reduces re-colonisation opportunities for terrestrial species from adjacent areas. Lost diversity within gene pools can result from fragmentation.	Wildsite Ecological Services, 2002 BSC, 2004
E10.	MO 2 MO 9 MO 10	Inappropriate fire frequency and intensity	For many coastal heath and scrubland communities, fire is an essential element of ecosystem health. Unmanaged / unplanned fires may damage ecological values, and can also cause damage to Aboriginal sites, heritage values, recreation facilities and residential areas, as well as threaten human life. Undertaking planned and managed burns at the appropriate intensity and time interval, is an important management tool. The heath / shrubland complex within the Byron Bay Embayment will see declines in ecosystem health if subsequent fires occur within 8 years of each other. Alternatively, decline may also occur if fires have intervals of greater than 15 years between events.	Wildsite Ecological Services, 2002 BSC, 2004
E11.	MO 9	Introduced flora / coastal vegetation	For many locations, coastal dune vegetation has been modified or significantly fragmented and degraded as a result of weed incursions, for example Bitou Bush infestations and other infestations caused by the inappropriate disposal of exotic garden species.	WBM Oceanics, 2003 Stratcorp Consulting, 2005
E12.	MO 3 MO 9	Declining or threatened species biodiversity	The number of threatened, vulnerable and endangered marine and terrestrial species and communities identified in the BBE are likely to increase as pressures from urbanisation and a changing climate increase.	Marine Parks Authority, 2010 NPWS, 2012
E13.	MO 3 MO 9	Direct impacts physical coastal	The narrowing or loss of coastal habitats and ecological communities as a result of coastal	WorleyParsons, 2013)

lssue #	CZMP Management Objective	Threat / Management Issue	Description	Source(s)
		processes	erosion / inundation, estuary entrance instability, long term recession and sea level rise.	BMT WBM, 2013
			Infrastructure and development damaged by coastal processes may result in marine pollution. For example geotextile associated with coastal protection works may become degraded and cause harm to marine fauna (WRL, 2016).	
E14.	MO 9	Indirect impacts physical coastal processes and coastal protection works	Coastal protection works located on the dune may hinder the colonisation of dunal grasses and the formation of incipient dunes, affecting the colonisation of foredune and hind dune areas and / or the resilience of vegetation communities located in or adjacent to these zones.	WorleyParsons, 2013 (Chapter 5)
			Rock revetment works may alter the type, structure and diversity of coastal ecological communities, for example while works may provide for the colonisation of inter-tidal species, these may replace benthic infauna and the voids in the rocks may become habitat for rats and potentially predators such as snakes (WRL, 2016).	WRL, 2016 WorleyParsons,
			Coastal protection works may affect the beach profile and width of the beach over time (up and downdrift), as assessed in WorleyParsons (2013).	2013 (Chapter 4)
			These impacts may affect the type, structure and diversity of coastal ecological communities.	
E15.	MO 3 MO 9	Climate change	Anthropogenic climate change may have myriad impacts on marine biodiversity in NSW waters. For example, a strengthening of the East Australian Current and increased sea surface temperatures will cause further southern shifts in the distribution of fish, invertebrates, algae and microorganisms, impacting the structure and function of marine ecosystems.	Marine Parks Authority, 2010
			Projected increases in storm and cyclone intensities may also result in exacerbated coastal erosion and inundation.	BSC, 2010
			Present and future development may restrict the way in which coastal ecosystems adapt to climate change, through 'habitat squeeze' and diminished resilience.	

lssue #	CZMP Management Objective	Threat / Management Issue	Description	Source(s)
E16.	MO 7 MO 9	Informal access through dunes	Informal access through dunes may lead to negative impacts on dune formation and stability, resulting in reduced habitat values.	WBM Oceanics, 2003
E17.	MO 8	Lack of education and awareness leading to negative behaviours	Behaviours such as littering, informal access through dunes, habitat removal and destruction, disturbing nesting shorebirds, have negative affects on ecological values. These may best be addressed through education programs and greater community awareness and involvement in ecological restoration activities.	Various Marine Parks Authority,2003
Appendix 7

Audit of Public Beach Access and Walkways of the Eastern Precincts of the Byron Bay Embayment

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1 Introduction

1.1 Study Objective

This study was completed in 2015 by Byron Shire Council with the primary purpose to inform the draft Coastal Zone Management Plan for the Byron Bay Embayment (CZMP BBE). The study aimed to describe and assess the current beach access arrangements, including coastal walkways, in the BBE so that high priority management issues could be identified. The information in the study was used to inform the development of management actions for consideration in the draft CZMP BBE with respect to public beach access.

This was reviewed and updated in 2017 to inform the development of the CZMP for the Eastern Precincts of the BBE.

A map depicting the beach access and walkway arrangements of the BBE is at Figure 1. Beach accesses and coastal walkways within the Eastern Precincts of the BBE are numbered 8 to 33.



Beach accesses and coastal walkways of the Eastern Precincts of the Byron Bay Embayment (#8 to #33). Figure 1

1.2 Study methodology and results

Observations and a photographic record of public beach access arrangements, including coastal walkways of the BBE, were collected over a period extending from 3 October 2013 to 23 December 2015. A review and update of the study was completed in December 2017 for development of the CZMP for the Eastern Precincts of the BBE (2018).

A review of literature from recent projects undertaken on Council's behalf has also been used to inform this study. These recent projects include:

- Draft Byron Bay Embayment Coastal Hazard Management Study: Stakeholder Engagement (Umwelt, in WRL 2015)
- Investigating the Re-design of the Jonson Street Protection Works (Worley Parsons, 2014)
- Byron Bay Erosion Protection Structures Risk Assessment (Worley Parsons, 2013)
- Draft Coastal Zone Management Plan for Byron Shire Coastline (Byron Shire Council, 2010)
- Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013)

Desktop and GIS analysis was undertaken using Council's survey and other data, and aerial photography (2009 and 2013) supplied by the NSW Department of Primary Industries.

The results of this study as relevant to the Eastern Precincts of the BBE are outlined below.

1.3 Coastal Protection Works

There are a number of coastal protection works located within the Eastern Precincts of the BBE that either provide the structural foundation for or impact upon public beach access arrangements. These works are summarised below.

1.3.1 Jonson Street Protection Works

The Jonson Street Protection Works (JSPW) provide protection and / or the structural foundation for beach accesses #7 to #9 (refer Figure 2). An aerial view of the JSPW is shown at Figure 2



Figure 2

Jonson Street Protection Works Aerial View (Byron Shire Council, 2015)

Various options have been investigated and assessed in previous studies (WorleyParsons, 2014 & WRL, 2009). A concept design exists for the upgrade of the JSPW, as presented in the WorleyParsons, 2014 report, however further work is required to refine a preferred concept after other alternatives have been re-considered.

1.3.2 Wategos ad hoc works

The accesses and walkway at Wategos are, in various locations, supported by ad hoc works, as shown at Figure 3 and Figure 4. The efficacy and structural integrity of these works is unknown and it is unclear as to the extent of bedrock which may underlay these works and Marine Parade.





Figure 3 Rock ad hoc works Wategos Beach (24 June 2014)



Figure 4 Geofabric bag ad hoc works Wategos Beach (24 June 2014)

2 Beach accesses

A brief description and accompanying photographic record of the beach access arrangements in each precinct of the BBE is provided in this section. Access numbers and the location of each access can be found at Figure 2.

All accesses are managed by BSC unless otherwise stated.

2.1 Main Beach

For the purpose of this study, the Main Beach compartment extends from the northern side of the JSPW, including access #7 to access #13. There are seven formal accesses in the Main Beach compartment. The JSPW are an important feature in this compartment and support access #7 to #10.



Figure 5

Access #7 First Sun Caravan Park (22 May 2014)



Figure 6

Access #8 West Jonson Street (22 May 2014)



Figure 7 Access #8 West Jonson Street (3 October 2014)



Figure 8 Access #9 Surf Life Saving Club - vehicle (3 October 2013)



Figure 9 Access #10 Surf Life Saving Club pedestrian access (3 October 2013)



Figure 10 Access #11 North Apex Park (3 October 2013)



Figure 11 Access #11 North Apex Park (3 October 2013)



Figure 12 Access #12 Apex Park (3 October 2013)



Figure 13 Access #12 Apex Park (3 October 2013)



Figure 14 Access #13 Apex Park (3 October 2013)



Figure 15 Access #13 Apex Park (3 October 2013)

2.2 Clarkes Beach

For the purpose of this study, the Clarkes Beach compartment is defined from access #14 to the eastern side of Clarkes Beach Holiday Park and including access #22.

There are different management arrangements for the beach accesses in the Clarkes Beach compartment, with the beach accesses within Clarkes Beach Holliday Park being on Crown Reserve and managed by the NSW Crown Holiday Parks Trust (NSWCHPT).

There are nine formal accesses in the Clarkes Beach compartment.



Figure 16 Access #14 Apex Park (3 October 2013)



Figure 17 Access #14 Apex Park (3 October 2013)



Figure 18 Access #15 Apex Park (3 October 2013)



Figure 19 Access #15 Apex Park (3 October 2013)



Figure 20 Access #16 Apex Park - (3 October 2013)



Figure 21 Access #16 Apex Park - (3 October 2013)





Figure 22 Access #17 adjacent storm water drain (3 October 2013)



Figure 23 Access #18 Clarkes Beach Park – vehicle (3 October 2013)



 Figure 24
 Access #18 Clarkes Beach Park – vehicle (3 October 2013)



Figure 25 Access #19 Clarkes Beach Park – wheelchair (3 October 2013)



Figure 26 Access #19 Clarkes Beach Park – wheelchair (30 November 2017)



Figure 27 Access #20 Adjacent (north) Clarkes Beach Café (3 October 2013)



Figure 28 Access #20 Adjacent (north) Clarkes Beach Café (3 October 2013)



Figure 29 Access #21 Clarkes Beach Caravan Park – managed by NSWCHPT (24 June 2014)



Figure 30 Access #22 Clarkes Beach Caravan Park – managed by NSWCHPT (24 June 2014)

2.3 The Pass

For the purpose of this study, The Pass beach compartment is defined from access #23 to and including the rocky headland at and adjacent Fisherman's Lookout.

The Cape Byron Trust and NPWS manage all of the beach access arrangements and associated infrastructure in this compartment.

There are three formal accesses in The Pass beach compartment.



Figure 31 Access #23 Captain Cook Car Park, managed by NPWS (22 May 2014)



Figure 32 Access #24 The Pass, managed by NPWS (24 June 2014)



Figure 33 Access #25 The Pass – vehicle/vessel, managed by NPWS (24 June 2014)



Figure 34 Fisherman's Lookout, managed by NPWS (24 June 2014)

2.4 Wategos / Little Wategos

For the purpose of this study, the Wategos Beach compartment is defined from the eastern side of the rocky headland adjacent Fisherman's Lookout, up to and including Little Wategos Beach and access #23.

The Cape Byron Trust and NPWS manage all of the beach access arrangements and associated infrastructure in this compartment.

There are seven formal accesses in the Wategos Beach compartment, and one formal access at Little Wategos.



Figure 35 Access #26 Wategos toilets and picnic Area, managed by NPWS (05 January 2018)



Figure 36 Access #27 Wategos, managed by NPWS (05 January 2018)



Figure 37 Access #28 Wategos, managed by NPWS (05 January 2018)



Figure 38 Access #29 Wategos, managed by NPWS (05 January 2018)



Figure 39

Access #30 Wategos, managed by NPWS (05 January 2018)



Figure 40 Access#31 Wategos, managed by NPWS (05 January 2018)



Figure 41

Access #32 Wategos, managed by NPWS (05 January 2018)



Figure 42

Access #33 Little Wategos, managed by NPWS (25 December 2015)

3 Coastal walkways

This section is a record of coastal walkways owned or the responsibility of Byron Shire Council, unless otherwise stated.

3.1 Main Beach

Concrete or paved pathway extending from the northern side of the JSPW to Clarkes Beach.



Figure 43 Walkway at Jonson Street carpark, managed by BSC (15 August 2014)

3.2 Clarkes Beach

Mainly concrete or paved pathway extending from Clarkes Beach to Lighthouse Road and The Pass.



Figure 44 Clarkes Beach coastal walkway, managed by BSC (15 August 2014)



Figure 45 Clarkes Beach coastal walkway, managed by BSC (15 August 2014)

3.3 Wategos / Little Wategos

Mainly concrete, timber or paved pathway, northern parts are informal / gravel.



Figure 46 Concrete pathway, Wategos Beach, managed by NPWS (4 June 2014)



Figure 47 Informal pathway, Wategos Beach, managed by BSC (4 June 2014)

3.4 Cape Byron

The NPWS manage and promote the Cape Byron Walking Track, a 3.7 km loop walk including Lighthouse Road, Captain Cook lookout, The Pass, Wategos Beach and the Cape Byron Lighthouse, refer Figure 2 for location.

More details can be found at the NPWS web site: <u>http://www.nationalparks.nsw.gov.au/things-to-do/Walking-tracks/Cape-Byron-walking-track/visitor-info</u>

Appendix 8 Council Resolutions

13-542 Resolved (relevant parts only):

That council endorse the report Byron Shire Coastline Hazards Assessment Update (BMT WBM, 2013) for informing and incorporation into the new draft Coastal Zone Management Plan for the Byron Bay Embayment.

14-66 Resolved:

1. That with respect to the report "Investigating the Redesign of Jonson Street Protection works", as contained in Annexure 12, #E2014/8731, Council:

a) Re-confirm its commitment to protecting the Byron Bay town centre through the provision of coastal protection works at Jonson Street, Byron Bay.

b) Adopt the final report, including the recommended alternative option of upgrading the rock revetment protection works with stepped concrete seawall and removing the spur groynes.

c) Include as actions in the implementation schedule of the draft Coastal Zone Management Plan for the Byron Bay Embayment the following:

(i) refining the consultant's recommended design to incorporate a viewing and meeting platform area along the proposed rock revetment protection works;

(ii) investigating funding sources to enable the detailed design approval, construction and ongoing maintenance of the proposed works.

2. That Council note the progression of major coastal projects from November 2013 to February 2014.

16-169 Resolved (relevant parts only):

- 1. That Council note the revised Coastal Hazard Management Study Byron Bay Embayment (Final Revision 1.0), prepared by the consultants Water Research Laboratory (2016).
- 2. That Council adopt the following management strategies for incorporation into the draft coastal zone management plan Byron Bay Embayment:
 - (a) Jonson Street Protection Works upgrade works, remove spur groynes and improve beach access and amenity, as per Council resolution 14 – 66, and monitor impacts.
 - (b) Revise and update coastal hazard land use and development planning controls for development at The Pass to Clarkes Beach, Main Beach, Cavvanbah (First Sun Caravan Park to Border Street), and North Beach, providing for adaptation of development.
 - (c) Dune revegetation and 'soft' dune stabilisation for all precincts, as a 'supporting' coastal hazard risk management strategy.
 - (d) Emergency action sub plan for coastal erosion emergencies applicable to all precincts, as a 'supporting' coastal hazard risk management strategy.

- (e) Coastal hazard investigation Lighthouse Road and Captain Cook Car Park investigation of future coastal hazard risks and bedrock levels at and adjacent to Lighthouse Road and Captain Cook Car Park.
- (f) Coastal hazard investigation Marine Parade, Wategos Beach investigation of future coastal hazard risks (inundation) and integrity of existing ad hoc coastal protection works at, Wategos Beach.

17-641 Resolved (relevant parts only):

- 1. That Council applies to OEH for a grant to fund 50% of the project costs for the Jonson Street Protection Works pre-construction stage.
- 2. That Council consider an allocation of \$150,000 (50%0 of the project costs) for the Jonson Street Protection Works pre-construction stage over the 2018/19 financial years.

18-104 Resolved that upon certification of the CZMP for the Eastern Precincts of the Byron Bay Embayment:

- 1. Further, options for the design of Jonson Street protection works and Main Beach access be canvassed, evaluated and costed.
- 2. Council prepare a scoping report for the engagement of a landscape architect to draw up a range of concept plans that fit in with the Byron Bay Masterplan vision for Main Beach and that a recognised and innovative coastal engineer be consulted to ensure designs meet OEH requirements including, but not limited to:
 - a) protecting public assets
 - b) reducing the constructed footprint on the natural environment
 - c) having a positive impact on adjacent and downdrift beaches (Cavvanbah, Belongil) i.e. removing the groynes
 - d) where possible, preferencing soft stabilisation and the management of social and natural ecosystems.