Stockton Coastal Management Program

FINAL

August 2020

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City of Newcastle

Acknowledgment

City of Newcastle acknowledges that we operate on the grounds of the traditional country of the Awabakal and Worimi peoples.

We recognise and respect their cultural heritage, beliefs and continuing relationship with the land and waters, and that they are the proud survivors of more than two hundred years of dispossession.

Council reiterates its commitment to address disadvantages and attain justice for Aboriginal and Torres Strait Islander peoples of this community.

Disclaimer

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

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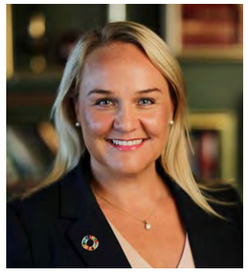

We are pleased to bring you the Stockton Coastal Management Program (CMP), a long-term plan for addressing erosion, shoreline recession and other hazards along Stockton's coastline between the northern breakwater of the Hunter River and Meredith Street.

Erosion at Stockton has over time had a devastating effect on the local community and in recent years particularly affected many residents' sense of place in their home suburb.

That's why the Stockton CMP has been developed in partnership with the local community. It is the culmination of more than a decade of community engagement and two years' of working closely with the Stockton Community Liaison Group on ensuring that the management actions proposed to return beach amenity and protect coastal assets, meet community expectations.

With 74% of submissions made during the 28-day public exhibition period supportive of the draft Stockton CMP, the CMP before you is one which both addresses the need to protect assets at immediate risk while allowing for a pathway to mass, offshore sand nourishment in the near future.

Stockton beach is of intrinsic value to the Stockton and Newcastle community, and visitors. There is a strong desire to preserve and protect its natural environment and character whilst responding to a changing climate. We'd like to thank all those who have taken the time to write into us, share their suggestions and help us to form the Stockton CMP. The supportive response we have received will help us to work towards ensuring Stockton beach is enjoyed by the current community and future generations to come.

Lord Mayor Nuatali Nelmes &
City of Newcastle CEO Jeremy Bath

Executive Summary

Local Governments across NSW are preparing Coastal Management Programs in line with State Government legislation to outline the long-term strategy for managing the coastal zone.

Management of the coastal zone presents various and significant challenges, including increasing development pressure and use of the coastal zone, increased impacts from urban pollution on coastal and oceanic environments and the effects of a changing climate on both beach areas and adjoining urban areas.

In response to coastal erosion and relocation of assets, on 17 February 2020 the Minister for Local Government issued a direction under Section 13 of the *Coastal Management Act 2016* (CM Act) that City of Newcastle (CN) submit a draft Coastal Management Program in accordance with the requirements under Division 2 of the CM Act for the coastline at Stockton Beach, to the Minister administering the CM Act, by 30 June 2020 (refer **Supporting Document A**). CN was assisted by the NSW Department of Planning, Industry and Environment (DPIE) during the development of the Stockton Coastal Management Program (Stockton CMP). CN engaged Royal HaskoningDHV to assist with the preparation of the Stockton CMP. Bluecoast Consulting Engineers were also engaged to prepare the Sediment Transport Study, Coastal Hazard Assessment and Cost-Benefit Analysis as supporting documentation.

The Stockton CMP presents a long-term plan for the management of the Stockton coastline that reflects community input, the objectives of CN, and the CM Act, delivering sustained benefits of amenity and coastal protection for the area between the Northern Breakwater of the Hunter River and Meredith Street. The coastal management strategy within the Stockton CMP has been developed using current scientific and economic investigations, which provides an iterative program of adaptable risk mitigation actions to address identified threats and issues that are feasible, viable and acceptable for CN and the community.

The Stockton CMP outlines the strategic aims that guide the management, preservation, improvement, promotion, and rehabilitation of Stockton Beach, and provides specific actions to mitigate identified threats and issues that are to be implemented over the next five years. The CM Act requires Coastal Management Programs to be reviewed at least once every ten years, however, due to the significant hazards identified at Stockton Beach within a five year planning horizon, the Stockton CMP will be reviewed by 2025 to ensure that actions to manage Stockton Beach remain current and relevant.

The intent of the Stockton CMP is to establish a pathway for the delivery of mass sand nourishment to the Stockton area, while simultaneously planning and delivering on the urgent protection of critical public assets in the short-term. This mass nourishment is designed to both return amenity and access to the Stockton coastal zone, while also establishing a sand protection buffer between the ocean and public assets, avoiding the need to build a buried terminal line of defence. To achieve this will require agreement and collaboration from all levels of government.

A sediment transport study for the full Stockton Bight was underway at the time CN received the Ministerial Direction. While not due for completion until late 2020, this study has been able to provide detailed and updated targeted output for the Stockton CMP area.

Targeted analysis from the sediment transport study have shown that the ongoing sand deficit rate within the Stockton CMP area is approximately 112,000 m^3 per year which is significantly higher than previously estimated, and likely to increase with time. This output plays a significant role in the understanding of coastal management along the coastal zone and has been pivotal in defining a sustainable solution.

A probabilistic coastal hazard assessment was undertaken using the targeted findings of the sediment transport study of sediment transport as inputs, which concluded that the Stockton CMP area is currently at high to extreme risk, with public assets at immediate threat requiring urgent protection, as well as private assets at threat over the longer term. This information has formed the basis for the development of the coastal management strategy and actions within the Stockton CMP.

Large scale (mass) sand nourishment has been identified as the only technically feasible solution that sustainably meets CN and the community's objectives of asset protection, beach amenity over the long term. Mass nourishment, with a 10 yearly renourishment period, would provide adequate coastal protection to eliminate the need for coastal protection structures beyond the immediate term.

The volumes of nourishment required to achieve coastal protection range from 1.8 million to 4.5 million m^3 depending on source and renourishment period. If using terrestrial sources, these volumes are neither available, or environmentally, socially or economically viable. Offshore marine sources would provide the most economically feasible solution; however, sand extraction under the *Offshore Minerals Act* 1999, requires authorisation through a mining licence. An applicant cannot apply for a mining licence without the Minister responsible for the *Offshore Minerals Act 1999* inviting applications.

The NSW Deputy Premier has announced the formation of a Taskforce of government agencies, CN and community representatives, to work together to address Stockton's erosion issues, and to consider options to fund long-term solutions. CN is committed to working with the Deputy Premier's Taskforce and the NSW Government to explore all opportunities to source sand for beach nourishment that is affordable and suitable (i.e. meet the technical specifications of CN's Sand Management Guidelines). This includes the permissibility of accessing marine sand, with the goal of mass nourishment to protect and preserve Stockton Beach.

Recognising the objective to provide beach amenity, access and the immediate need to address existing risks, CN will commit $4 million to beach nourishment from terrestrial (or other permissible) sources on Stockton Beach and construct limited buried terminal structures to protect threatened public assets.

Further protection may be required to maintain public assets prior to the resolution of mass nourishment investigations and permissibility, if coastal recession continues. CN will monitor recession and if threshold foreshore widths are reached this will trigger consideration of adaptive risk mitigation strategies including temporary structures, protection structures, managed retreat and opportunistic sand nourishment. CN views protection structures as an unfavourable fall-back plan, if mass nourishment is not achieved, as it would not meet the objectives of the CM Act to protect and enhance natural coastal processes and coastal environmental values, nor maintain public access, amenity, use and safety.

The sediment transport study for the full 32 km Stockton Bight will be completed in late 2020, and will inform the broader Newcastle Coastal Management Program (Newcastle CMP) which will encompass the entire Local Government Area (LGA) from Glenrock State Conservation Area in the south to the Northern boundary of the Stockton Cemetery, and is not due for completion until December 2021 in accordance with the *CM Act*.

The coastal management strategy and actions in the Stockton CMP will be reviewed during development of the Newcastle CMP, and opportunities to further enhance or improve coastal management of Stockton Beach will be identified. CN will endeavour to use other adaptive risk mitigation strategies until the outcome of mass nourishment is a surety or the Newcastle CMP is complete in 2021 and replaces the Stockton CMP.

1. Introduction

Stockton Bight is located to the north of the Hunter River and stretches from the Northern Breakwater (the Breakwater) of the Hunter River entrance, to Birubi Point. Forming the largest Holocene coastal dune system in New South Wales, Stockton Bight extends for a distance of 32 km and across the local government area (LGA) boundaries of City of Newcastle (CN) and Port Stephens Council (PSC) as shown in Figure 1. Stockton Beach and the adjacent Hunter River has been modified over the course of European settlement. Modifications that have impacted the beach response include the construction of the Hunter River breakwaters, capital and maintenance dredging of the navigation channel, revetment construction, beach nourishment, beach scraping and temporary and emergency protection works.

Figure 1: Sediment compartment from Stockton to Birubi Point and Newcastle LGA and Port Stephens LGA boundary

The northern section of Stockton Bight, within Port Stephens local government area, is mainly managed by the Worimi traditional owners in partnership with the NSW National Parks and Wildlife Service, while the southern 4.5 km section is located within the CN local government area (CN LGA).

The residential suburb of Stockton is located on a peninsula at the southern tip of Stockton Bight. The suburb is within the CN LGA with the boundary of the local government area north of the Stockton Centre located at 342 Fullerton Street, Stockton. The northern end of Stockton Beach within the CN LGA is a low-density mixture of land uses including a disability services facility (Stockton Centre), former defence services facility (Fort Wallace), former Hunter Water Corporation (HWC) sewage infrastructure facility, recreation area (Corroba Park) and residential housing.

The central section of Stockton Beach is dominated by the Mitchell Street seawall, which was jointly funded by CN and the NSW Government, between Pembroke Street and Stone Street in 1990-91. The seawall was constructed to protect residential development and infrastructure west of the beach. The central section of Stockton is primarily residential development with public recreation areas south of the Mitchell Street seawall.

The southern section of Stockton is primarily residential with community facilities along the former hind dune areas of the beach south of the Stockton Surf Life Saving Club (SLSC) seawall built and funded in 2016 by CN. These community facilities include the SLSC, Stockton Beach Amenities Building, Lexie's Café Building, Lynn Oval, Tennis Courts, Stockton Bowling Club, and the Stockton Beach Holiday Park. A vegetated dune system was established seaward of the Stockton Beach Holiday Park in the mid-1990s after storm events in 1994 (January and December) and 1995 (March). The Breakwater is located to the south of this dune system. Little Beach is located between the Breakwater and a smaller rock groyne to the south.

The Stockton Beach coastal zone is subject to impacts from coastal hazards such as beach erosion, shoreline recession, coastal and tidal inundation, end effects of existing protection structures and slope instability. Coastal hazards pose a risk to the ongoing use of coastal areas and facilities by the community, as well as amenity and use of Stockton Beach, now and into the future. Other management issues include on-going pressures on the coastal environment from urban development and sea level rise.

1.1 Stockton Coastal Management Plan Area

The purpose and vision for the Stockton CMP follow the Newcastle Coastal Management Program Scoping Study (Scoping Study) (CN 2019).

Direction from the Minister for Local Government on 17 February 2020 (refer **Supporting Document A**) requires CN to submit a draft CMP by 30 June 2020 for the coastline at Stockton Beach. Due to the shortened time frame available for the completion of the Stockton CMP, the spatial extent has been truncated to the coastal zone from the Breakwater extending north to Meredith St on the southern boundary of Corroba Oval, as shown in **Figure 2**. The coastal zone incorporates the coastal foreshore in public ownership and lands affected by coastal hazards. The immediate offshore environment is also included.

It is important to note that the area to the north of Meredith Street Stockton to the LGA boundary will be addressed in the broader Newcastle CMP to be completed by 2021. It is expected that actions within the Stockton CMP will be reviewed and appropriately addressed within the Newcastle CMP, which will replace the Stockton CMP.

Figure 2: Stockton CMP area spatial extent

Purpose

The purpose of the Stockton CMP is to provide an adaptive, integrated and long-term approach to coastal management to address identified risks and ensure developing opportunities can be taken, assessed on their merit and be implemented if advantageous. The Stockton CMP is intended to be subject to regular review to assess the effectiveness of recommended actions.

The Stockton CMP will aim to protect and enhance the coastal zone while balancing the diversity of needs of the community.

Vision

Our coastal environment is protected, enhanced and resilient while maintaining the recreational amenity and sense of identity the coast provides to the community. Through sustainable and integrated management, the coastal zone will provide a liveable and distinct urbanism that strengthens community connections and wellbeing.

Management will be responsive and adaptable to current and future coastal hazard risks, including climate change, to ensure the continued community use and enjoyment of our unique coastal area.

1.2 Time Frame Covered by the Stockton CMP

The Stockton CMP considers a range of timeframes and planning horizons both in completing the risk assessment for known threats, and in terms of the management actions to address these threats both now and into the future.

For certain threats that are likely to change over time, the following future timeframes were considered:

- 2040-2050, where 20 years from present (i.e. 2040) is a regularly applied "short(er)" planning timeframe, and 2050 is and was a commonly applied timeframe for strategic planning purposes;
- 2070-2120, where 50 years from present (i.e. 2070) is a regularly applied planning timeframe, 2120 is a commonly applied timeframe for strategic planning purposes, and consideration of timeframes beyond 2100 is also provided because processes such as sea level rise will continue for many hundreds of years.
- Coastal vulnerability assessments such as storm event, coastal erosion, long term recession and sand losses were based on probabilistic models with set timeframes, providing revised immediate hazard lines and the 1% Annual Exceedance Probability (AEP) hazard line for the immediate (2020), 2025, 2040, 2060 and 2120 planning periods (Bluecoast, 2020a & 2020b).

Management actions were developed as a priority for threats considered to be high or extreme at the present timeframe. Management actions were also developed for future high to extreme threats where the future threat is well accepted and requires planning intervention now in order to adequately manage the future threat.

The CM Act requires Coastal Management Programs to be reviewed at least once every ten years, however, due to the significant hazards identified at Stockton Beach within a five year planning horizon, the Stockton CMP will be reviewed by 2025 to ensure that actions to manage Stockton Beach remain current and relevant.

1.3 NSW Coastal Management Framework

Local councils and public authorities are required to manage their coastal areas and activities in accordance with relevant legislation, and state and regional policies and plans.

The framework for managing the NSW coast as shown in **Figure 3** includes:

- Coastal Management Act 2016 (CM Act)
- State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP)
- Coastal Management Programs (CMPs) prepared in accordance with the NSW Coastal Management Manual.

Other NSW legislation is relevant to the management of the environmental, social and economic values of the coastal zone, including:

- Environmental Planning and Assessment Act 1979 (EP&A Act)
- Local Government Act 1993 (LG Act)
- Crown Land Management Act 2016
- National Parks and Wildlife Act 1974
- Fisheries Management Act
- 1994 Marine Estate Management Act 2014
- Local Land Services Act 2013
- Biodiversity Conservation Act 2016

The relevant regional plans and policies prescribed by these regulations include;

- Hunter Regional Plan 2036 (DPE, 2016). Contains the land use priorities for the Hunter region. It identifies increasing growth in tourism due to local coastal attractions and highlights the need for community preparedness regarding coastal hazards and climate change. The coastal management strategy outlined within the Stockton CMP allows adaptation pathway for coastal hazards and climate change that preserves the recreational value and amenity of the beach as a tourist destination.
- Greater Newcastle Metropolitan Plan 2036 (DPE, 2018). Identifies catalyst areas or dedicated zones for increased population, housing and employment growth. The Stockton CMP area is not identified within this as a catalyst area.
- Local Planning Strategy provides guidance to inform amendments to the *Newcastle Local Environmental Plan 2012.*
- Newcastle Community Strategic Plan 2030. This outlines the main priorities and planning for the LGA for the following ten years. Further detail is provided in **Section 2.1.**
- Fern Bay and Stockton North Strategy 2020. The Strategy seeks to identify opportunities for Fern Bay and North Stockton to create a pedestrian focused place which offers housing diversity, a mixed-use town centre, connected open spaces and community facilities. While outside the Stockton CMP area the plan supports the goals open space and community facilities, and tourism.
- The Stockton CMP is in line with the *Newcastle LEP 2012* which guide the infrastructure, housing, commercial, recreational and conservation land use directions.

Greater detail regarding these strategies is contained within the Newcastle Coastal Management Program – Scoping Study **(Supporting Document B).**

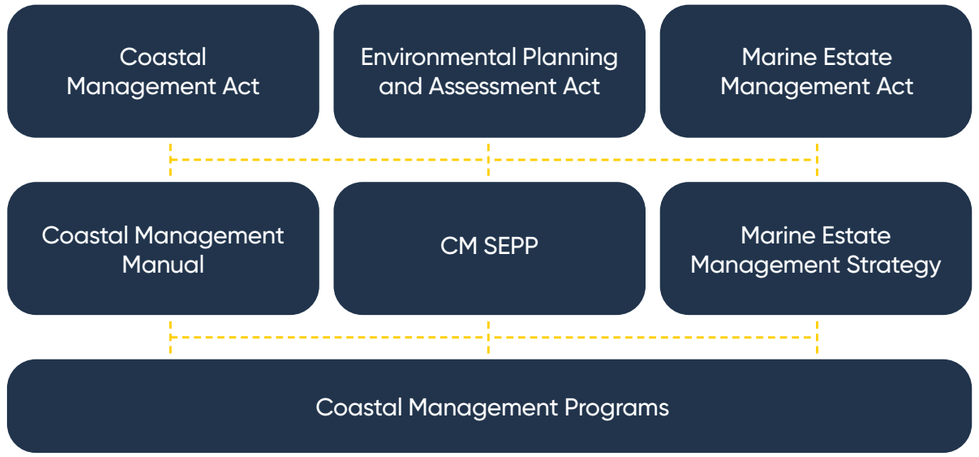

Figure 3: NSW Coastal Management Framework (NSW Coastal Management Manual Part A)

To reduce social conflict and improve effective management of coastal and marine resources beyond existing marine parks, the NSW Government introduced the Marine Estate Management Act 2014 (MEM Act). The MEM Act provides for strategic and integrated management of the whole marine estate. The marine estate includes all marine waters, estuaries and coastal areas. The NSW Government also established a new advisory Marine Estate Management Authority (MEMA).

MEMA has undertaken a state-wide Threat and Risk Assessment (TARA) to consider and prioritise the social, economic and environmental threats to community benefits of the marine estate. The Marine Estate Management Strategy has been prepared to allow a holistic approach to dealing with the cumulative threats to the marine estate. Consistency between the Marine Estate Management Strategy and CMPs is an essential element listed in the Coastal Management Manual (OEH, 2018). Although the state-wide MEMA threat and risk assessment was undertaken at a much broader scale than Stockton Beach, information from the MEMA background reports has been reflected during development of the actions within the Stockton CMP. The Stockton CMP also considers the priority threats identified in the Marine Estate TARA as described in Section 2.2 and within the scoping study **(Supporting Documentation B)**.

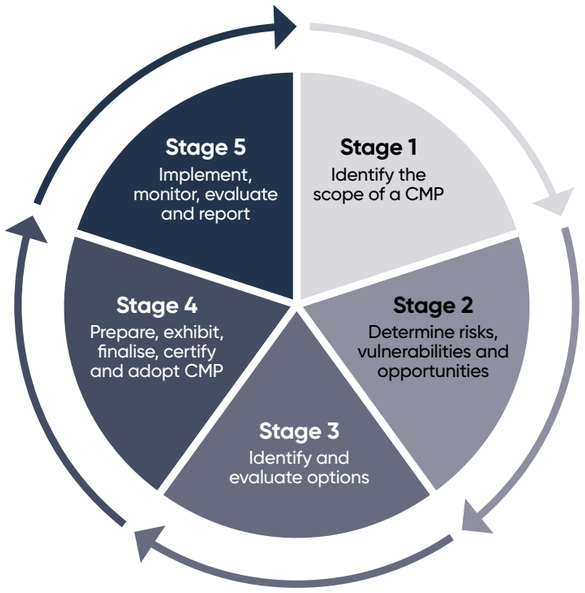

Figure 4: Stages for Preparation of a Coastal Management Program (NSW CMM Part A)

Stockton Beach has been managed under the Newcastle Coastal Zone Management Plan 2018 Part A – Stockton (CZMP), which was prepared under the savings provisions of the Coastal Protection Act 1979 (CP Act) (now repealed). CN's elected Council adopted the CZMP on 24 July 2018, which was certified by the Minister for the Environment on 24 August 2018, however under provisions of the Coastal Management Act 2016 (CM Act), the CZMP will cease on 31 December 2021.

Councils in locations identified as significant open coastal hazards, such as Stockton Beach, may apply for funding throughout the year under the NSW Coast and Estuary Grants Program. Funding is available for works that directly reduce/mitigate coastal hazards related to a significant open coastal hazard site.

The Stockton CMP has been prepared in accordance with the requirements under Division 2 of the CM Act, the provisions of the State Environmental Planning Policy (Coastal Management) (CM SEPP), and the NSW Coastal Management Manual Part A (The Manual) (OEH, 2018).

Many of the Objects and objectives of the Coastal Management Act 2016 (Section 3 of the CM Act) have been considered and promoted via the CMP scoping study (**Supporting Document B**). These have been included as part of the vision of the CMP described in **Section 2**, seeking to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience.

A key driving factor during development of the Stockton CMP has been recognising that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline, may result in the loss of coastal land to the sea, and providing actions to manage coastal use and development accordingly. Through the proposed management actions, CN seek to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety.

The management actions described in **Section 4** further reflect and promote the Objects and objectives of the CM Act. Particularly; working to ensure coordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities, seeking to mitigate current and future risks from coastal hazards, while taking into account the effects of climate change. Plans and strategies within the Stockton CMP seek to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events. These includes development of the Stockton Coastal Zone Emergency Action Subplan, described in **Section 7** and included as **Appendix A**.

Council have not identified any requirements for the acquisition of land within the Stockton CMP, as the majority of the coastal zone at immediate risk in Stockton is already owned or managed by public authorities. A table outlining how the Stockton CMP addresses the Mandatory Requirements and Objects of the CM Act, CM SEPP and Manual is provided in **Supporting Document H**, with additional description provided in **Section 5**.

The Stockton CMP identifies priorities and recommends specific actions to manage the coast within the Stockton CMP area from the Breakwater to Meredith Street, Stockton, over a five year timeframe (2020 to 2025). (see **Figure 2**).

Part A of the Manual recommends that councils follow a five-stage risk management process for preparation and implementation of a CMP as shown in **Figure 4**: Stages for preparation of a Coastal Management Program (NSW Coastal Management Manual Part A).

Figure 5: Spatial extent of the Coastal Management Program Scoping Study

During 2019, following the guidance of the NSW Coastal Management Manual Part B: Stage 1 - Identify the scope of a coastal management program, CN developed a Scoping Study for the wider Newcastle LGA that includes the coastal area shown in **Figure 5**. The focus of the Scoping Study area was the coastline and the lower part of the Hunter River estuary, including the Throsby Creek catchment within the coastal zone, and is included as **Supporting Document B**. The Stockton CMP addresses a subset of the area considered within the Scoping Study, and draws heavily on the relevant information provided within the Scoping Study (see **Figure 2**).

Technical studies to analyse sediment transport and coastal processes with the entire Stockton Bight as well as to develop an updated hazard assessment for the Stockton area within the Newcastle LGA in accordance with NSW Coastal Management Manual Part B: Stage 2 – Determine risks, vulnerabilities and opportunities (OEH 2018), were commenced on 14 January 2020. Following the Ministerial Direction on 17 February 2020, outputs of these studies relevant to the Stockton CMP area were prioritised in order to facilitate options analysis (**refer Supporting Document C**).

Stage 2 studies for the Newcastle CMP continue and will be incorporated, when complete, later in 2020.

Investigation and assessment of coastal management opportunities to address coastal hazards within the CMP area were undertaken in accordance with the NSW Coastal Management Manual Part B: Stage 3 – Identify and evaluate options (OEH 2018). Consideration has been given to risks to environmental, social and economic values and benefits through preparation of a Cost Benefit Analysis (Bluecoast 2020b) which are further described in **Section 3.3.1** and included as **Supporting Document F**.

1.4 Community and Stakeholder Engagement

Stakeholder and community consultation regarding the management of the Stockton Coastal Zone has been ongoing for over a decade.

A summary of the key consultation undertaken to date includes:

Year	Consultation Activities
2008	• Community workshop on the Stockton Coastline Management Study
2014	• Consultation with the Newcastle Coastal Technical Working Group on the Newcastle Coastal Zone Hazards Study (BMT WBM, 2014(a)) and the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)
2016	• Community workshops during the preparation of the Newcastle Coastal Zone Management Plan • Public exhibition of the Newcastle Coastal Zone Management Plan
2018	• Town hall meeting at Stockton RSL Club venue attended by more than 200 people • Formation of the Stockton Inter-agency Advisory Committee • Public exhibition of Newcastle Coastal Zone Management Plan – Part A Stockton
2018 - 2020	• Formation of Stockton Community Liaison Group and subsequent focus groups – meetings held on an ongoing and regular basis
2018 - 2020	• Formation of the Newcastle Coastal Planning Working Group • Town hall meeting and drop-in session at Stockton RSL Club venue • Public exhibition of the draft Stockton CMP was delivered between 13 May 2020 - 10 June 2020, utilising tools and processes that ensured consultation requirements were meet within the constraints of social distancing and regulated business operations during COVID 19 pandemic. Copies of the draft Stockton CMP were distributed to members of the Stockton Community Liasion Group, accessed via postal requests for hard copies, websites downloads and via local bowling club

Picture 1: Community Consultation – Town Hall Meeting at the Stockton RSL Club

1.4.1 Stockton Community Liaison Group

The Stockton Community Liaison Group (CLG) was formed by the Lord Mayor in February 2018. It consists of a group of leading locals that joined together to share community views and knowledge of local issues with CN and seek a long-term solution to erosion at Stockton Beach. Other NSW Government representatives have attended CLG meetings on an invitation basis. Including Office of Environment and Heritage (now Department of Planning, Industry and Environment), Hunter Water Corporation, Crownland, Worimi Aboriginal Land Council and Port of Newcastle.

The CLG has been meeting frequently since 2018 and continues to meet regularly and advise CN during development of the Stockton CMP. Stockton community representatives of the CLG, including representative from Worimi Local Aboriginal Land Council, provide an information network between CN and the Stockton community to better understand the concerns of the community and provide meaningful feedback towards the development of long-term management solutions to the erosion at Stockton Beach as contained within this Stockton CMP.

Ward 1 Councillors, State MLAs and MLCs, and other agencies are also invited to attend these meetings. The CLG has been integral to CN during the development of the Stockton CMP.

1.4.2 Newcastle Coastal Planning Working Group

The Newcastle Coastal Planning Working Group (NCPWG) was formed in 2019 to provide strategic guidance to the preparation of the Newcastle Coastal Management Program (Newcastle CMP).

The NCPWG comprises members from key government and community stakeholders including representatives from:

- City of Newcastle
- Community representatives (5)
- Department of Planning, Industry and Environment
- Crown Lands
- Hunter Water Corporation
- Transport for NSW
- Port of Newcastle
- NSW National Parks and Wildlife Service
- Awabakal Local Aboriginal Land Council
- Worimi Local Aboriginal Land Council
- Port Stephens Council
- Lake Macquarie City Council
- Other stakeholders are invited to attend as required

1.4.3 Government Agency Stakeholder Liaison

In line with CM Act (2016) statutory provisions consultation has been ongoing with key agency stakeholders throughout the development of the CZMP (2018) and the Stockton CMP (2020). This has included ongoing consultation with Port Stephens Council in relation to the management of the Stockton Bight Sediment compartment.

The following government agencies and key stakeholders have provided feedback to CN throughout the development of the Stockton CMP:

- Department of Planning, Industry and Environment
- Department of Planning, Industry and Environment – Crownland
- Hunter Water Corporation
- Worimi Local Aboriginal Land Council
- Port of Newcastle
- Port Authority of NSW
- NSW National Parks and Wildlife Service
- Defence Housing Australia (re Fort Wallace & former Fern Bay rifle range)
- Department of Family and Community services (Stockton Centre)
- Geological Survey of NSW
- Department of Agriculture, Water and the Environment
- Transport NSW
- Heritage NSW
- Port Stephens Council
- NSW Department of Primary Industries – Fisheries

Additional agencies were consulted in relation to the development of Stockton Coastal Zone Emergency Action Subplan (SCZEAS) 2020 through the Local Emergency Management Committee (LEMC) this included:

- NSW Police
- Ambulance Service
- NSW State Emergency Service (SES)
- Fire and Rescue NSW
- Hunter Local Land Services
- Environmental Protection Authority
- Hunter New England Health
- Surf Life Saving NSW

1.5 Natural Connection Program

Community consultation has been complemented and supported by broader community coastal education and awareness projects under CN's Natural Connection Program. These programs have focused on improving the community's appreciation and understanding of the coastal environment.

CN's Natural Connection Program delivers a range of activities that connects the community to Newcastle's unique natural areas. Since 2016 the issues of coastal processes have been incorporated through engagement, education and community partnership activities. Stockton was a focus of a month of coastal activities as part of Newcastle's World Environment Day 2018 program.

1.6 Community and Stakeholder Engagement Strategy for the Stockton CMP 2020

Effective community engagement and communication are important aspects of the CMP. Engagement with both stakeholders and members of the community has be undertaken through the development of the Stockton CMP in accordance with CN's Community Engagement Policy (CN, 2018(c), in addition to the requirements of the CM Act (2016) and NSW Coastal Management Manual Mandatory Requirements.

The Community Engagement Policy recognises and abides by the best practice principles developed by the International Association for Public Participation (IAP2). IAP2 promotes the values of involving the public in the Government decision making process. CN has adopted the IAP2 Public Participation Spectrum (Table 59) as a core tool to help identify and select the appropriate level of public participation, select methods of engagement, and identify how the public will be involved in the process.

A community and stakeholder engagement strategy considered CN's response to COVID-19 and associated impacts on the community engagement program.

The key communication principles of the Stockton CMP engagement program were to:

- Communicate clearly the complexities of coastal erosion and coastal processes
- Provide accessible options for the community and stakeholders to share their feedback
- Educate the community on the CMP process and the opportunities available to provide their feedback
- Ensure members of the community without computer access or unable to leave their households to be able to share their feedback
- Encourage feedback from the local Stockton community in addition to the Hunter community and stakeholders

The community engagement program was delivered in 3 stages:

- **Stage 1** - Prior to the onset of the community exhibition period commencing on 13 May 2020
- **Stage 2** - During the community exhibition period from 13 May – 10 June 2020 (28 days)
- **Stage 3** - After the closure of the community exhibition period on 10 June 2020 ahead of the Stockton CMP being considered for certification

The following methodology was utilised through stage 1 (pre-exhibition);

- Printed materials – Flyer and frequently asked questions (FAQ)
- Stakeholder Meetings – Agency and CLG and focus group meetings
- Online – Website Updates and 'Ask an Expert' Coastal Education videos
- Media Release

A summary of the engagement methodology utilised during stages 2 and 3 is contained within **Section 10** and **Supporting Document G**.

In March 2020, the NSW Deputy Premier announced the formation of a Taskforce of Government Agencies, CN and community representatives, to work together to address Stockton's erosion issues and to consider options to fund long-term solutions. Further, the Taskforce is intended to look at options for sand nourishment, including from marine sources, as well as provide solutions to inter-agency approvals processes.

2. A Snapshot of Issues

2.1 Community Values and Issues

The Newcastle 2030 Community Strategic Plan (CN 2018) was adopted by CN on 26 June 2018 and includes seven strategic directions for the future of the Newcastle LGA. While all seven strategic directions have relevance to coastal zone management three directions are particularly pertinent and guide CN's coastal planning and management documents, being: protected environment; vibrant, safe and active public places, and liveable built environment. How the Stockton CMP management actions address the goals and objectives of the Newcastle 2030 Community Strategic Plan is outlined in the business plan in **Section 6.**

Strategic Direction: Protected Environment

The protected environment strategic direction is supported by the Newcastle Environmental Management Strategy 2013 (NCC 2013), which outlines three objectives and the strategies to achieve these:

- Greater efficiency in the use of resources
- Our unique environment is maintained, enhanced and connected
- Environment and climate change risks and impacts are understood and managed

Strategic Direction: Vibrant, Safe and Active Public Places

The vibrant, safe and active public places strategic direction is supported by the Parkland and Recreation Strategy (NCC 2014) which includes four strategic directions, and an action plan to deliver

each of these:

- Equitable provision and development of facilities
- Efficient management of facilities
- Partnership development
- Promotion of facilities and opportunities

A key planning document for the coastal zone as part of the vibrant, safe and active public places strategic direction is the Newcastle Coastal Revitalisation Strategy Master Plan (Urbis, 2010).

Strategic Direction: Liveable Built Environment

The liveable built environment strategic direction is supported by the Local Planning Strategy (NCC, 2015), which in turn informs the Newcastle LEP 2012. Heritage management within the coastal zone is supported by the Heritage Strategy 2013-2017 (NCC 2014).

As **Section 1.4** outlines consultation has been ongoing within the Stockton community for over ten years.

Through these activities CN has identified strong opinions regarding Stockton Beach that have been incorporated in **Section 3**, including:

- The beach is highly valued and represents a critical asset to the local community
- The preference to maintain a clean beach area providing enough width for recreational space, including uses such as nippers, and which supports the current foreshore amenity and character
- Stockton has a strong surf culture with a desire to maintain surf amenity nearby the residential areas
- The preference to ensure any nourishment programs utilise sand that matches the existing visual profile of Stockton Beach
- The preference to maintain beach connectivity along the entirety of the beach

The consistent issue that has been raised by the community (and that has been identified in the CZMP) is the replenishment of sand on Stockton Beach to address beach erosion events and shoreline recession including repair and remediation of beach access and beach amenity.

The priority management objectives have not changed since the CZMP was completed in 2018. The coastal management strategy and actions within the Stockton CMP have been developed to be an iterative program that reflects the objectives of CN, the community, and the CM Act, delivering long term benefits of coastal protection and amenity.

The purpose of the Stockton CMP is to outline proposed long-term actions that will be implemented to further address the following six key issues:

- Coastal hazards
- Coastal environment
- Beach access
- Beach amenity
- Recreational use of the coastal zone
- Culture and heritage

2.1.1 Social and Cultural

The residential suburb of Stockton is located on the peninsula at the southern end of the larger embayed section of sandy coast known as Stockton Bight. Stockton's sense of identity is strongly connected to the community's relationship and ability to interact with the beach and coastline. The beach is heavily utilised for both passive and active recreation for residents and visitors. The ongoing loss of the beach is felt acutely by all levels of the community and represents a deep-seated concern.

The suburb comprises 360 hectares of land area and a population of 4,179 with a population density of 12.32 per hectare (CN, 2019). A forecast model was used to analyse the potential population and dwelling growth for the Newcastle Coastal Management Program - Scoping Study **(Supporting Document B)**. While the Newcastle coastal zone is projected to increase in population by 10,368 people in the period 2018-2041, the Stockton CMP area has not been identified as an area for high growth (CN, 2019). This model is supported by the Greater Newcastle Metropolitan Plan 2036 that does not identify the Stockton CMP area for significant changes in population, land use or employment.

The measurement of income provides a potential indicator of wealth within communities. Data from the 2016 census illustrated that despite being a beachside suburb the median weekly household income for Stockton ($1,226/week) which is below the medium income for the Newcastle coastal zone ($1,426/week). However, Stockton has the highest rate of dwelling ownership at 30% (CN, 2019).

CN anticipates that the coastal public land parcels and assets will see recreational demand in line with projected population growth. The southern section of Stockton is primarily residential and accommodates the beach front Stockton Beach Holiday Park. Community facilities exist along the former hind dune areas of the beach, including the Stockton Surf Life Saving Club, Lexie's Café building and Lynn Oval. The beach is popular for primarily locals and visitors from the Hunter Valley for activities including swimming, fishing, nippers, beach going and surfing. Visitation data for Stockton Beach is limited but based on a seasonal head count conducted by CN's Aquatic Services and projected population growth it is estimated that approximately 100,000 people currently utilise the beach annually. In addition, no beach user survey information (e.g. frequency, duration, purposes, expenditure, etc.) was available for this study. The Stockton CMP will support the current and projected use of these recreational assets.

Newcastle has two archaeological management plans, prepared in 1997 (Suters Architects) and 2003 (Higginbotham and Associates) for the Newcastle area. As an early colonial settlement, there are multiple historical shipwrecks along the Stockton Peninsula area, and some of these sites have recently been exposed off Stockton Beach (e.g. *Durisdeer* and *Berbice).* The North Stockton Breakwater was built over the remains of at least 11 wrecks (including the *Adolphe*). There is also a large offshore ships graveyard (where vessels were deliberately scuttled) located off Newcastle. Other historical items are the tanks traps associated with the defence of Stockton Beach along with the multiple Royal Australian Army amphibious vehicles (LVT4A tanks and DUKWs) which are located offshore of Stockton Beach (Heritage NSW, 2020).

Aboriginal people's connections to the coastal area are long-standing and involve a complex interaction of spiritual links, customary obligations to care for Country and the sustainable use of resources. *Sea Countries of NSW: A benefits and threats analysis of Aboriginal people's connections with the marine estate (Sue Feary, 2015)* outlines historical and contemporary benefits derived from the coastal area from various Aboriginal communities in NSW.

There are no Native Title claims under the Native Title Act 1993 (Cwlth) within the Stockton CMP area. However, within the Newcastle scoping study area there are 51 Aboriginal lands claim under the Aboriginal Land Rights 1983 (NSW). These Aboriginal land claims include portions of terrestrial Crown Land at Stockton and aquatic areas including the seabed off Stockton Beach.

2.1.2 Environmental

The coastal environment has been heavily modified within Stockton by historical activities and construction of infrastructure and dwellings. Dune systems remain along the coastline to the north of the former HWC sewage treatment plant at 310 Fullerton Street, but are owned by various State Government departments. These dune systems mainly comprise sand scrub vegetation including Coast Banksia (Banksia integrifolia), Coast Tea-Tree (Leptospermum laevigatum) and Old Man Banksia (Banksia serrata) with the shoreline predominantly consisting of Beach Spinifex (Spinifex sericeus).

South of the former HWC sewerage treatment plant the coastal vegetation community is highly modified with urban parklands and open spaces dominated by exotic grasses and planted landscape species such as Norfolk Island Pine (Araucaria heterophylla). Dune system vegetation has been re-established east of the Stockton Beach Holiday Park and at Pitt Street Reserve at the back beach area of Little Beach. The extent and condition of vegetation within CN owned and managed properties on Stockton Bight are detailed in the City of Newcastle Coasts and Estuary Vegetation Management Plan (Umwelt Pty Ltd, 2014).

CN has also undertaken an ecological audit of the beach environment (UoN, 2018). This study included the Stockton CMP area and will continue to inform further beach management approvals and activities, such as beach scraping.

Picture 2: Stockton SLSC Interbranch Event 2018. Stockton Beach

2.2 Initial Risk Assessment

The CMP Scoping Study completed an initial risk assessment for 160 locations across the Newcastle coastal zone. Section 9 of the CMP Scoping Study provides an assessment and evaluation of cumulative risks to assets across the Newcastle LGA, with reference to the previous risk assessment undertaken in the Newcastle Coastal Zone Management Study (BMT WBM, 2014(b)) and assessment by CN staff. The risk assessment was adapted from the Threat and Risk Assessment Framework for the NSW Marine Estate (MEMA, 2015) that was applied in the NSW Marine Estate Threat and Risk Assessment Report (BMT WBM, 2017(b)). The risk assessment considered priority threats from the NSW Marine Estate Threat and Risk Assessment Report (BMT WBM, 2017(b)) and coastal management issues as part of the overall assessment.

Threats were classified from minimal to high at three time periods; immediate, 2050 and 2100. The following table describes the coastal management issues with higher risk identified for Stockton.

Location	Coastal management issues	Comments
Stockton Beach – Northern end	Beach erosion and shoreline recession	Coastal erosion represents an immediate high risk for properties such as the Barrie Crescent Reserve and the former Hunter Water sewage treatment plant. Ongoing erosion will increase potential properties at risk into the future
	Invasive species	Species such as Bitou Bush are rated as a moderate risk
Stockton Beach – Central section	Beach erosion	An increasing risk of beach erosion is identified at the buried terminal ends of the Mitchell Street seawall in particular the dune system between Mitchell Street seawall and Memorial Reserve and Dalby Oval
	Coastal inundation	Coastal inundation is reasonably understood with emergency actions detailed in the Coastal Zone Emergency Action Subplan within the Stockton CMP
Stockton beach – Southern end	Beach erosion	High environmental and economic risks to the dune system seaward of the Stockton Beach Holiday Park. The risk profile is minimal or low for properties landward of the recently constructed seawall at the Stockton Surf Life Saving Club
	Coastal inundation	Coastal inundation is reasonably understood with emergency actions detailed in the Coastal Zone Emergency Action Subplan within the Stockton CMP

Table 1: Risk profile overview (Scoping Study)

2.3 Coastal Processes and Hazard Assessment

In line with the Coastal Management Act 2016 and the Manual, a probabilistic coastal hazard assessment for Stockton Beach has been undertaken. CN engaged Bluecoast and their sub-consultants Salients to undertake the coastal hazard assessment. The hazard assessment is limited to the area north of the Breakwater (northern training wall of the Hunter River), and the northern boundary of the Stockton Centre, which marks the boundary of CN's Local Government Area (see **Figure 2**).

Relevant sections of the coastal hazard assessment are discussed throughout the Stockton CMP, and the full report is included in **Supporting Document C**.

The hazard assessment for Stockton Beach (Part B) was undertaken concurrently to a sand transport study for Stockton Bight (Part A), namely the 'Stockton Bight Study'. During Stage 1 of the Newcastle Coastal Management Program (CMP) processes, CN identified the need for these two investigations. The two studies are being delivered as part of Stage 2 of the Newcastle CMP.

In addition, a cost benefit analysis (CBA) has been undertaken for the Stockton CMP informed by findings of the Part A and Part B investigations (Bluecoast, 2020c). Due to the time constraint imposed by Ministerial direction to prepare a CMP for Stockton Beach, the CBA was fast-tracked and undertaken concurrently to the Part A and Part B investigations incorporating information readily available during the study time frame.

Furthermore, the studies were undertaken during State and Federal Government enforced restrictions on public gatherings, in response to the COVID-19 pandemic. This has meant, for example, that a proposed stakeholder workshop could not be completed to inform the risk assessment. However, during the public exhibition period CN undertook extensive consultation through social media and direct mail out that generated 175 submissions and these have been documented in **Supporting Document G.**

Necessary assumptions were made through desktop review of previous hazard assessments and relevant literature, and are described in more detail where relevant to this report.

Figure 6: Coastal hazard assessment study area and NSW photogrammetry blocks and transects (coloured lines) at Stockton Beach.

2.3.1 Previous Hazard Assessments

A deterministic coastal hazard assessment for Stockton Beach was undertaken by DHI in 2006 and a reassessment of the 2050 and 2100 hazard lines by DHI in 2011. More recently, an LGA-wide Coastal Hazard Assessment was undertaken for CN by BMT WBM in 2014. This study mapped coastal hazards using a risk-based approach that defines the likely extent of the hazards for 2014, 2050 and 2100 planning periods.

However, the likelihoods for the erosion hazard were qualitatively assigned by combining estimated storm erosion and long-term recession values. The storm erosion extent was adopted as the most-eroded profile in the photogrammetry data while long-term recession was determined using a simplified numerical modelling approach and analysis of photogrammetry data (see **Figure 6**).

The probabilistic assessment that informs the Stockton CMP includes the following updates to the hazard assessment approach:

- A detailed, quantified coastal processes investigation as part of the Part A - Stockton Bight Study
- Being undertaken in parallel (Bluecoast, 2020a)
- Recommendations set out in the Manual (OEH, 2019)
- Probabilistic modelling approach to account for uncertainties in the coastal processes definitions and provide robust risk levels (likelihoods), i.e. not qualitatively assigned
- Use of high quality 2020 and 2018 topography data as baseline
- Latest sea level rise projections
- Consideration of built coastal protection structures

2.3.2 Stockton Bight Study

Beach erosion processes and quantitative sediment transport estimates for the coastal zone within the Stockton Bight sediment compartment are currently being assessed as part of the Stockton Bight Study (Part A) in Bluecoast (2020a) (refer **Supporting Document C**). A brief summary of the relevant findings to inform the Stockton CMP, as discussed in **Section 1.3**, is presented in the following paragraphs.

Stockton Beach and the adjacent Hunter River has been modified over the course of European settlement. Modifications that have impacted the beach response include the construction of the Hunter River breakwaters, capital and maintenance dredging of the navigation channel, revetment construction, beach nourishment, beach scraping and temporary and emergency protection works.

Stockton Beach has been the subject of numerous studies to assess coastal processes. However, further investigation has been identified as necessary to underpin the identification of appropriate options for management of coastal hazards on the Stockton coastline. Based on the Stage 2 sediment transport studies completed at this time, a summary of the most relevant processes is provided below.

A key knowledge gap identified in the Scoping Study (CN, 2019) was to determine the changes in the sub-aqueous part of the coastal profile. An assessment of the change in the sand volume in the Stockton Beach area was undertaken. This assessment found both the sub-aqueous and sub aerial profiles to have changed. The combined rate of long-term sand loss from the Stockton CMP area is recommended as 112,000m^3/year, which is based on the historical observations of:

- 12,000m^3/year of sand loss from sub aerial part (i.e. the land-based part above 0m AHD) of the coastal profile in Block A, Block B and Block C (refer **Figure 11**) between 1985 and 2020
- 100,000m^3/year of sand loss from sub aqueous part (i.e. the part below the water approximated by 0m AHD) of the coastal profile in Compartment 4 and Compartment 5 (refer **Figure 9**) between 1988 and 2018

These rates do not account for placement of dredged material by Port of Newcastle (PoN) in the nearshore zone. Between 2009 and 2019 approximately 33,000m^3/year of sand dredged from so-called Area E near the entrance to the port was placed off Stockton Beach. Had this sand not been placed as beach nourishment the rate of sand loss from these compartments would have been higher.

A timeseries showing the sub-aqueous sand volume change in Compartments 4 and 5, offshore of Stockton Beach is shown in **Figure 7**. Over the 152-year record, over 8 million cubic metres of sand has been lost from Compartments 4 and 5.

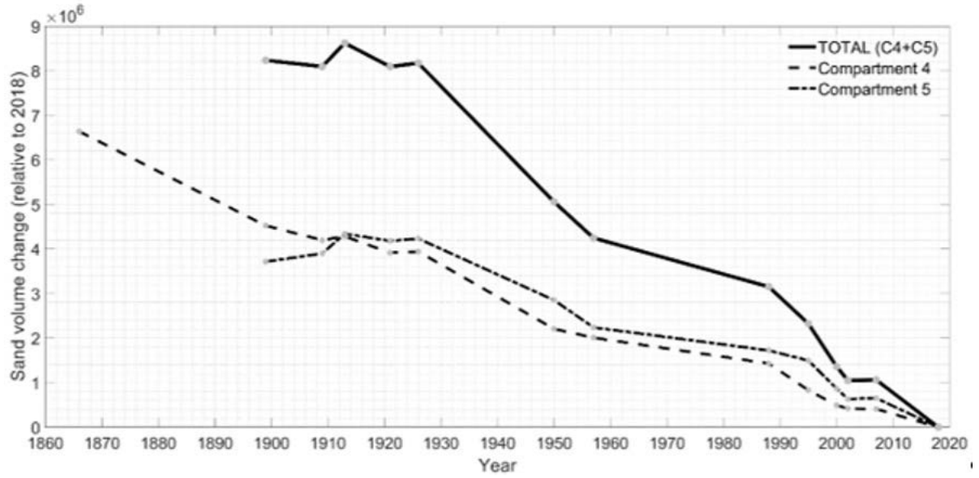

Figure 7: Long-term sand volume change at Stockton Beach (Compartments 4 and 5).

Figure 8 provides an example plot of the coastal profiles observed in selected surveys from 1816 to 2018 at a profile located near Meredith Street.

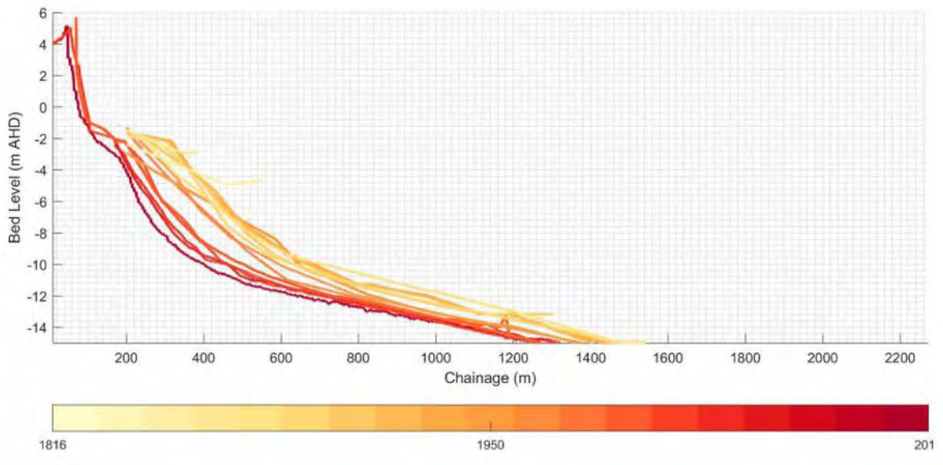

Figure 8: Historical coastal profiles historical bathymetric surveys at profile location near Meredith Street.

Maps of the changes in seabed levels relative to 2018 were produced for selected surveys with an example from 1988 to 2018 shown in **Figure 9**. In these maps, red indicates areas where the seabed has eroded and blue areas indicate areas of accretion.

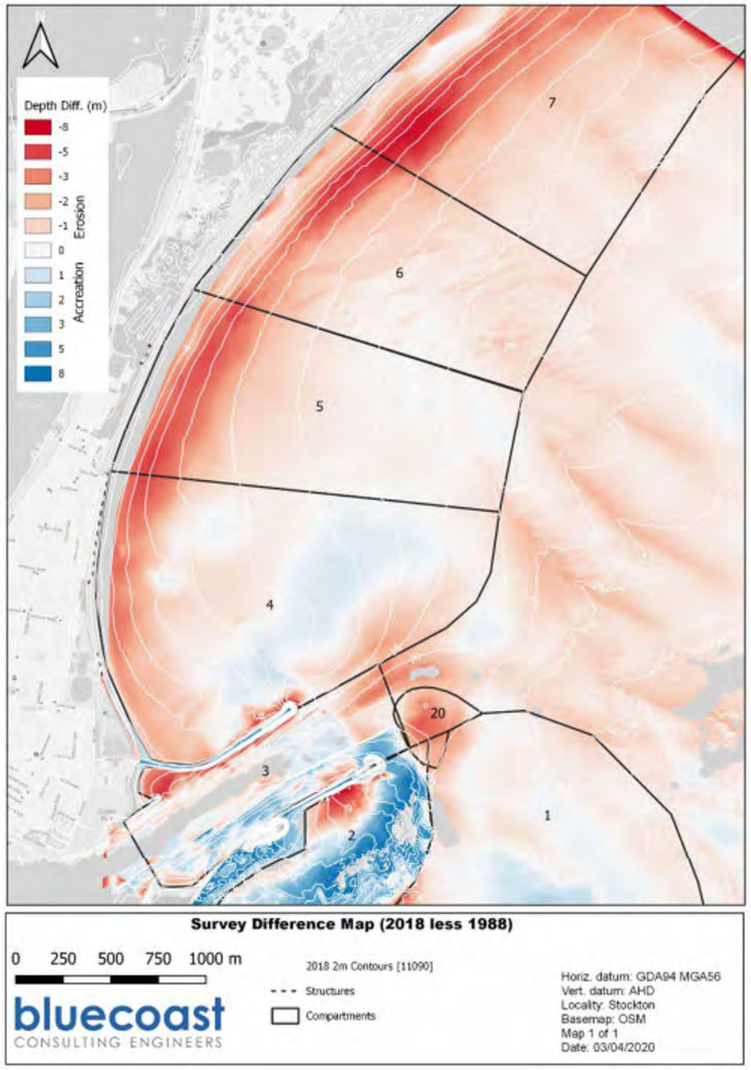

Figure 9: Survey difference map for 1988 relative to 2018.

The approach for estimating the long-term sand loss rate from the coastal profile in the CMP area is reasonable and valid. However, it is acknowledged that there is inherent uncertainty associated with the assumptions underlining the estimates as well as the comparative volumetric analysis of available survey data. The estimated sand loss rates are therefore subject to the accuracy of these surveys, noting that most recent surveys are more accurate.

Further investigations are underway to review the key coastal processes and quantify the sediment transport pathways that adequately explain these observations.

2.3.3 Key Coastal Hazards

The assessment relates to risks arising from coastal hazards as defined by the *Coastal Management Act 2016*. A simplistic assessment would see beach erosion as comprising that hazard relating to the erosion and recovery of a beach around a stable 'equilibrium' position. However, these beach fluctuations are often superimposed on a trend of ongoing shoreline recession or gradual adjustment of the shoreline location with time. Additional shoreline recession is expected to result from future sea level rise along the NSW coast. Hazard lines reported herein incorporate the following hazards as required by that Act:

- Long term recession (sometimes referred to as underlying recession) – historic shoreline recession due to deficits in longshore sediment transport
- Sea level rise and associated recession – future shoreline recession as a result of projected sea level rise
- Beach erosion – upper beach erosion as a result of large wave events and high-water levels
- Coastal slope instability – selecting the Zone of Reduced Foundation Capacity (ZRFC) following the schema published by Nielsen et al. (1992), the ZRFC represents the extent landward behind an eroded beach where special considerations would need to be adopted when designing footings for structures

2.3.4 Long Term Recession

The NSW beach profile (photogrammetry) data (DPIE, 2020) for Stockton Beach was analysed to determine appropriate input parameters for long-term recession for the probabilistic hazard assessment. The adopted analysis period included photogrammetry data collected between 1955 and 2018.

Where survey extents allowed, the photogrammetry record was extended to February 2020 using recent drone survey data collected by CN. The variation in estimated recession rates for each profile within the analysis blocks and over the study area is demonstrated in **Figure 10**. Estimated average shoreline change rates for the period 1985 to 2020 are shown in **Figure 11**.

Overall, the trends identified in this analysis were verified with volumetric changes in the full coastal profile as observed in bathymetric analyses undertaken as part of Part A (Bluecoast, 2020a). The results of both recession analyses agree reasonably well as a long-term volumetric rate of sand loss over the full beach profile was estimated at 112,000m^3/year between the Northern Breakwater and the Hunter Water site (Block C).

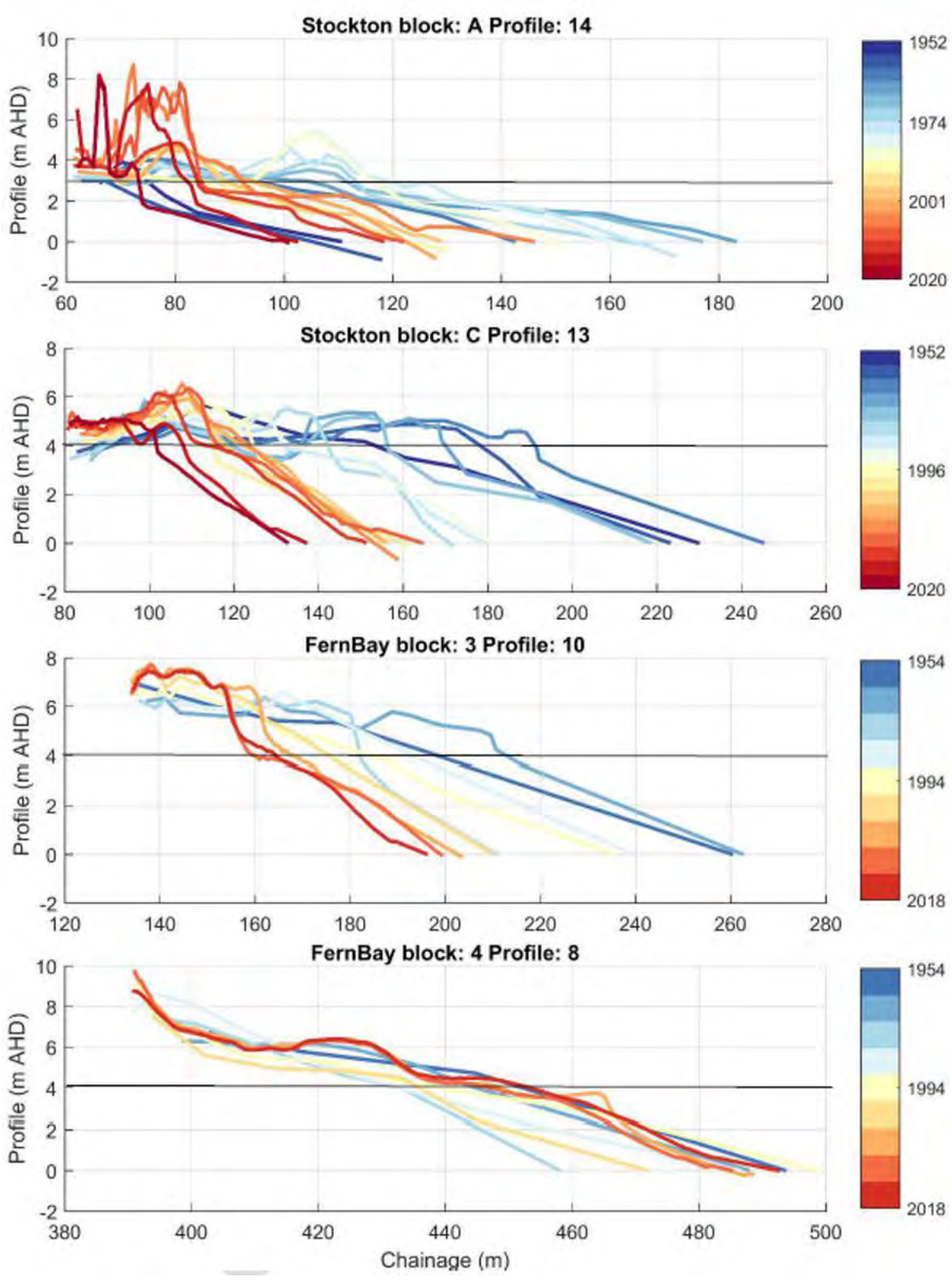

Figure 10: Example photogrammetry profiles at blocks Stockton A to Fern Bay 4.

The contour elevation adopted for recession analysis is shown in black

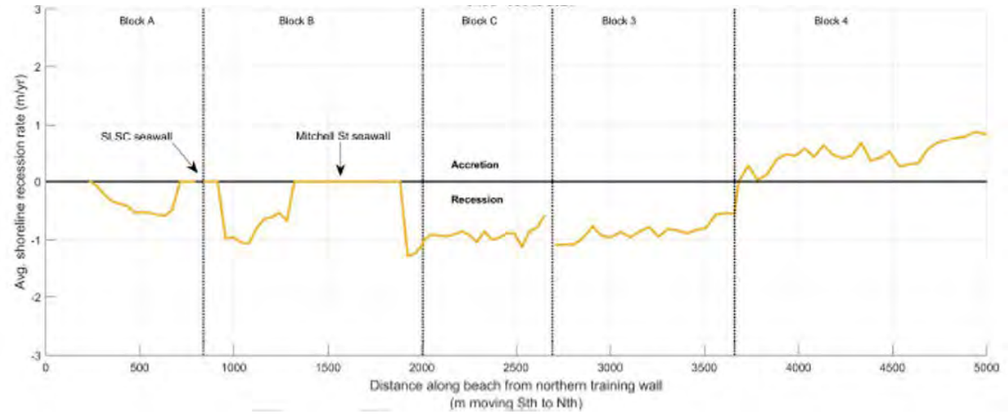

Figure 11: Estimated average shoreline change rates for the period 1985 to 2020.

2.3.5 Sea Level Rise and Associated Recession

The latest advice from IPCC (2019) on sea level rise calls for increases to the allowances in previous documents. The latest global SLR (above 1986 - 2005 baseline) projections for the 'likely' scenario are 0.43m and 0.84m (i.e. 0.1m higher than AR5 projections in IPCC, 2013) by 2100 for RCP2.6 and RCP8.5, respectively. Sea-level rise contributes to coastal erosion and inundation of low-lying coastal regions, particularly during extreme sea-level events.

2.3.6 Beach Erosion

Historical measurements of beach erosion volumes due to major storm events, or a series of storms in succession, at Stockton Beach are limited to recent drone surveys and approximate values that can be obtained from the photogrammetry profiles. Potential short-term erosion for Stockton Beach was analysed by DHI (2006) using a dune erosion model and application of storm conditions from May and June 1974, as well as a storm in June 1999 that arrived from a more easterly direction. Both historical measurements and DHI's dune erosion modelling indicate that the extent of storm erosion experienced at Stockton Beach increases from south to north in line with increased wave exposure from southerly storms. However, the alongshore distribution of storm erosion is sensitive to storm wave direction with more easterly or northerly storms leading to higher storm demands in the southern parts of the beach, as occurred in February 2020.

Stockton Beach is experiencing long term recession, and therefore it is difficult to separate short term events from the long-term recession signal in beach survey and photogrammetric data. The maximum erosion estimates in major storm events adopted by DHI (2006) ranged from 5 m at the Stockton Holiday Park to 17 m at Meredith Street, and 24.5 m at the LGA boundary. The deepening of the sub-aqueous profile due to an on-going sediment deficit in the Stockton Beach compartment is likely to increase storm erosion volumes into the future. DHI (2016) completed an analysis to determine the impact of deepening on dune face erosion. It was estimated that a further deepening of the nearshore zone by 1 m would increase erosion rates by 5%.

2.3.7 Hazard Assessment Approach

The probabilistic approach allows adopting probability distribution functions for each input parameter to the erosion hazard model. The adopted planning periods for which the coastal erosion hazards have been determined are present day (2020), 2040, 2060 and 2120. Full details of the input parameters can be found in **Supporting Document C.**

2.3.9 Probability Distribution Curves

Following the millions of Monte-Carlo simulations of combining the three hazards of long-term recession, sea level rise recession and storm erosion, probability curves of the position of the Zone of Reduced Foundation Capacity (ZRFC) at different time periods were produced.

2.3.9 Probabilistic Hazard Lines

For the purpose of mapping the erosion hazard, Bluecoast adopted the 1% exceedance probability hazard line, see **Figure 12**. According to Bluecoast **(Supporting Document C),** the associated lines represent the annual exceedance probability (AEP) of the landward end of the ZRFC. The 1% AEP is considered comparable to the 100-year annual recurrence interval (ARI) event for the presented years. Further presentation and mapping of the probabilistic hazard assessment results are provided in **Section 9**.

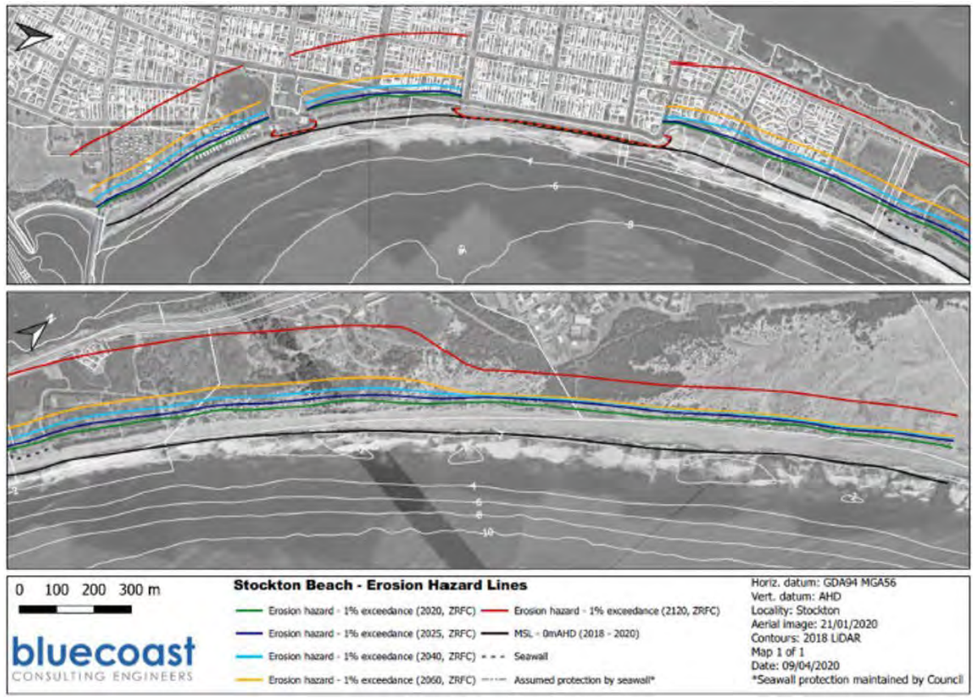

Figure 12: Hazard lines for the 1% AEP erosion hazard for various years in the planning period.

2.4 Risk Assessment Process

The risk assessment has been prepared using guidance provided by the international risk management standard, ISO 31000. That standard suggests the following steps for risk assessment:

- Establish the risk management context
- Identify the risks
- Assess the likelihood and consequences of those risks
- Evaluate the risks

Management strategies can then be suggested for those risks which are assessed as being unacceptable, with these later steps normally falling under the scope of subsequent studies to inform a CMP. The risk assessment presented here deals with the 'Base Case' of business as usual, involving the continued delivery of the actions in the certified CZMP.

2.4.1 Context of the Assessment

Consistent with the CBA (Bluecoast, 2020a), the extents of the hazard lines considered have certain probabilities of being exceeded (50%, 10% and 1% chance) are assessed at several time frames (present day (2020), 2040, 2060 and 2120). This represents an appropriate range of lines for consideration by stakeholders as part of risk assessment.

An important aspect of risk assessment context is understanding which stakeholders will suffer from the risks being assessed (noting that benefits may also result if risks eventuate) and who is best placed to take responsibility for those risks.

2.4.2 Risk Identification

Risks are going to arise from direct impacts of erosion on assets within and behind Stockton Beach, described as: *"There is a risk that ongoing coastal processes at Stockton will lead to the beach receding/eroding to such an extent that assets are either destroyed or their functionality compromised such that the value those assets provide to the community is permanently lost."*

2.4.3 Likelihoods

This study aligns with the risk management framework adopted by CN with the three hazard probabilities selected in accordance with CN's Likelihood Selection Table as presented in **Supporting Document C**. The hazard lines have been assigned based on the description of 'Likely' in CN's likelihood selection table as having a 50% to 80% chance of occurring over the time frames indicated by the frequency descriptors.

2.4.4 Hazard Lines

Hazard lines for planning use in the Stockton CMP were based on information including annual sand loss, shoreline recession rates, storm erosion and projected climate change. They identified Stockton's likely future risk exposure if the coast continues to recede, and no action is undertaken.

The processing of spatial data was completed to support the concurrent cost benefit analysis and three hazard lines ('Zone of Reduced Foundation Capacity (ZRFC))' for 1% likelihood, 10% likelihood, 50% likelihood) at four future time periods (2020, 2040, 2060, 2120). Maps showing the relevant lines for the four time periods are presented in **Section 9**.

2.4.5 Consequences

Spatial data were provided by CN, including value information where available, for several different classes of assets. Omissions from the data provided, includes public utility services (telecommunications, water and sewer, electricity, gas).

Similarly, to the likelihood descriptors, CN provided a table with its standard risk consequence categories as reflected in CN's risk management framework. There are seven risk impact categories considered:

- Financial
- Environmental
- Health and Safety
- Infrastructure / ICT Systems / Utilities
- Legislative Compliance
- Reputation / Image
- Service Delivery

Categories 2 through 7 were not included within the review due to the time constraints directed by the Minister for Local Government on completing the Stockton CMP. A preliminary consequences assessment has been completed using the financial category, and the valuation has adopted the results of analysis completed in developing the CBA (Bluecoast, 2020b).

The total financial loss has been calculated and categorised for the time periods and likelihoods adopted for the analysis, with results presented in **Table 2.**

Chance	Loss of Value by Year: ($M AUD)			
	2020	2040	2060	2120
50%	0.18 (Moderate)	9.1 (Severe)	37 (Severe)	117 (Severe)
10%	1.9 (Major)	18 (Severe)	44 (Severe)	157 (Severe)
1%	2.2 (Severe)	29 (Severe)	49 (Severe)	184 (Severe)

Table 2: Valuation and classification of coastal erosion hazard consequences

The hazard assessment identified the consequence is predominately comprised of significant impacts to public land, assets and services within the Holiday Park, Lynn Oval and roadways and car parking facilities, due to their location within public land generally seaward of Mitchell Street. **Table 3** summarises the estimated value of CN public land and assets at risk.

The assets which are covered in this summary have been compiled from Councils Asset Register and cover (but are not limited to) footpaths, road pavements, car parks, street furniture; buildings and structures such as shade shelters, monuments and seating, mains water distribution and irrigation, stormwater pit pipe and infiltration devices, and taps (refer **Supporting Document F).**

	2020		2040		2060		2120	
Council Land (m^2)	Units	Value	Units	Value	Units	Value	Units	Value
50%	8,955	$168,744	70,588	$3,496,601	87,227	$3,839,284	129,710	$4,641,428
10%	15,279	$932,018	76,635	$3,639,668	94,520	$3,976,710	139,250	$4,822,377
1%	28,023	$1,397,798	83,028	$3,760,159	100,990	$4,098,994	145,530	$4,947,497
Council Buildings and Structures (no.)	Units	Value	Units	Value	Units	Value	Units	Value
50%	1	$121,950	24	$5,145,694	33	$6,849,500	36	$7,777,971
10%	16	$2,881,800	28	$6,087,993	34	$7,534,851	37	$7,846,999
1%	18	$4,535,943	31	$6,889,041	34	$7,534,851	37	$9,326,999
Paved Areas (m^2)	Units	Value	Units	Value	Units	Value	Units	Value
50%	132	$8,059	6,004	$277,356	12,218	$468,085	28,381	$1,194,056
10%	1,622	$90,323	8,592	$345,263	14,579	$536,784	35,254	$1,481,975
1%	4,866	$224,239	11,131	$435,907	16,293	$593,655	47,189	$2,038,054
Stormwater Pipe (m)	Units	Value	Units	Value	Units	Value	Units	Value
50%		$-		$-	13	$7,922	371	$162,679
10%		$-		$-	29	$17,672	505	$209,297
1%		$-	4	$2,438	43	$26,204	840	$306,306
Public Shelter (no.)	Units	Value	Units	Value	Units	Value	Units	Value
50%		$-	3	$157,000	4	$164,500	6	$208,500
10%		$-	4	$164,500	5	$196,500	6	$208,500
1%		$-	4	$164,500	5	$196,500	7	$213,000
Expect Total Annual Loss		**$1,368,063**		**$8,043,182**		**$12,121,905**		**$13,992,286**

Table 3: Estimated value of CN land and Assets at Risk

A further overview of the assets at risk are reflected in the Coastal Zone Emergency Action Subplan **(Appendix A** Section 9 – Assets and Hazards by Zone)

2.4.6 Risk Evaluation

A risk matrix enables risk evaluation by combining likelihoods and consequences. The current and future financial risk levels at Stockton Beach have been determined as presented in **Table 4.**

Chance	Risk level by year			
	2020	2040	2060	2120
50% (Likely)	High	Extreme	Extreme	Extreme
10% (Unlikely)	High	High	High	High
1% (Rare)	High	High	High	High

Table 4: Assessed financial risk profiles at various time frames.

Results should be considered alongside a risk manager's level of 'risk tolerance'. When combined, these considerations govern the urgency with which risks should be treated. AS5334 (Australian Standards, 2013) regards that the following treatments are suitable when considering climate change risks for settlements and infrastructure:

- Low risks would typically be addressed through routine maintenance and day to day operations
- Moderate risks would require a change to the design or maintenance regime of assets
- High risks require detailed research and appropriate planning (or design)
- Extreme risks would require immediate action to mitigate

Prompt research, planning and design are presently indicated to manage coastal erosion at Stockton Beach. However, these risk levels must be interpreted recognising that only financial risks have been considered. There is a strong possibility that the present-day risk profile for the suburb of Stockton would be assessed as 'Extreme' if social and environmental values were also considered.

2.4.7 Impacts on Infrastructure, Environment and People

Complementing the risk assessment, this discussion is viewed as a precursor to inform other activities associated with coastal management for Stockton Beach. It includes a 'high level' overview of current and future coastal hazards which were not able to be included in the risk assessment but may warrant further consideration.

2.4.7.1 Impacts on Infrastructure

Several impacts on infrastructure have not been examined by this study including services such as:

- Water
- Sewer
- Gas (noting there is a gas pipeline that runs along Mitchell Street)
- Electricity
- Communications

The main issue relating to these services is that they commonly perform as a network and damage to one part of a network will degrade performance at other locations across the network.

The protection/retention of safe and well-maintained roads, as per Strategy 1.3(a) of the current Community Strategic Plan (CN, 2018) will help to protect much of the buried services networks across the suburb as they are most commonly located within the road reserve.

Over the 100-year (2120) time frame, there remains a small chance that Fullerton Street is made unsafe at the northern end of the Stockton residential area (see Figures 19 & 20 in **Appendix A**), effectively cutting off access to Stockton from the north. Clearly, this would have an impact on CN's ability to provide services to Stockton. Worth considering is that, even if buried terminal protective works were provided across northern Stockton as the sole strategy for mitigating against erosion risks, outflanking of the structure to the north could possibly threaten Fullerton Street in a more northerly location. This consideration will be included in the development of the Newcastle CMP.

2.4.7.2 Impacts on the Environment

Considering Strategic Direction 2 of CN's Community Strategic Plan, protection of the environment and natural areas is an important matter. Embedded within the table outlining that Strategic Direction is a strategy which encourages decisions and policy that support an up to date understanding and response to climate change.

An ongoing understanding of the potential for erosion to affect land is required. This can be maintained by revisiting and updating coastal hazard lines with reasonable regularity, as understanding improves, and climate change projections are revised. By ensuring information is up to date, impacts by severe coastal storms can be managed to ensure that appropriate emergency management strategies are in place.

The key environmental asset at Stockton is the beach. If the beach is lost, for example, by providing coastal protection infrastructure without ongoing nourishment and allowing the dry beach width to disappear, many of the environmental benefits derived from the beach are lost.

There are also values associated with remnant dune systems to the rear of the beach, although the remaining vegetated dunes are typically narrow and far less significant than the dune system which exists to the north of Stockton.

2.4.7.3 Impacts on People

The CBA (Bluecoast, 2020b) reports that approximately 100,000 people utilise Stockton Beach annually. The beach is popular for swimming, fishing, surf lifesaving, beachgoing and surfing.

Coastal erosion has the potential to threaten several of the Strategic Directions in CN's CSP.

Vibrant Safe and Active Public Places:

These include the beach, which is the first asset to be lost to erosion and potentially the parkland and facilities that are behind the beach.

Liveable Built Environment:

The loss of parkland and public spaces, services, and the road network present a serious risk to the overall 'Liveability' of Stockton. Of course, liveability can be affected before severe physical impacts occur. It could be argued that the liveability of Stockton is already being impacted even though the loss of facilities has been limited to date. A lack of confidence in the future viability of an area affects the sense of liveability.

Open and Collaborative Leadership:

This follows from the previous point and the 'sense of identity' of an area. The strategies around this direction relate to long term planning and financial sustainability. It is important that planning is as strategic as it can be to appropriately follow this Key Strategic Direction. This implies that planning should consider the longer term (say 100 year) time frame, to ensure viability, minimise any future financial shocks and to increase the confidence of the Stockton Community in the place where they live.

Health and Safety:

Through appropriate strategic planning, severe health and safety impacts from coastal erosion should be appropriately mitigated. At Stockton, it appears that the current risks are close to being considered 'very high to extreme'.

The safety of structures and people need to be maximised wherever possible. One limitation of the present risk analysis is that the risks associated with inundation hazards (e.g. wave overtopping of the foreshore) have not been considered as updated information on those hazards was not available within the required timeframe for completion of the Stockton CMP. The health and safety risks to people can be largely avoided through *Open and Collaborative Leadership and strategic planning.*

Unfortunately, legacy planning issues often remain in conflict with this strategic direction.

2.4.8 Intangible Values

Some of the values discussed in the immediately preceding sections have aspects that are intangible, or less amenable to valuation. Provided below are brief comments on some of the more intangible risks outlined in CN's standard Risk Consequence Table.

Legislative Compliance:

Compliance with legislation is largely a risk that needs to be borne by CN. In the context of coastal management, continued compliance with the requirements of the Coastal Management Act 2016, the Coastal Management Manual (NSW Government, 2018) and related directions from the relevant Minister, will assist CN in minimising these risks.

Reputation/Image:

These risks are primarily organisational and beyond the scope of this assessment.

2.5 Outcomes of Risk Assessment

On the consideration of the current risk profile for Stockton Beach, it is assessed as 'High', meaning that detailed research, planning and study are indicated. The probabilistic hazard assessment undertaken further concluded that the Stockton CMP area is currently at high to extreme risk, with public assets at immediate threat requiring urgent protection, as well as longer term threats to assets.

3. Selecting Coastal Management Options

3.1 Introduction

An evaluation and coarse filtering of all options for long-term coastal management within the Stockton CMP area has been undertaken in accordance with the NSW Coastal Management Manual to facilitate the preparation of the Stockton CMP (refer **Supporting Document D**). **Table 5** outlines the options that were considered in this initial assessment.

Table 5: Options Evaluated in Coarse Filter

Nourishment Options	Structural Solutions	Planned Retreat
Beach scraping	Seawalls	Relocate Assets
Beach Nourishment (from dredging)	Artificial Reef Breakwaters	Land Acquisition
Beach Nourishment (from terrestrial sources)	Groyne Field	Buy Back / Lease Scheme
Beach Nourishment (bypassing from Nobbys beach)	Large Single Artificial Headland	Sacrifice Land / Assets
	Multiple Small(er) Artificial Headlands	

**Provide protection to assets seaward of 2025 ZSA for 5% AEP*

The coarse filter was undertaken for each zone and considered the following criteria to evaluate options and determine a shortlist of options for assessment in the CBA:

- Addresses storm erosion
- Addresses long term recession
- Addresses beach amenity
- Capital cost/ Recurring costs
- Environmental or social impact
- Likely community acceptability
- Adaptability in future
- Long term effectiveness
- Approval risk
- Ease of implementation

Further investigation of the feasible management actions such as planned retreat, relocation of assets, sand nourishment or engineered structures to address beach erosion and shoreline recession was then conducted (refer **Supporting Document F**).

The Stockton CLG has, with input from the local community, identified sand nourishment as a preferred long-term option to address coastal hazards and improve beach amenity and access. Whilst nourishment using an offshore sand source is currently not permissible under NSW legislation without a mining licence, it has been included in the Stockton CMP as a potential future option via a sensitivity analysis in the CBA.

The NSW Deputy Premier in March announced the formation of a taskforce of community representatives, government agencies and CN, to work together to address Stockton's erosion issues, and to consider options to fund long-term solutions. CN is committed to working with the Deputy Premier's Taskforce and the NSW Government to explore all opportunities to source sand that are affordable and are suitable (meet the technical specifications of CN's Sand Management Guidelines). This includes the permissibility of accessing marine sand, with the goal of mass nourishment to protect and enhance Stockton Beach. The Stockton CMP has been prepared to include the potential for marine sand (or other potential sources) becoming available in the future.

3.2 Options for CBA

The sediment transport study (refer **Supporting Document C**) identified an ongoing sediment deficit leading to long term recession and increasing erosion. The probabilistic hazard assessment (refer **Supporting Document C**) identified that public assets were currently at high to extreme risk.

The community strongly view the beach as a critical asset to the local community and desire beach amenity, access and connectivity to be maintained. Many coastal management strategies were evaluated (refer **Supporting Document D**) to determine a shortlist of options to be assessed in the CBA including nourishment, protection structures and varying degrees of planned retreat.

The technically feasible solution that addresses the sediment deficit issue and achieves CN and the community's objectives of beach amenity, access and asset protection in the long term, requires mass sand nourishment. The volumes of sand required to achieve coastal protection are calculated to be 1.8 million to 4.5 million m^3 depending on source and re-nourishment period.

Terrestrial sand sources cannot supply sand on this scale. Potential marine sand sources have been identified however they currently have availability or permissibility impediments.

Hunter River capital dredging works are another potential source of sand though this is dependent on the proponent gaining appropriate approvals. The development of Sand Management Guidelines will enable CN to be agile in its response to this and other opportunities as they become available.

Potential sand sources are discussed further in **Supporting Document E**.

On the basis of the options assessment and giving consideration to the tight timeframe of the Stockton CMP development, a shortlist of options was progressed through to the CBA stage of the process. Nine different combinations of nourishment and protection works were developed to meet the technical and community objectives and were assessed in the CBA, and are summarised in **Table 6.**

A detailed outline of the development of these options is provided in **Supporting Document F**.

Due to the immediate risks to assets identified in the hazard assessment, all options included some limited buried terminal protection works (typically at the flanks of the existing coastal protection structures).

Table 6: Summary of options and sub-options assessed in CBA

Option	Sub-Option	Description	Sand Source	Initial nourishment volume (m^3)	Maintenance nourishment vol (m^3)	Maintenance nourishment frequency (years)	Buried Terminal Protection Structures (m)	
							Stage 1	Stage 2
1	1a	Mass nourishment for protection + amenity buried terminal protection works to address immediate erosion risk	Terrestrial**	4.5 million*	1.4 million*	5 years	458	0
	1b		Marine (offshore)	2.4 million	1.12 million	10 years		
	1c		Hunter River	1.8 million	560,000	5 years		
	1d	Option 3b adopted for first year, then mass nourishment as per Option 1b, with optimised stage 1 coastal protection work	Terrestrial** and marine	50,000 2.4 million	1.12 million	10 years	225	0
2	2a	Sand nourishment for improved beach amenity + staged buried terminal protection	Terrestrial**	525,000*	280,000*	Annual	458	995
	2b	Sand nourishment for improved beach amenity + 1 year ARI storm each year + staged buried terminal protection	Marine (offshore)	610,000	560,000	5 years	458	995
	2c	Sand nourishment for improved beach amenity + 1 year ARI storm each year + staged buried terminal protection	Hunter River	610,000	560,000	5 years	458	995
3	3a	Sand nourishment to maintain beach amenity (logistically feasible terrestrial volume) + staged buried terminal protection	Terrestrial**	200,000	200,000	annual	458	995
	3b	Reduced sand nourishment (economically feasible terrestrial volume) + optimised stage 1 and 2 buried terminal protection	Terrestrial**	50,000	50,000	annual	225	1186

** exceeds volume from terrestrial sources that can feasibly be placed on the subaerial beach*

*** terrestrial sources have an overfill factor of 2.5 to account for incompatibility of grain size and a sensitivity analysis has been undertaken for overfill factor of 1 (refer* **Glossary Section 12).**

Nourishment volumes were estimated by RHDHV for input into the CBA, with refinements made by Bluecoast based on models and outcomes of the Stage 2 Sediment Transport Study. It is noted that sand from local quarries is typically finer than native beach sand as it is from aeolian (wind-blown) dune sands. An overfill factor of 2.5 has been applied to terrestrial volumes to account for this incompatibility in grain size (refer Glossary in **Section 12**). A sensitivity analysis, adopting an overfill factor of 1, was also undertaken. Maintenance nourishment quantities were based on the long-term sediment deficit rate of 112,000m^3/yr determined by Bluecoast in the Stage 2 Sediment Transport Study. The annual sand deficit rate will be further reviewed by refining the sediment dynamics as part of the Stockton Bight Sediment Transport Study.

Further detail of the development, rationale and risks of each of the Options and sub-options is provided in **Supporting Document F**.

3.3 Cost Benefit Analysis

In accordance with the Coastal Management Act 2016 and the Manual and consideration of the Guidelines for using cost-benefit analysis (CBA) to assess coastal management options (OEH, 2018), a CBA for Stockton Beach was undertaken to provide an economic analysis of coastal management options (refer **Supporting Document F**). CN engaged Bluecoast and their sub-consultants Rhelm to undertake the CBA for the proposed Stockton CMP options.

The CBA assessed the nine identified coastal management options (and sub-options) for Stockton Beach outlined in **Section 3.2**. As the only currently readily available sand source is terrestrial, this was assumed to be the standard supply source for the options.

Recognising the potential for future marine sources of sand a sensitivity analysis was undertaken formass nourishment using offshore marine sources and Hunter River marine sources.

All cases were assessed relative to the Base Case of business as usual, involving the continued delivery of the actions in the certified CZMP. All of the options (and sub-options assessed for sensitivity analysis) are summarised in **Table 6.**

3.3.1 Methodology

The economic assessment considers the comparative costs and benefits of each of the three management options (and variations therein) against the base case scenario with consideration of population growth.

The economic merit of each option was determined by comparing the present value of the change in net economic benefits (compared with the base case) less the change in capital and operational and maintenance costs (compared with the base case). The key benefits incorporated within this cost benefit analysis (CBA) assessment were in the form of:

- Maintained beach area and associated non-use and use values
- Reduced loss of property and land to both private landowners and the CN

In conjunction with the CBA, a probabilistic erosion hazard assessment was undertaken by Bluecoast. A discussion of the approach and adopted input parameters to the probabilistic modelling are provided in **Supporting Document C**. In summary, appropriate ranges of long-term recession, sea level rise and storm demand were adopted to produce inputs that fed into a Monte-Carlo simulation of over one million scenarios.

In the development of the management strategy see **Section 4.1** CN adopted a distance of 20m from the 2025 ZSA 5% AEP hazard line as a foreshore recession threshold in line with the established 5 year planning horizon.

The ZRFC was adopted as the erosion hazard extent, which is the estimated unstable zone of a dune following a coastal erosion event in which it is not acceptable to locate foundations for coastal buildings and infrastructure unless suitable precautions are taken. The results from the probabilistic hazard modelling provide probabilities of exceedance (PoE) for the position of the ZRFC for every year in a 100-year planning horizon.

The capital, operational and maintenance costs were identified for each option with Net Present Value (NPV) of expenditure determined over a 50 year period (using discount rates of 7%, with 3% and 10% also calculated for sensitivity assessment).

The benefits considered included: beach amenity, avoid losses to private property, CN lands and CN assets, producer surplus and residual value.

Further detail of the methodology and assumption are in the CBA Report in **Supporting Document F**.

3.3.2 CBA Results

As noted above, the costs and benefits for each option relative to a Base Case, as outlined above, were compared through a CBA. The Benefit Cost Ratios (BCRs) resulting from the economic assessment, for each of the project options (based on a 7% discount rate), are provided in **Table 7**.

Table 7: Benefit Cost Ratios (BCRs) for each of the project options (based on a 7% discount rate)

Option	Description	BCR (@7%)
1a	Mass nourishment for protection + amenity, limited coastal protection works – terrestrial sand source	0.1
1b	Mass nourishment for protection + amenity, limited coastal protection works – offshore marine source	1.5
1c	Mass nourishment for protection + amenity, limited coastal protection works – Hunter River marine source	0.9
1d	Option 3b adopted for first year, then mass nourishment as per Option 1b, with no Stage 2 buried terminal protection	1.3
2a	Sand nourishment (from terrestrial sources) for improved beach amenity + staged buried terminal protection	0.1
	Sensitivity analysis for overfill ratio of 1	0.1
	Sensitivity analysis for overfill ratio of 1 and cost reduced to $50/m3	0.1
2b	Sand nourishment (from offshore marine sources) for improved beach amenity + staged buried terminal protection	0.4
2c	Sand nourishment (from Hunter River sources) for improved beach amenity + staged buried terminal protection	0.3
3a	Sand nourishment to maintain beach amenity (logistically feasible terrestrial volume) + staged buried terminal protection	0.1
3b	Reduced sand nourishment (economically feasible terrestrial volume) + minimised* stage 1 and 2 buried terminal protection	0.1

**Provide protection to assets seaward of 2025 ZSA for 5% AEP*

Of the nine options, only options 1b and 1d are seen to have a BCR greater than one at a 7 percent discount rate. For Option 1b, at a 7 percent discount rate the BCR is 1.5, implying for every $1 spent on the project, $1.50 is expected to be returned in economic benefits. The net benefit under this option is $19.4 million. For Option 1d at 7 percent discount rate the BCR is 1.3, implying for every $1 spent on the project, $1.30 is expected to be returned in economic benefits. The net benefit under this option is $11.3 million. Option 1b is the economically preferred option. However, as noted previously, there are currently a range of legislative and environmental issues associated with this option that would prevent its immediate implementation. Both options 1b and 1d depend upon access to a lower cost, higher volume and more compatible nourishment sand source to be available upon commencement of mass nourishment activities.

Options 2 and 3 do not generate positive results as they provide little to no amenity benefit in comparison to the base case, while incurring high upfront costs. While these options do provide protection of private assets, the risk of damage and loss of these assets is too far into the future to economically support investment in these options which rely upon physical infrastructure for asset protection. It is considered that seawall options are likely to improve in their economic feasibility over time (i.e. by 2040).

A sensitivity analysis for overfill ratio and cost/m^3 for terrestrially sourced sand indicated that these factors did not impact on the cost benefit analysis outcome for Option 2a and it remains economically unviable (BCR = 0.1).

3.3.3 Preliminary Distribution Analysis

From a distributional perspective the affected and benefiting parties varies over time. Under the base case scenario, it is CN and the users of the Stockton Beach Holiday Park that are likely to incur the greatest costs associated with this approach. The expected value of land and assets at risk to CN exceeds $8 million dollars within the next 20 years. Other community members will not be directly affected through impacts to property in the short term but are likely to experience the loss of beach amenity (although the beach width will likely remain relatively constant) as well as reduced associated foreshore amenity, loss of recreational spaces and sporting grounds. see **Supporting Document F.**

The short-term impacts to the Holiday Park are likely to be large and could ultimately lead to the closure of the Holiday Park. Tourists from outside the LGA will be required to choose alternate destinations for beach side camping (of which there are many within the areas to the north and south of Newcastle).

Beyond 2040, it is likely that some land owners near the beach will experience property damage.

Under all the options proposed, private property damages are avoided into the future. However, the options differ in the broader impacts to the communities. The mass beach nourishment options retain and enhance the value of the beach asset and are likely to add additional value to properties and the attractiveness of the Stockton Beach Holiday Park. This may also support increased economic activity through beach related commerce.

In contrast, Options 2 and 3 will ultimately lose public space adjacent to the beach as recession shifts back to the proposed Stage 2 buried terminal protection. While a beach area will be retained, the reduced area will alter the utilisation and desirability of the beach. Moreover, the construction of the seawall will require the removal of a significant portion of facilities at the Stockton Beach Holiday Park. A management strategy for the future for the Holiday Park will need to be undertaken to assess the future operational requirements.

3.4 CBA Outcome and Recommendation

Option 1b (mass nourishment from offshore marine sources) was identified as the economically preferred option, with a BCR of 1.5 and producing over $19 million in NPV to society. However as previously identified in **Section 3.1**, the permissibility and technical details of this option requires further investigation and resolution. These can be largely achieved through the proposed Deputy Premier's Taskforce and within the timeframe for the completion of the Newcastle CMP which will replace the Stockton CMP. As noted previously, option 3b (reduced sand nourishment from economically feasible terrestrial volume and minimised stage 1 and 2 buried terminal protection) is the only currently permissible option however the CBA has shown it is not economically feasible over 50 years due to the high cost of nourishment and Stage 2 buried terminal protection works (resulting in a BCR of 0.1). Option 1b, when combined with elements of 3b is a technically and economically viable option as it uses a 1 year program to address risk and amenity followed by mass nourishment from marine sources to provide ongoing protection and amenity. This strategy eliminates the need for the construction of future Stage 2 buried terminal protection works as the nourishment is able to provide coastal protection.

Given the positive BCR of 1.1, the hybrid of option 3b and option 1b (identified as option 1d) is the recommended way forward. As such it is recommended that further investigation of **option 1d be considered as a practical viable option**. It is noted that all the nourishment options identified are highly sensitive to the cost assumptions associated with access and delivery of nourishment material.

The sensitivity analysis undertaken indicates that should lower costs be realised, the economic performance of option 1d will significantly improve.

3.5 Potential Sources of Sand for Beach Nourishment

There are numerous potential sources of sand for beach nourishment at Stockton.

Supporting Document E outlines these potential sources and provides further information regarding availability, permissibility, methodology for extracting and other factors. Offshore local sand sources such as the lobe off Nobbys Beach and deposits further seaward provide potentially viable opportunities for large quantities of sand.

CN is committed to working with the Deputy Premier's Taskforce (see **Section 3.1**) and the NSW Government to investigate the permissibility and feasibility of accessing marine offshore sand.

Mining, Exploration and Geoscience (MEG) in Regional NSW recently carried out a desktop study to identify marine sand bodies that may be suitable for beach nourishment at Stockton Beach (MEG, 2020). Whilst some key historical sediment sampling data was not able to be sourced and included in this study, the main findings included:

- Sand suitable for the renourishment of Stockton Beach is likely to occur on the inner shelf plain, the lobe and possibly the dredge spoil dumps in Stockton Bight (refer **Figure 6**)
- The lobe and spoil dumps off Nobbys Head also contain sand that may be suitable. However, some data suggests the variability of the sand in these areas may not be as uniform as that on the inner shelf plain to the northeast
- The available data indicates that the medium-grained, quartzose sands of the Newcastle inner shelf sand sheet (ISSS) that are lying on the inner shelf plain[1] appear to be suitable for beach renourishment and represent the largest potential sand resource in Stockton Bight

In consideration of current legislation, MEG recommends that CN should seek to source sand from state waters (i.e. within 3 nautical miles of the NSW coast) in the first instance. It is evident that extensive areas of the ISSS lie within state waters and it is considered that adequate sand reserves are likely to be available in these areas to meet the volume requirements for mass nourishment at Stockton Beach (refer **Supporting Document E** for further information).

A comprehensive offshore sampling program is required to confirm the extent, thickness and continuity of the sand sheet and to identify the most suitable areas to source sand for renourishment.

Strategies identified for potential sources of sand for beach nourishment will require consideration of the potential impact on the Worimi Conservation Lands (WCL) and other lands gazetted under the National Parks and Wildlife Act 1974 (NPW Act). The WCL conserves a large proportion of the Stockton Bight mobile dune system.

Any increased extractive pressure on the dune system from adjoining extraction operations poses increased risk to the WCL. Risks need to be properly assessed and mitigated prior to any new operations or alteration to an existing sand extraction operation adjoining the WCL.

The implications of offshore marine sand extraction are relevant to the WCL and potentially marine fauna identified in the NPW Act. The consequences of any proposed offshore marine sand extraction on sediment movement and replenishment of the dune system in the WCL will need to be identified and assessed. The potential impact on marine fauna protected under the NPW Act of any proposed offshore sand extraction method and location will need to be identified and assessed.

Within the Hunter River there are also opportunities for sourcing dredged sand which would be further investigated. Terrestrial sand sources resulting from large tunnelling projects in Sydney are also possible opportunities.

Some of these opportunities such as Metro West tunnelling spoil in Sydney, and the recent dredging of the South Arm of the Hunter River may not have been realised, however others are still potentially available.

The proposed Newcastle GasDock LNG import terminal project would require capital dredging of around 4.0 million m^3 of material, a substantial proportion of which is likely to be sand.

Potential opportunities and synergies with the PoN could also be explored. Dredging of the North Arm (south of Stockton Bridge) may provide synergies with PoN operations (e.g. reduced maintenance dredging). Modification of the existing PoN Part 5 approval could be undertaken to investigate dumping dredged sand further inshore at Stockton. This modification of the approval could also potentially look at including an option to source material from the North Arm or other sources in the Hunter River.

The critical factor in securing sand from some of these opportunities will be having a pre-existing approval for the beach nourishment works under Part 5 of the EP&A Act in place to facilitate alternative disposal by a Contractor to Stockton Beach, which is discussed further in **Section 4.2** CN will advocate for this issue to be addressed with the assistance of the Deputy Premier's Taskforce and take initiatives to affect streamline processes that are able to deliver sand to Stockton. Without this, opportunities will continue to be missed.

[1] *The inner shelf plain is a seaward-sloping surface occurring between 20–65 m depth, between 1.5 km and 11 km wide with an average gradient of 0.05–0.42° (Boyd et al. 2004).*

4. Actions to be Implemented

4.1 Coastal Management Strategy

The purpose of the Stockton CMP is to provide an adaptive, integrated and long-term approach to coastal management to address identified risks and ensure developing opportunities can be assessed on their merit and be implemented if advantageous. The intention is to ensure that the coastal environment is protected, enhanced and resilient while maintaining the recreational amenity and sense of identity the coast provides to the community.

The Coastal Management Strategy and actions within the Stockton CMP have been developed to be an iterative program that reflects the objectives of CN, the community, and the CM Act, delivering long term benefits of coastal protection and amenity. To achieve this will require effective collaboration between the community, CN, and other relevant governments and agencies.

A sediment transport study for the whole-of-Stockton-Bight was underway at the time CN received the Ministerial direction to complete the Stockton CMP. While not due for completion until late 2020, this study has been able to provide targeted information to inform the Stockton CMP. Based on the latest available scientific data, the sediment transport study concluded that the ongoing sand deficit rate within the Stockton CMP area is approximately 112,000m^3 per year which is significantly higher than previously estimated. It is acknowledged that there is inherent uncertainty in this estimation, associated with the accuracy of surveys used in volumetric comparisons and the high degree of complexity in this coastal system. This quantity would be refined on the basis of the findings of the Stockton Bight Sediment Transport Study and used to inform the development of the Newcastle CMP.

A probabilistic coastal hazard assessment was undertaken using the findings of this analysis of sediment transport as inputs, which concluded that the Stockton CMP area is currently at high to extreme risk. The hazard assessment identified significant potential immediate impacts requiring urgent protection to public land, and essential assets and services including roads along the coastline, as quantified within **Section 2.4.5**. This coastline at immediate threat generally corresponds to the existing five locations where emergency sandbag works have been undertaken as detailed in **Appendix A**. Protection works will maintain the existing land use and the functionality of the associated essential assets and services to support current and future service delivery demands in line with projected growth in population and tourism. The probabilistic hazards assessment also identified the probable extent and impact of ongoing coastal erosion over time if no further action is taken.

4.1.1 Immediate Works

To assist in maintaining beach amenity as well as addressing immediate risk to assets, CN is committed to a $4 million sand nourishment campaign commencing in the first year using terrestrial or other permissible sources. In addition, the provision of essential buried terminal protection works along the 2025 ZSA 5% AEP hazard line would also commence in the first year to provide protection for identified public assets at immediate threat. This correlates to the formalisation of the existing sand filled geotextile bag emergency works in Zone 1, 2 and 4 of the Stockton CMP area (See **Figures 13, 14 and 16**). These works are located at the southern and northern end of both the SLSC and Mitchell Street seawalls as identified land parcels in **Table 8.**

Table 8: Location of essential buried terminal protection works

DP/Lot	Address	Description	Ownership
1249904/2	124 Mitchell St	Southern end SLSC seawall	Crownland – CN Reserve Trust Manager
1249904/ 2	126 Mitchell St	Northern end SLSC seawall	Crownland – CN Reserve Trust Manager
1146198/ 7300	260A Mitchell St	Southern end of Mitchell St seawall	Crownland
758929/18/40 758929/17/40 758929/15/40	2A Barrie Cr	Northern end of the Mitchell St seawall	Council
DP758929 (Road reserve)	Barrie Crescent	Intersection of Barrie Crescent and Griffith Avenue	Council

4.1.2 Mass Sand Nourishment

Of the options explored, marine offshore mass nourishment has been identified as the technically feasible and economically viable solution that meets CN and the community's objectives for the long-term sustainable management of beach amenity and coastal asset protection at Stockton. The desktop study to identify marine sand bodies potentially suitable for beach nourishment at Stockton Beach of historical data, completed by the Mining, Exploration and Geoscience (MEG) in Regional NSW in May 2020 identifies sand on the Newcastle inner-shelf sand sheet within Stockton Bight that is likely to be suitable for beach re-nourishment and represents the largest potential offshore sand source in the Stockton Bight (MEG, 2020).

To deliver this level of protection using beach nourishment a significant initial volume of sand is needed to establish the required beach width. To obtain the initial volume of sand required, economic and scientific investigations identified that 2.4 million m^3 of compatible sand from the offshore zone is the most effective strategy (with a 10 year renourishment).

To ensure the long-term protection strategy is successful, the beach width must be maintained. This would require an ongoing monitoring and renourishment program with an estimated quantity of 1.12 million m^3 over a ten-year period, that accommodated the evidence-based sand loss (112,000 m^3 annually) calculated for the Stockton CMP area.

4.1.3 Opportunistic Sand Sources

Under the *Offshore Minerals Act* 1999, sand extraction is not permissible in NSW coastal waters without being authorised by a mining licence. An applicant cannot apply for a mining licence without the NSW Minister responsible for the Offshore Minerals Act 1999 inviting applications. With reference to these restrictions, CN has undertaken a series of investigations to identify the potential volumes and associated costs of many sand source options as summarised in **Section 3.5**. Economic analysis performed during the Stockton CMP development noted that if the cost of sand (placed) is less than $40/m^3 then mass nourishment is more 'economical' than protection structures. Further, if the cost of sand (placed) is less than $11/m^3 then mass nourishment will be economically feasible (with a BCR>1).

CN have recognised that to be flexible and agile in securing sand sources, preparation will be essential. This preparation will include development of a Sand Management Guideline (SMG), building on **Supporting Document E,** to ensure CN can proactively acquire as well as react without delay should an opportunity arise to receive acceptable sand from any appropriate terrestrial or marine source (environmentally compatible with existing native sand). The SMG will provide a technical specification for nourishment sand and compatibility criteria to assist in the initial assessment of potential sand sources. The SMG will also outline an approval pathway that CN could pursue for conceptual approval for the beach nourishment works under Part 5 of the EP&A Act and State Environmental Planning Policy (SEPP) (Coastal Management) 2018. The approval could cover receiving material from a number of potential sources. The excavation, dredging or extraction of the source material would be covered by separate project approvals not by CN's beach nourishment Part 5 approval. The environmental assessment to be prepared with the Part 5 approval would need to consider impacts of a defined range or upper limit volume from a variety of sources. Different source material will have different physical properties resulting in different placement methods and or locations on the beach. The potential impacts of these options would need to be assessed in the environmental assessment document.

The SMG, the conceptual Part 5 approval for nourishment and the associated environmental assessment will be actioned in accordance with **Table 15** as an immediate response.

CN is committed to working with the Deputy Premier's Taskforce and with State Government and other agencies to explore, share information and problem-solve every opportunity to source sand that is technically compatible and economically feasible to enable initial mass nourishment and ongoing renourishment of Stockton Beach to be undertaken. Key areas of focus will include investigation of options for sand sourcing including onshore and offshore sources, actions to mitigate loss of community amenity from engineered solutions and seeking priority capital and operational funding required.

4.1.4 Adaptive Risk Mitigation Strategy

CN have developed an adaptive risk mitigation strategy to manage risk to assets not protected by the immediate buried terminal protection works, prior to the realisation of mass nourishment or the completion of the Newcastle CMP, as part of the Coastal Management Strategy outlined in **Section 4.1.**

The Adaptive Risk Mitigation Strategy will include:

Firstly, CN will continue to pursue opportunistic smaller renourishment campaigns as outlined in **Section 4.1.3**, to further address sand losses and maintain existing amenity. The identified buried terminal protection as per **Section 4.1.1** will address the areas at immediate risk. Potential impacts to the coastline outside these areas will be managed by the Coastal Zone Emergency Action Subplan.

Secondly, as a safeguard, CN has accepted a distance of 20 m from the 2025 ZSA 5% AEP hazard line as a foreshore recession threshold. This reflects the CMPs planning horizon. If this threshold foreshore width is reached, adaptive risk mitigation strategies will be considered and designed, on a site-specific basis, with reference to the following heads of consideration:

- Results of monitoring program
- Management Plan for areas such as Stockton Holiday Park (Zone 1)
- Existing recreational, access and amenity provisions
- Safety – person and property
- Projected sand renourishment frequency
- Stakeholder and community feedback
- Environment and asset infrastructure management implications

Based on this approach, CN will assess a range of adaptive risk mitigation measures including, but not limited to, opportunistic sand nourishment, managed retreat, beach scraping, temporary protection works, removable Rock Bags and built structures. This assessment aims to ensure a flexible and appropriate response is adopted once triggers are reached. The location and the design of these works will involve ongoing consultation with the community and all relevant stakeholders.

Finally, for most of the Stockton CMP foreshore it is considered unlikely that this threshold will be reached during the five-year planning horizon, once the initial buried terminal protection is in place. The Griffith Avenue / Barrie Crescent intersection, however, is a potential location where the threshold may be triggered and the above adaptive response may be required.

The Stockton CMP will be reviewed in 2025 to ensure the actions to manage Stockton Beach remain current and relevant, however it is anticipated that prior to 2025, the completion of the Sediment Transport Study for the full 32 km Stockton Bight will further inform the broader Newcastle CMP which is due for completion in December 2021.

4.1.5 Newcastle CMP

It is expected that the Coastal Management Strategy and actions in the Stockton CMP will be reviewed during the development of the Newcastle CMP. It is expected that the Stockton CMP will be replaced by the Newcastle CMP. This will provide opportunities to incorporate consideration of complementary management strategies north of Meredith Street (Zones 5, 6 and 7), within the Newcastle Harbour and south of the northern breakwater before December 2021 to further enhance or improve coastal management of Stockton Beach.

Ongoing community and agency consultation in the development of the Newcastle CMP will be facilitated through the NCPWG **(Section 1.4)** and other stakeholders as required. As an adaptive risk mitigation strategy CN may undertake coastal protection works such as the placement of additional rock, Rock Bags (subject to consent), and/or undertake further emergency coastal protection works (as outlined in **Appendix A)** to protect assets whilst allowing time for the Newcastle CMP to be completed and the outcome of mass nourishment investigations to be evident.

4.2 Implementation of Coastal Management Strategy

4.2.1 Key Issues

The most significant coastal management issues affecting the Stockton CMP area have been identified by the community in the CZMP (2018) and the CMP Scoping Study (CN, 2019), and as outlined in **Section 2.1,** are:

- Coastal hazards
- Coastal environment
- Beach access
- Beach amenity
- Recreational use of the coastal zone
- Culture and heritage

The actions required to address these coastal management issues have been developed in an evidence-based and strategic manner, as outlined in **Section 3.** Agreement for the inclusion of actions identified to be the primary responsibility of other public authorities has been received and is included in **Appendix B.**

4.2.2 Management Zones

The Stockton frontage was divided into seven zones for the CZMP to enable identification of the location of management actions within the CZMP area, and these zones have been adopted for use in the Stockton CMP. The seven zones are located from south to north along the Stockton coastline (refer **Figure 2**) and include:

- Zone 1 - Holiday Park frontage from Northern Breakwater, to the Stockton Surf Life Saving Club revetment
- Zone 2 - Stockton Surf Life Saving Club revetment to the southern end of Mitchell Street revetment
- Zone 3 - Mitchell Street revetment extent
- Zone 4 - Northern end of Mitchell Street revetment to Meredith Street
- Zone 5 - Meredith Street to the northern boundary of Corroba Oval
- Zone 6 - Northern boundary of Corroba Oval to southern boundary of Fort Wallace (main land ownership by Hunter Water Corporation)
- Zone 7 - Southern boundary of Fort Wallace to CN local government boundary (main land ownership by Defence Housing Australia and Family and Community Services).

This Stockton CMP is limited to Zones 1 to 4 inclusive as outlined in **Section 1.1**. Zones 5 to 7 will be addressed in the broader Newcastle CMP due for completion by the end of 2021.

The implementation of the proposed Coastal Management Actions is outlined for each of the issues as listed above in **Table 9 to Table 14**. The Coastal Management Actions are illustrated for Zones 1 to 4 in **Figure 13 to Figure 16** respectively. Not all actions have been mapped, only those actions for which mapping is useful or relevant.

4.2.3 Delivery Timeline

The implementation of the Stockton CMP is projected over a five-year planning horizon. The following indicative timeline reflects the key deliverables (that are detailed in **Section 6, Table 15**).

	Year 1	Year 2	Year 3	Year 4	Year 5
	2020-21	2021-22	2022-23	2023-24	2024-25
Certification and Gazettal of the Stockton CMP triggers the timeline	★				
Identification, application and approval of funding sources	■	■	■	■	■
Immediate Works					
Initial $4 million nourishment campaign	■	■			
Construction of essential buried terminal protection structures	■	■			
Maintenance of existing seawalls	■	■			
Implementation of Coastal Zone Emergency Action Subplan	■	■	■	■	■
Monitoring					
Establishment of monitoring and reporting framework	■				
Ongoing review of risk and hazard assessments	■	■	■	■	■
Sand Nourishment					
CN commitment to the Taskforce*	■	■	■	■	■
Implementation of the Sand Management Guideline	■	■	■	■	■
Delivery of initial mass nourishment from sand sources as determined through the Taskforce*	■	■			
Identification of planning pathways for ongoing renourishment as determined through the Taskforce*	■	■	■	■	■
Additional Works					
Completion of the Stockton Bight Sediment Transport Study	■				
Preparation of the Newcastle CMP before December 2021	■	■			
Certification and Gazettal of Newcastle CMP			★		

Footnote - Year 1 start date based on certification

** In accordance with the Deputy Premier's Taskforce Terms of Reference whilst still in force*

ZONE 1 PLAN
1:1250 (A1)

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SAVED: 12-Jun-20

DIAL BEFORE YOU DIG www.1100.com.au

AUSTRALIAN HEIGHT DATUM

25 0 25 50 75 100 125m
1:2500 (A3) 1:1250 (A1)

FIGURE 13

Royal HaskoningDHV
Enhancing Society Together

Figure 13: Management Actions for Zone 1

ZONE 2 PLAN
1:1250 (A1)

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SAVED: 12-Jun-20

DIAL BEFORE YOU DIG www.1100.com.au

AUSTRALIAN HEIGHT DATUM

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1:2500 (A3) 1:1250 (A1)

FIGURE 14

Royal HaskoningDHV
Enhancing Society Together

Figure 14: Management Actions for Zone 2

ZONE 3 PLAN

1:1250 (A1)

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SAVED: 12-Jun-20

DIAL BEFORE YOU DIG www.1100.com.au

AUSTRALIAN HEIGHT DATUM

25 0 25 50 75 100 125m

1:2500 (A3) 1:1250 (A1)

FIGURE 15

Royal HaskoningDHV Enhancing Society Together

Figure 15: Management Action Plan for Zone 3

ZONE 4 PLAN
1:1250 (A1)

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SAVED: 12-Jun-20

DIAL BEFORE YOU DIG www.1100.com.au

AUSTRALIAN HEIGHT DATUM

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1:2500 (A3) 1:1250 (A1)

FIGURE 16

Royal HaskoningDHV
Enhancing Society Together

Figure 16: Management Actions for Zone 4

Table 9: Management Actions to Address Coastal Hazards

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
CH1	Planning	1, 2, 4	Investigation, design and documentation of buried terminal protection structures to address immediate risks , including geotechnical and quarry investigations	CN		$100,000 (CN)	Completed investigation and design documentation	Short
CH2	Planning	1,2,4	Environmental Assessment and associated approvals of buried terminal protection structures at four locations	CN		$20,000 (CN)	Completed Environmental Assessment report and associated approvals	Short
CH3	On-ground works	4	Construction of Zone 4 buried terminal protection structure to address immediate risks at Stone St/Barrie Crescent and Griffiths Avenue/ Barrie Crescent (location 1)	CN	DPIE	$2 million $20,000-$70,000/ annum maintenance (CN, State Government competitive grants funds)	Works complete.	Short- Medium
CH4	On-ground works	2	Construction of Zone 2 buried terminal protection structures to address immediate risks at Mitchell St (south end of Mitchell St revetment) and north end of SLSC (location 2 and 3)	CN	DPIE	$3.75 million $187,500 every 5 years Maintenance (CN, State Government competitive grants funds)	Works complete	Short- Medium
CH5	On-ground works	1	Construction of Zone 1 buried terminal protection structures to address immediate risks at Holiday Park (location 4)	CN	DPIE	$875,000 $43,750 every 5 years Maintenance (CN, State Government competitive grants funds)	Works complete	Short- Medium
CH6	Planning	1	Develop a management plan for the Holiday Park addressing the asset management requirements for the cabins and amenities block	CN		$10,000 (CN)	Plan developed	Short- Medium
CH7	On-ground works	1	Construction of new amenities block in Holiday Park	CN		$450,000 (CN)	New amenities building complete and commissioned	Short- Medium
CH8	On-ground works	1	Demolition of existing amenities block in Holiday Park	CN		$40,000 (CN)	Amenities building removed.	Short- Medium
CH9	On-ground works	1	Relocation of cabins as per the Holiday Park Management Plan	CN		$30,000 (CN)	Cabins in new permanent location	Short- Medium
CH10	Planning	1,2	Investigation, design, documentation and approvals for nourishment works at Holiday Park and Dalby Oval frontage from terrestrial or other opportunistic, permissible sand sources (for initial $4 million nourishment campaign) (including environmental assessment and monitoring plan)	CN		$150,000 (CN)	Contract documentation complete	Short- Medium
CH11	Planning	1,2,3,4	Work Collaboratively with the Deputy Premier's Taskforce* to investigate the planning and approvals for sand nourishment from opportunistic sources	CN		$150,000	Sand nourishment undertaken	Short-Medium*
CH12	On-ground works	1,2	Implementation of nourishment works from terrestrial (or other permissible sources) at Holiday Park and Dalby Oval frontages	CN		$4 million (CN, State Government competitive grants funds)	Sand placement complete	Short- Medium
CH13	Monitoring	1-7	Ongoing monitoring of nourishment works as per monitoring plan. Terrestrial and bathymetric surveys	CN		$100,000 per annum (CN, State Government competitive grants funds)	Surveys complete	Short- Medium
CH14	On-ground works		Port of Newcastle to place suitable sand from maintenance dredging activities from harbour entrance offshore of Stockton Beach in accordance with concurrence issued by Office of Environment and Heritage (to be revised February 2022)	Port of Newcastle	DPIE Roads and Maritime Services	Minimal. Maintenance dredging for navigational safety currently conducted by Port of Newcastle.	Placement of sand after dredging campaigns.	Short
CH15	Planning	LGA	Complete Newcastle CMP detailed investigations and other required studies	CN	DPIE	$150,000 (CN, State Government competitive grants funds)	Detailed studies completed and Coastal Management Program prepared and certified.	Short
CH16	Planning	LGA	Establish an expert panel to advise CN on coastal management matters.	CN		Minimal	Expert panel established	Short

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
CH17	Planning	LGA	Assess potential options for long-term management of coastal hazards in the broader Stockton study area through the development of a Newcastle Coastal Management Program in accordance with the Coastal Management Act 2016 and the NSW Coastal Management Manual.	CN	DPIE	$100 000 (CN, State Government competitive grants funds)	Newcastle CMP prepared and certified.	Medium
CH18	Planning	1-7	Consultation with stakeholders to the north of Stockton to identify coastal management opportunities to enhance coastal management actions proposed in the Newcastle CMP	CN	Hunter Water/ DHA / Worimi/ PSC/ FACS	Minimal	Agreement on preferred Newcastle CMP actions as required	Short
CH19	Planning	LGA	Consultation with stakeholders to identify options for coastal management within broader Newcastle CMP	CN	Various	Minimal	Agreement reached on preferred CM actions	Short
CH20	Monitoring	LGA	Monitor opportunities under grant programs and ensure grant applications are best positioned to deliver funding for Stockton CMP actions	CN	DPIE	Internal CN resources	Funding applications submitted.	Short-Medium
CH21	Monitoring	LGA	Alternative funding methods to be investigated and considered for Stockton CMP actions	CN		Minimal	Alternative funding sources investigated and advocated for	Short, Medium
CH22	Monitoring	3	Undertake condition assessment/scope of works for maintenance to SLSC and Mitchell Street seawalls.	CN		$20,000 (CN)	Condition assessment/scope of works completed.	Short- Medium
CH23	On-ground works	3	Undertake maintenance to Mitchell Street seawall identified in condition assessment report	CN		$4.5 million capital. $200 000 per annum maintenance. (CN)	Identified repairs to Mitchell Street seawall completed.	Short- Medium
CH24	On-ground works	3	Undertake maintenance to SLSC seawall identified in condition assessment report	CN		$400,000 capital. $36,000 per annum maintenance. (CN)	Identified repairs to SSLSC seawall completed.	Short- Medium
CH25	Planning	4	Design and consultation for road and terminal protection works at Griffith Avenue and Barrie Crescent	CN		$40,000 (CN, State Government competitive grants funds)	Consultation and design documentation completed	Short- Medium
CH26	On-ground works	4	Undertake roadworks at seaward end of Griffiths Avenue/ Barrie Crescent intersection and construct traffic management devices.	CN		$150,000 (CN, State Government competitive grants funds)	Works constructed	Short- Medium
CH27	Planning		Adaptive risk mitigation strategy includes completing environmental assessment for opportunistic beach nourishment of varying scales	CN		$100,000 (CN)	Environmental Assessment complete	Short- Medium
CH28	Planning		Adaptive risk mitigation strategy including seeking approval for beach nourishment works under Part 5 of EP&A Act covering receiving material from a number of sources for opportunistic nourishment campaigns with reference to Sand Management Guideline. Also seek other permits required.	CN		$100,000 (CN)	Approval received	Short- Medium
CH29	Planning		Adaptive risk mitigation strategy including investigating potential sand sources/opportunities for maintenance nourishment of Stockton in accordance with Sand Management Guideline	CN		$10,000 (CN)	Nourishment source identified and placement strategy agreed.	Short- Medium
CH30	Planning		Participation in the Deputy Premier's Taskforce* to seek to deliver mass nourishment (subject to ongoing investigations and resolution of permissibility)	CN		$10,000 (CN)	CN's participation in Deputy Premier's Taskforce*	Short-Medium (10 year re-nourishment period)*
CH31	Planning		Investigate potential offshore sand sources, for mass nourishment at Stockton, including undertaking sampling and surveying to identify a suitable resource	Department of Regional NSW	CN	$1 million (Department of Regional NSW)	Sampling program complete and resource assessment finalised.	Short-Medium*
CH32	Planning	1,2,3,4	Work collaboratively with the Deputy Premier's Taskforce* to investigate planning and approvals processes, and funding mechanisms for mass nourishment from offshore marine sources	CN		Funding source to be confirmed	Funding mechanism for sand source identified. Permissibility of sand source confirmed	Short-Medium*

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
CH33	Planning	1, 2, 4	Adaptive Risk Mitigation Strategy including investigation, design and documentation of potential protection works against the adopted threshold, for Newcastle CMP consultation, including geotechnical investigations	CN		$100,000 (CN, State Government competitive grants funds)	Completed investigation and design documentation	Short-Medium
CH34	Planning	1,2,4	Environmental Assessment of designed protection works as at CH33	CN		$30,000 (CN, State Government competitive grants funds)	Environmental Assessment complete	Short-Medium
CH35	Planning	1,2,3,4	Prepare and adopt a Plan of Management (PoM) for dedicated or reserved Crown Land under CN care and control	CN	DPIE (Crown Lands)	$80,000 (CN)	PoM complete	Short
CH36	Planning	1	Undertake annual inspection of Northern breakwater as per the PON lease area and assess potential issues from coastal hazards	PoN	Transport for NSW	As required (PoN)	Visual inspection of rock armour, public pathway and ancillary infrastructure	Short
CH37	Planning, on-ground works	1-4	Continue beach and seawall monitoring program with cross section survey sites and utilising UAV and other monitoring methods, within the Stockton CMP area	CN		$10,000 per annum (CN)	Beach and seawall monitoring program, cross sections completed. Innovation in methodology undertaken	Short-Medium
CH38	Development controls		Review planning certificates to ensure properties potentially affected by coastal hazards contain an appropriate notation and reflect ability (or not) for complying development to be carried out on the land	CN		Minimal	Planning certificate notification reviewed	Short
CH39	Development controls		New subdivisions or greenfield development to be located landward of 2120 ZRFC coastal hazard line	CN		Minimal	Design of subdivisions or development landward of 2120 ZRFC coastal hazard line	Short-Medium
CH40	Planning	1-4	When the opportunity arises, Plans of Management, public domain plans and other master plan documents within the Stockton CMP area will be prepared or amended in consideration of the coastal hazards outlined in the Stockton CMP	CN	As required	Minimal	Coastal hazards incorporated into relevant plans	Short- Medium
CH41	Planning	1-4	Consider impacts of coastal hazards when renewing or constructing public assets within the Stockton CMP area. The design of assets should consider the coastal hazards outlined in the Stockton CMP	CN		Varied due to project undertaken, costing within project budget (CN)	Incorporation of coastal hazards into project design documents	Short-Medium
CH42	Planning, on-ground works	1-4	Incorporation of coastal hazards into CN's service asset plans and implement service asset plans	CN		$20,000 (CN)	Coastal hazard analysis included in service asset plans	Short-Medium
CH43	Planning, Engagement, On-ground works	1-4	Undertake planning, engagement and emergency works, if appropriate, to manage beach erosion before, during and after storm events in accordance with the Emergency Action Subplan contained in **Appendix A**	CN		$200,000 per annum estimate (5 year average) and varied based on extent of emergency works. $5000 annual monitoring budget (CN, State Government competitive grant funds)	Emergency response and subsequent grant funding applications lodged, in accordance with Subplan completed as required	Short-Medium
CH44	Planning	4	Adaptive risk mitigation strategy including design and approval of coastal protection works upon erosion triggers, for the identified risk potential at Griffith Ave and Barrie Cres. See Section 9 Mapping for potential locations for adaptive risk mitigation implementation.	CN		$35,000 (CN)	Design and approval of coastal protection works	Short-Medium
CH45	On-ground Works	4	Construction of approved coastal protection works upon reaching threshold, for the identified risk potential at Griffith Ave and Barrie Cres	CN		$100,000 initial budget Final budget variable	Construction of approved coastal protection works	Short-Medium
CH46	Partnerships		Continue to consult with Port of Newcastle and capital dredging proponents to request excess suitable sand from capital dredging projects is placed offshore of Stockton Beach	CN	PoN, Transport for NSW	Minimal	Excess suitable sand from capital dredging placed offshore of Stockton Beach	Short- Medium (project based)
CH47	Engagement		Conduct community engagement and education programs focusing on the Stockton CMP area environment and coastal processes including inundation and erosion hazards	CN		$25,000 per annum for coastal education program (CN)	Education programs developed and presented to community	Short-Medium

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
CH48	Engagement		Update and enhance CN's website with information about coastal processes, management of the coastal environment. Provide more information about coastal activities in conjunction with CH43, CH47 and on-ground works,	CN		Minimal	CN website updated	Short-Medium
CH49	On-ground works	1,2,4	Conduct beach management works, such as beach scraping and beach grooming, in areas south and north of the Mitchell Street seawall to increase dune volume	CN	DPIE	$100,000 per annum (CN, State Government competitive grant funds)	Identified beach scraping activities completed as conditions permit	Short-Medium
CH50	Planning	1-4	Resourcing the integrated delivery of on-ground works as detailed in this business plan	CN		$200,000 per annum (CN, State Government competitive grant funds)	2x Effective Full-Time staff engaged. integrated delivery the Stockton CMP works program	Short-Long

[1] *Supporting partners are Government Agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management.*

**In accordance with the Deputy Premier's Taskforce Terms of Reference whilst still in force.*

Table 10: Management Actions to Address Coastal Environment

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
CE1	Monitoring	1-4	Continue to monitor coastal habitat and implement recommendations of monitoring program	CN		$5,000 (CN)	Monitoring program undertaken	Short-Medium
CE2	On-ground works	1-4	Undertake coastal revegetation works as outlined in Coast and Estuary Vegetation Management Plan (Umwelt, 2014). Options to control Bitou Bush and other invasive plant species included in revegetation works for dunes and recreational areas	CN		$15,000 per annum (CN)	Coastal revegetation works completed	Medium
CE3	Planning	1-3	Public domain works along the coastal section of the Stockton CMP area to include landscaping with native provenance species	CN		$10,000 (CN)	Public domain plan completed	Short-Medium
CE4	On-ground works	1-4	Implement beach stormwater outlet maintenance program to manage dunes and remove stormwater ponding, particularly after rain events	CN		$10 000-$15 000 per annum (CN)	Stormwater outlet areas on beach maintained	Short-Medium
CE5	Planning	1-4	Water Sensitive Urban Design (WSUD) principles to be included in Public Domain Plans (or other masterplan documents) within the Stockton CMP area	CN		Minimal		Short-Medium
CE6	On-ground works	1-4	Provide support and assistance to Landcare/volunteers when revegetation activities are undertaken in Stockton CMP area	CN		Minimal	Assistance to Landcare provided	On-going
CE7	Monitoring, Partnerships		Build capacity for community volunteers to undertake citizen science environmental monitoring	CN		Minimal	Community environmental program established	Medium
CE8	On-ground works	1, 2, 4	Undertake removal of historical buried waste along the erosion scrap	CN		Costed to project work	Rubbish removal as required	Short-Medium

Table 11: Management Actions to Address Beach Access

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
BA1	Risk assessment	1-4	Undertake an audit of beach access points to assess public safety issues and erosion potential. Access point data to be available in CN GIS program	CN	DPIE	$5,000 (CN)	Audit undertaken	Short
BA2	Monitoring	1-4	Identify beach access points for closure and/or replacement in consultation with relevant stakeholders and the community	CN	DPIE	Minimal	Access points identified for closure and/or replacement	Short
BA3	Planning	1-4	Design of new fencing and beach access points are undertaken in accordance with the Coastal Dune Management Manual (Department of Land and Water Conservation, 2001)	CN	DPIE	$10,000 (CN, State Government competitive grant funds)	Design drawings completed with reference to Coastal Dune Management Manual	Short-Medium
BA4	On ground works	1-4	Construction of new fencing and beach access points	CN	DPIE	$20,000 (CN, State Government competitive grant funds)	Fencing and access points complete	Short-Medium
BA5	On ground works	1-4,	Investigate, design and construct new access ways associated with, but not limited to, buried terminal protection structures to address immediate risks	CN	DPIE	$200,000 (CN, State Government competitive grant funds)	Accessways complete	Short-Medium

Note: Beach nourishment Actions have been listed in Coastal Hazard Action Table 6 though they also address beach access issues.

Table 12: Management Actions to Address Beach Amenity

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
B1	Planning	1-3	Investigate opportunities for landscaping within the Stockton CMP area as part of public domain plans	CN	DPIE	Minimal	Appropriate landscaping included within public domain plan	Medium
B2	On-ground works	1-4	Undertake beach maintenance program and continue dune rehabilitation works. This includes dune fencing, access controls, invasive species control and replanting native colonising species	CN	DPIE	$150,000 per annum (CN, State Government competitive grant funds)	Beach maintenance program undertaken	Short
B3	Planning, risk assessment	1-4	Undertake audit of stormwater discharge points onto Stockton coastline and assess water quality and erosion potential	CN	DPIE	Minimal	Stormwater audit undertaken	Short-Medium
B4	On-ground works	1-4	Undertake beach maintenance at stormwater discharge points on Stockton coastline after storm events to prevent additional erosion	CN		Minimal (included in operational costs)	Beach maintenance at stormwater discharge points undertaken where required	Short-Medium

Table 13: Management actions to Address Recreational Use

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
RU1	Planning	1-3	Prepare public domain plan for the Stockton CMP area in consultation with relevant land managers and stakeholders. Public domain plan will build upon the adopted Newcastle Revitalisation Strategy Master Plan	CN	DPIE	$30,000 (CN)	Public domain plan prepared	Medium (>5 years)

Table 14: Management Actions to Address Culture and Heritage

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners[1]	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
H1	Planning		Incorporate Aboriginal cultural information into CN projects and works within the Stockton CMP area	CN	Guraki Committee Worimi Aboriginal Land Council	Minimal	Aboriginal cultural information incorporated into CN projects	Short-Medium
H2	Planning		Implement dual naming of sites within the Stockton CMP area where appropriate	CN	Guraki Committee Worimi Aboriginal Land Council	Minimal	Dual naming sites determined	Short-Medium
H3	Planning		Ensure high quality interpretive treatments of heritage items or places that increase understanding of the heritage significance of these items or places in CN projects and works within the Stockton CMP area	CN		Cost to be determined as part of individual project	Heritage treatment incorporated into CN projects	Short-Medium
H4	Planning		Prepare Aboriginal Heritage Management Strategy to ensure due diligence processes are followed for CN projects and assessment of development applications	CN	Guraki Committee Worimi Aboriginal Land Council	$30 000 (CN, State Government competitive grant funds)	Aboriginal Heritage Management Strategy completed	Medium
H5	Planning		Interpretation of the history and heritage within the Stockton CMP area is to be integrated into Public Domain Plans	CN		Minimal	Heritage considerations included in Public Domain Plan	Medium
H6	Planning		Investigate protection of heritage listed items on public lands from coastal hazards	CN		Minimal		Short-Medium

Supporting partners are Government Agencies or stakeholders with ownership of land or an interest in the proposed management action and will be consulted at the time of project management.

5. CMP Recommended Changes to Relevant Planning Controls

As noted in Section 16 of the CM Act, before adopting a CMP, a local Council must consult on the draft program with the community. Furthermore, if the local Council's Local Government Area contains land within the coastal vulnerability area, it must also consult with any other local Council whose Local Government Area contains land within the same coastal sediment compartment (as specified in Schedule 1). For Stockton Beach this is the Stockton Bight sediment compartment, shared with Port Stephens Council.

The Ministerial direction requires CN to submit a CMP for Stockton Beach, and Stockton CMP identifies priorities and recommends specific actions to manage the coast at Stockton Beach from the Northern Breakwater to Meredith Street, Corroba Oval. The Stockton CMP does not provide management actions for the entire Stockton Bight sediment compartment.

It is important to note that a Newcastle CMP that addresses management of a wider spatial area is due for completion by December 2021, and that CN would consult with Port Stephens Council during its development. It is expected that the Stockton CMP will be replaced by the Newcastle CMP.

The Stockton CMP management area is mapped by the CM SEPP as containing Coastal Use and Coastal Environment Areas and is adjacent to (though not containing) Coastal Wetlands and Littoral Rainforest Area, as shown in **Figure 17 Figure 18 Figure 19.**
A table outlining how the Stockton CMP addresses Mandatory Requirements and Objects of the CM Act, CM SEPP and Manual is provided in **Supporting Document H**, and further described below.

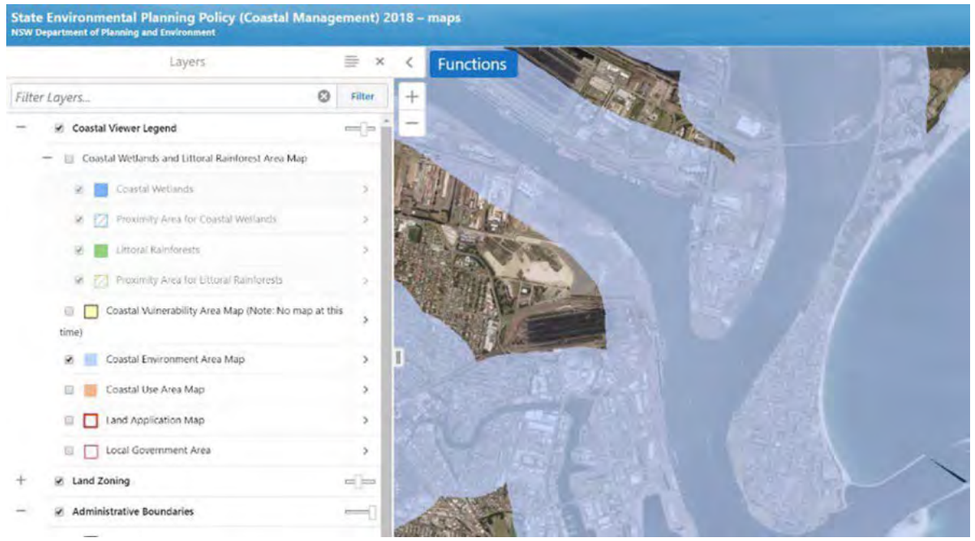

Figure 17: State Environmental Planning Policy (Coastal Management) 2018
Source: NSW Department of Planning and Environment Planning Portal (date: 21/04/20)

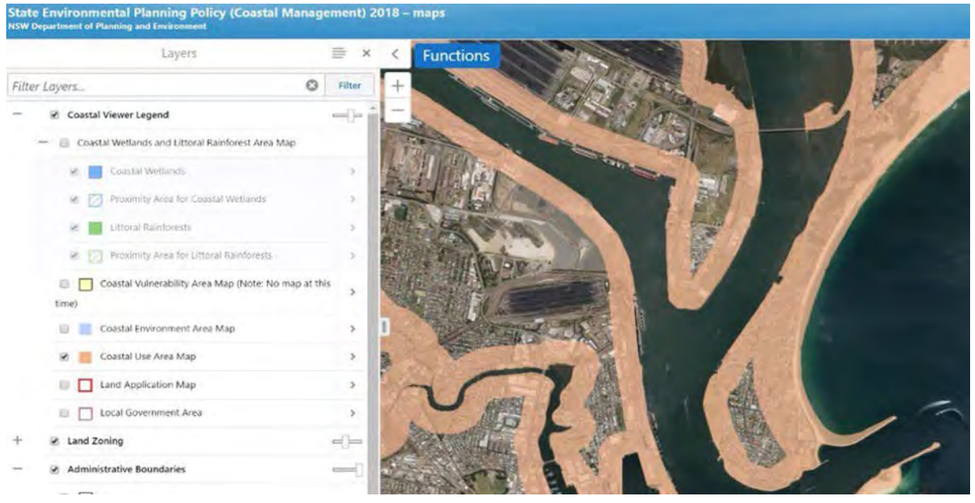

Figure 18: State Environmental Planning Policy (Coastal Management) 2018
Source: NSW Department of Planning and Environment Planning Portal (date: 21/04/20)

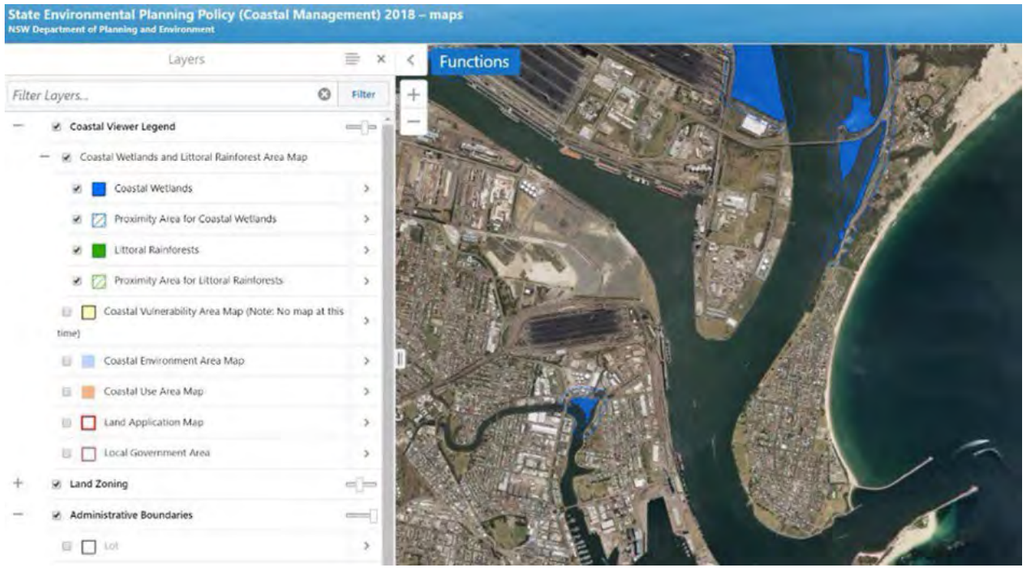

Figure 19: State Environmental Planning Policy (Coastal Management) 2018
Source: NSW Department of Planning and Environment Planning Portal (date: 21/04/20)

It is noted that at the commencement of CM SEPP, no Coastal Vulnerability Area Map was adopted and therefore no coastal vulnerability area has been identified. Suitable mapping does exist to prepare a coastal vulnerability area for Stockton, however CN has considered and decided not to pursue the option of a Planning Proposal to gazette a coastal vulnerability area for Stockton Beach, at this time.

Clause 12 of the CM SEPP only applies to coastal vulnerability areas where mapping for that area has been gazetted under the SEPP. Regardless, Clause 15 of the CM SEPP applies to all land within the coastal zone, and states that "development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land".

The Stockton CMP gives effect to the management objectives for a coastal vulnerability area (Section 7 of the CM Act) through the management actions proposed in **Section 4**, as well as:

- Via the CZEAS described in **Section 7** and **Appendix A**
- With coastal processes and climate change informing the hazard assessment and options evaluation undertaken
- Including a strong focus on the provision of beach amenity via maintaining the presence of a natural foreshore, and providing various actions to improve public access and use of the beach and foreshore
- In particular action CH40 (New subdivisions or greenfield development to be located landward of 2120 ZRFC coastal hazard line)
- Including a strong focus on the provision of beach nourishment to provide a degree of natural defence against coastal hazards
- Coastal protection structures are identified as a secondary means of reducing expose to coastal hazards should beach nourishment not prove sufficient of be implementable

The Stockton CMP gives effect to the management objectives for a coastal environment area (Section 8 of the CM Act) through the management actions proposed in **Section 4**, as well as:

- Including a strong focus on the provision of beach amenity and natural coastal processes via maintaining the presence of a natural foreshore
- Including a strong focus on the provision of beach amenity and natural coastal processes via maintaining the presence of a natural foreshore. It is noted that the CMP does not cover an area sufficiently large to have an appreciable impact on coastal waters or other water bodies
- The CMP does not cover an area where any actions would have an appreciable impact on water quality or estuary health
- Including a consideration of social and cultural values of the coast
- Various actions relating to improving access and amenity along the coast

The Stockton CMP gives effect to the management objectives for a coastal use area (Section 9 of the CM Act) through the management actions proposed in Section 4, as well as by including a strong focus on the provision of a natural foreshore adjacent to residential areas. A subsequent CMP proposed for completion in 2021 for the entire Newcastle coast is expected to further consider these objectives for the broader Newcastle LGA area.

The existing coastal inundation (storm event and tidal inundation) hazard information is already part of existing CN development assessment processes. The existing coastal hazard information is suitable to guide proponents in preparing development applications and to guide CN in providing consent or conditions regarding the potential coastal risk to proposed developments.

The Stockton CMP does not propose any amendments to planning controls, nor to the existing mapping of coastal management areas currently gazetted with the CM SEPP.

6. Business Plan

6.1 Management Action Approvals and Considerations

Coastal management actions in the Stockton CMP will potentially require approvals or authorisation from relevant landowners, or stakeholders with interest in the land, where the management action is proposed. As per existing management practices approvals and assessments or authorisations under various legislative instruments may be required and will be obtained prior to commencement of the management action. This includes but is not limited to assessment of European and Aboriginal heritage, environmental impacts and navigation.

Crown Reserve 79066, with reserve purpose of public recreation, port facilities and services; Gazetted 9 November 1956, runs along the open coastline of the Stockton CMP study area. Where management actions are proposed on Crown Land as per **Table 8** relevant authorisations and approvals may need to be obtained under the Crown Land Management Act 2016.

Management actions undertaken on Crown Land will also need to consider Aboriginal Land Claims lodged under the Aboriginal Land Rights Act 1983 as outlined in **Section 2.1.1**. Any works as a result of management actions will need to be compliant with the Native Title Act 1993 (Cwlth). The proposed actions have been reviewed by the Worimi LALC in relation to the undetermined land claims and consultation will continue to manage any potential impacts (as outlined in **Supporting Document B**).

Under the *Offshore Minerals Act* 1999, sand extraction is not permissible in NSW coastal waters without being authorised by a mining licence. An applicant cannot apply for a mining licence without the Deputy Premier inviting applications. CN recognises that there are still significant investigation, assessment, authorisation and approval requirements that are necessary to progress the mass nourishment component of the Coastal Management Strategy. This includes consideration of the requirement of the *Offshore Minerals Act 1999* that royalties be paid to the state for offshore sand extraction. Ongoing extensive consultation with relevant government, industry and community stakeholders will be an essential component of identifying and addressing extraction, placement and offsite impacts. This process will be informed by existing investigations that have been identified in **Section 2.**

CN has also undertaken an ecological audit of the beach environment (UoN, 2018). This study included the Stockton CMP area and will continue to inform further beach management approvals and activities, such as beach scraping.

6.2 CBA Distribution Analysis

As noted in **Section 3.4**, option 1b was identified as the economically preferred option, with a BCR of 1.5 and producing over $19 M in net present value to society. However, the permissibility and technical details of this option require further investigation and resolution.

It is recommended that option 1d be considered as a viable, feasible and acceptable option for the Stockton CMP. It is noted that all the nourishment options identified are highly sensitive to the cost assumptions associated with access and delivery of nourishment material. The sensitivity analysis undertaken indicates that should lower costs be realised, the economic performance of option 1d will significantly improve.

Delivery of the Stockton CMP is estimated to cost $27,540,250 over 10 years.

It should be acknowledged that if additional affordable sources of sand become available, and/or understanding of coastal processes changes, other management actions may become feasible and will be reviewed for inclusion in the Newcastle CMP.

Based upon the timeframes for actions and estimated costings, approximately $10.69M is required in Year 1 to implement specified actions, while a forecast of approximately $12.36M is estimated across Year 2 to 5 (inclusive) and approximately $4.4 M for years 6 to 10 (inclusive). The cost estimates and their breakdown across the specified years for delivery is provided in **Table 15.**

6.2.1 Benefit and Cost Distribution

The land parcels along the foreshore of Stockton Beach are either owned by CN, or managed by CN on behalf of other government agencies. The actions within the Stockton CMP seek to address the objects of the CM Act, including to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience, as well as to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety.

The beneficiaries of the actions are considered to be the natural and built environment of Stockton Beach, residents of and visitors to the location, as well as 'non-use' values such as amenity.

As such, it is considered appropriate that the costs for the actions are principally borne by CN, however it is noted that a range of potential funding sources will be explored to support delivery of actions, and these are described in **Section 6.3**.

6.3 Funding Sources

Sustainable funding and financing arrangements for management actions will be established in consultation with key stakeholders. Funding for management actions may be gained from various sources, including CN internal funds, competitive State or Federal Government grant programs and local third parties.

6.3.1 Council Funding Mechanism

CN may fund management actions outlined in the Stockton CMP from revenue generated by ordinary rate income. The Integrated Planning and Reporting framework described in **Section 8** requires CN to develop a four year Delivery Program and annual Operational Plan to achieve the objectives and strategies detailed in the Newcastle 2030 Community Strategic Plan (NCSP 2030). Alignment of Stockton CMP management actions with the objectives of NCSP 2030 are shown in **Table 15**, and these actions will be incorporated into the Delivery Program and Operational Plan for funding through CN's working funds. Management actions may also be included into CN asset management plans for allocation of funding.

Under Section 496B(1) of the Local Government Act 1993 CN may levy a coastal protection service charge (CPSC) on a parcel of rateable land where either the current or previous owner has voluntarily:

- constructed or contributed to the cost of constructing long-term coastal protection works, such as seawalls, that benefit the land, or
- agreed to pay the charge relating to works that existed prior to the commencement of the Local Government Act 1993 amendments that introduced this charge

The CPSC covers a council's reasonable costs of providing coastal protection services to the land on which the charge is levied. The CPSC will provide for maintaining and repairing the works and mitigating any impacts (such as replacement of eroded beach sand). There are currently no properties within the Stockton Beach location that meet these criteria.

6.3.2 State Government Funding Mechanism

A number of competitive State Government funding mechanisms are currently available to support the management actions in the Stockton CMP. The provision of funding is subject to terms of eligibility, competitive funding rounds and assessment, and availability of funds for each respective program.

Funding mechanisms include:

- Grants under the NSW Coastal Management Program administered by the DPIE
- Crown Reserves Improvement Fund administered by the DPIE (Crown Lands)
- Environmental Education Grants administered by the DPIE
- NSW Environment Trust grants administered by the DPIE
- NSW Heritage Grants Program

The NSW Minister for Local Government declared Stockton Beach a Significant Open Coast Location on 30 September 2019. This declaration means that CN can apply for funding to implement actions in a certified plan under the CM Act at any time, especially in circumstances where that action cannot wait until the next funding round. It also means that approval of applications for funding are prioritised where there is an identified urgency. This enables the rapid approval of funding for CN to start emergency actions such as sandbagging and beach nourishment.

The Deputy Premier has also announced the formation of a Deputy Premier's Taskforce of Government Agencies, CN and community representatives, to work together to address Stockton's erosion issues, and to consider options to fund long-term solutions. It is anticipated that the Deputy Premier's Taskforce outcomes will inform the development of the Newcastle CMP, which is due for completion by December 2021, and will likely replace the Stockton CMP.

6.3.3 Federal Government Funding Mechanism

Federal Government funding mechanisms are available to support the management actions in the Stockton CMP including Building Better Regions Fund administered by the Department of Infrastructure, Regional Development and Cities.

Funding programs are regularly changing, and CN will maintain an awareness of appropriate funding opportunities as they arise.

6.3.4 Disclaimer

It is noted that all cost estimates provided in the Business Plan in **Table 15** are based on project experience and external inputs, are for budgetary purposes only, and shall not be relied upon for any other purpose.

Table 15: Business Plan for Stockton CMP

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
	Total Cost for Stockton CMP			**$ 10,690,000**	**$ 12,364,000**	**$ 4,486,250**			
Strategy 1 – Coastal Hazards									
CH1	Investigation, design and documentation of buried terminal protection structures to address immediate risks	$100,000	Short	$100,000	-	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
CH2	Environmental Assessment and associated approvals of buried terminal protection structures at four locations	$20,000	Short	$20,000	-	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
CH3	Construction of Zone 4 buried terminal protection structures to address immediate risks at Stone St/Barrie Crescent and Griffiths Avenue/ Barrie Crescent (location 1)	$2 million construction $50,000 per annum maintenance	Short - Medium	$2,000,000	$200,000	$250,000	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
CH4	Construction of Zone 2 buried terminal protection structures to address immediate risks at Mitchell St (south end of Mitchell St and north end SLSC seawalls) (location 2 and 3)	$3.75 million $187,500 every 5 years maintenance	Short - Medium	-	$3.75 million	$187,500	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
CH5	Construction of Zone 1 buried terminal protection structures to address immediate risks at Holiday Park (location 4)	$875,000 $43,750 every 5 years maintenance	Short - Medium	-	$875,000	$43,750	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
CH6	Develop a management plan for the Holiday Park addressing the asset management requirements for the cabins and amenities block	$10,000	Short - Medium	$10,000		-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 6.3 Strategy 6.3b Objective 7.1 Strategy 7.1a

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
CH7	Construction of new amenities block in Holiday Park	$450,000	Short - Medium	-	$450,000	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 6.3 Strategy 6.3b Objective 7.1 Strategy 7.1a
CH8	Demolition of existing amenities block in Holiday Park	$40,000	Short - Medium	-	$40,000	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 6.3 Strategy 6.3b Objective 7.1 Strategy 7.1a
CH9	Relocation of cabins as per the Holiday Park Management Plan	$30,000	Short - Medium	-	$30,000	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 6.3 Strategy 6.3b Objective 7.1 Strategy 7.1a
CH10	Investigation, design and documentation and approvals of nourishment works at Holiday Park and Dalby Oval frontage from terrestrial or other opportunistic, permissible sand sources (for initial $4 million nourishment campaign) (Including environmental assessment and monitoring plan)	$150,000	Short - Medium	$150,000		-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1b Objective 5.4 Strategy 5.4b Objective 6.3 Strategy 6.3b Objective 7.1 Strategy 7.1a
CH11	Work Collaboratively with the Deputy Premier's Taskforce* to investigate the planning and approvals for sand nourishment from opportunistic sources	$150,000	Short - Medium	$75,000	$75,000	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1b Objective 5.4 Strategy 5.4b Objective 6.3 Strategy 6.3b Objective 7.1 Strategy 7.1a
CH12	Implementation of nourishment works from terrestrial (or other permissible sources) at Holiday Park and Dalby Oval frontages	$4 million	Short - Medium then review	$2,000,000	$2,000,000	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1b Objective 7.1 Strategy 7.1a
CH13	Ongoing monitoring of nourishment works as per monitoring plan terrestrial and bathymetric surveys	$100,000 per annum	Short - Medium	$100,000	$400,000	$100,000	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 3.1 Strategy 3.1b Objective 7.1 Strategy 7.1a

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
CH14	Port of Newcastle to place suitable sand from maintenance dredging activities from harbour entrance offshore of Stockton Beach in accordance with concurrence issues by Office of Environment (to be revised Feb 2022)	Minimal. Maintenance dredging for navigational safety currently conducted by PoN.	Short	-	-	-	Public	Port of Newcastle	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1b Objective 7.1 Strategy 7.1a
CH15	Complete Newcastle CMP detailed investigations and other required studies	$150,000	Short	$150,000	-	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 7.1 Strategy 7.1a
CH16	Establish an expert panel to advise CN on coastal management matters	Minimal	Short	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 7.1 Strategy 7.1a Objective 7.3 Strategy 7.3b
CH17	Assess potential options for long-term management of coastal hazards in the broader Stockton area through the development of a Newcastle CMP in accordance with the CM Act 2016 and the NSW Coastal Management Manual	$100,000	Medium		$100,000	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 3.1 Strategy 3.1b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH18	Consultation with stakeholders to the north of Stockton to identify coastal management opportunities to enhance coastal management actions proposed in the Newcastle CMP	Minimal	Short	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.3 Strategy 7.3a
CH19	Consultation with stakeholders to identify options for coastal management within broader Newcastle CMP	Minimal	Short	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.3 Strategy 7.3a
CH20	Monitor opportunities under grant programs and ensure grant applications are best positioned to deliver funding for Stockton CMP actions	Internal CN resources	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 7.1 Strategy 7.1b
CH21	Alternative funding methods to be investigated and considered for Stockton CMP actions	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 7.1 Strategy 7.1b

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
CH22	Undertake condition assessment/scope of works for maintenance to SLSC and Mitchell Street seawalls	$20,000 per annum	Short - Medium	$20,000	$80,000	$100,000	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH23	Undertake maintenance to Mitchell Street seawall identified in condition assessment report	$4,500,000 capital $200,000 per annum maintenance	Short - Medium	$4,500,000	$800,000	$1,000,000	Public	CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH24	Undertake capital and maintenance works to SLSC seawall identified in condition assessment report	$400,000 capital $36,000 per annum maintenance.	Short	$400,000	$144,000	$180,000	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH25	Design and consultation for roadworks and terminal protection structures at Griffiths Ave and Barrie Cres	$40,000	Short - Medium	$40,000		-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH26	Undertake roadworks at seaward end of Griffiths Ave and Barrie Cres intersection and construct traffic management devices	$150,000	Short - Medium	-	$150,000	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH27	Adaptive risk management strategy includes completing environmental assessment for opportunistic beach nourishment at varying scales	$100,000	Short - Medium	$100,000	-	-	Public	CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH28	Adaptive risk mitigation strategy including seeking approval for beach nourishment works under Part 5 EP&A Act	$100,000	Short - Medium	$100,000	-	-	Public	CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
CH29	Adaptive risk mitigation strategy including investigating potential sand sources/ opportunities for maintenance nourishment of Stockton in accordance with Sand Management Guidelines	$10,000	Short - Medium	$10,000		-	Public	CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH30	Participation in the Deputy Premier's Taskforce* to seek to deliver mass nourishment (subject to ongoing investigations and resolution of permissibility)	$10,000	Short - Medium (min. 10 year renourishment)	$10,000	$10,000	-	Public	CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH31	Investigate potential offshore sand sources, for mass nourishment at Stockton, including undertaking sampling and surveying to identify a suitable resource	$1 million	Short - Medium	variable	variable	-	Public	Department of Regional NSW	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH32	Work collaboratively with the Deputy Premier's Taskforce* to investigate planning and approvals processes, and funding mechanisms for mass nourishment from offshore marine sources	Variable	Short - Medium	variable	variable	-	Public	Funding mechanism to be confirmed	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH33	Adaptive risk mitigation strategy including investigation, design and documentation of potential protection works against adopted threshold for Newcastle CMP consultation including geotechnical investigations triggered at adopted threshold	$100,000	Short - Medium	-	$100,000	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH34	Environmental Assessment of designed protection works as at CH33.	$30,000	Short - Medium	-	$30,000	-	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH35	Prepare and adopt a PoM for dedicated or reserve Crown Land under CN care and control	$80,000	Short (by 20 June 2021)	$80,000	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 3.1 Strategy 3.1b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
CH36	Undertake annual inspection of Northern Breakwater as per the PON lease area and assess potential issues from coastal hazards	As required	Short (annual basis)	-	-	-	Public	Port of Newcastle	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH37	Continue beach and seawall monitoring program with cross section survey sites and utilising UAV and other monitoring methods within the Stockton CMP area	$10,000 - $15,000 per annum	Short - Medium	$10,000	$40,000	$50,000	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH38	Review planning certificates for properties potentially affected by coastal hazards contain an appropriate notation and reflectability (or not) for complying development to be carried out on the land	Minimal	Short	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 7.1 Strategy 7.1a Objective 7.3 Strategy 7.3b
CH39	New subdivisions or greenfield development to be located landward of 2120 ZRFC coastal hazard line	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.3 Strategy 7.3b
CH40	Plans of Management, public domain plans and other master plan documents prepared or amended in consideration of the coastal hazards outlined in the Stockton CMP	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH41	Consider impacts of coastal hazards when renewing or constructing public assets within the Stockton CMP area. The design of assets should consider the coastal hazards outlined in the Stockton CMP	Varied due to project undertaken, costing within project budget	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH42	Incorporation of coastal hazards into CN's service asset plans and implement service asset plans	$20,000	Short - Medium	-	$20,000	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH43	Undertake planning, engagement and emergency works, if appropriate, to manage beach erosion before, during and after storm events in accordance with the Emergency Action Subplan contained in **Appendix A**	Varied based on extent of emergency works, approx. $200,000 for works and $5,000 monitoring (annually)	Short - Medium	$200,000	$800,000	$1,000,000	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Federal Government Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
CH44	Adaptive Risk Mitigation Strategy including design and approval of coastal protection works upon reaching threshold for the identified risk potential at Griffith Ave and Barrie Cres. See **Section 9** Mapping for potential locations for adaptive risk mitigation implementation	$35,000	Short - medium	$35,000			Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH45	Construction of approved coastal protection works upon reaching threshold, for identified risk potential at Griffiths Ave and Barrie Cres	$100,000 initial budget. Final budget variable	Short - medium	$100,000			Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.3 Strategy 2.3a Objective 2.3 Strategy 2.3b Objective 5.1 Strategy 5.1b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH46	Continue to consult with PoN and capital dredging proponents to request excess suitable sand from capital dredging projects is placed off shore from Stockton Beach	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 3.1 Strategy 3.1b Objective 5.1 Strategy 5.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH47	Conduct community engagement and education programs focussing on the Stockton CMP area environment, and coastal processes including inundation and erosion hazards	$25,000 per annum	Short - Medium	$25,000	$100,000	$125,000	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH48	Update and enhance CN website with information about coastal processes, management of the environment. Provide more information about coastal activities in conjunction with CH43, CH47 and on-ground works	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH49	Conduct beach management work such as beach scraping and beach grooming in areas south and north of Mitchell Street seawall to increase dune volume	$100,000 per annum	Short - Medium	$100,000	$400,000	$500,000	Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 1.3 Strategy 1.3a Objective 2.2 Strategy 2.2a Objective 2.3 Strategy 2.3a Objective 5.1 Strategy 5.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CH50	Resourcing the integrated delivery of on-ground works as detailed in this business plan	$200,000 per annum	Short - Long	$200,000	$800,000		Public	NSW Coastal and Estuary Management Program CN (Ordinary Rates, Revenue) Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b

**In accordance with the Deputy Premier's Taskforce Terms of Reference whilst still in force.*

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
Strategy 2 – Coastal Environment									
CE1	Monitor coastal habitat	$5,000 per annum	Short - Medium	$5,000	$20,000	$25,000	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 7.1 Strategy 7.1a
CE2	Undertake coastal revegetation works including dunes and recreational areas	$15,000 per annum	Short - Medium	$15,000	$60,000	$75,000	Public	CN (Ordinary Rates, Revenue) NSW Coastal and Estuary Management Program Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.2 Strategy 2.2b Objective 3.1 Strategy 3.1a Objective 7.4 Strategy 7.4b
CE3	Public domain works along the coastal section of the Stockton CMP area	$10,000	Short - Medium	-	$10,000	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 3.1 Strategy 3.1a Objective 3.1 Strategy 3.1b Objective 3.2 Strategy 3.2a Objective 4.2 Strategy 4.2a
CE4	Implement beach stormwater outlet maintenance program	$10,000 - $15,000 per annum	Short - Medium	$15,000	$60,000	$75,000	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CE5	Include WSUD principles in planning documents for the Stockton CMP area	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.2 Strategy 2.2b Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
CE6	Provide support and assistance to Landcare/volunteers for revegetation activities in the Stockton CMP area	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.2 Strategy 2.2b
CE7	Build capacity for community volunteers to undertake citizen science environmental monitoring	Minimal	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.2 Strategy 2.2b
CE8	On-ground works zones 1,2 and 4 to undertake removal of historical buried waste along the erosion scarp	Costed to project work	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 2.2 Strategy 2.2b Objective 3.1 Strategy 3.1a Objective 7.4 Strategy 7.4b
Strategy 3 – Beach Access									
BA1	Beach access audit	$5,000	Short	$5,000	$20,000	$25,000	Public	CN (Ordinary Rates, Revenue)	Objective 2.2 Strategy 2.2a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
BA2	Identify beach access points for closure and/or replacement	Minimal	Short	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 4.1 Strategy 4.1c Objective 4.2 Strategy 4.2a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
BA3	Design of new fencing and beach access points	$10,000	Short - Medium	-	$10,000	-	Public	CN (Ordinary Rates, Revenue) NSW Coastal and Estuary Management Program Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 4.1 Strategy 4.1c Objective 4.2 Strategy 4.2a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
BA4	Construction of new fencing and beach access points	$20,000	Short - Medium	-	$20,000	-	Public	CN (Ordinary Rates, Revenue) NSW Coastal and Estuary Management Program Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 4.1 Strategy 4.1c Objective 4.2 Strategy 4.2a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
BA5	Investigate, design and construct new access ways associated with the immediate protection works	$200,000	Short - Medium	$100,000	$100,000	-	Public	CN (Ordinary Rates, Revenue) NSW Coastal and Estuary Management Program Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 4.1 Strategy 4.1c Objective 4.2 Strategy 4.2a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
Strategy 4 – Beach Amenity									
B1	Investigate opportunities for landscaping as part of public domain plans	Minimal	Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a
B2	Undertake beach maintenance program and continue dune rehabilitation works	$150,000 per annum	Short - Medium	$150,000	$600,000	$750,000	Public	CN (Ordinary Rates, Revenue) NSW Coastal and Estuary Management Program Council will seek funding from a range of sources in accordance with Section 6.3.2	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 3.1 Strategy 3.1a Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
B3	Undertake audit of stormwater discharge points and assess water quality and erosion potential	Minimal	Short	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a Objective 7.4 Strategy 7.4b
B4	Undertake beach maintenance at stormwater discharge points after storm events	In operational budget	Short - Medium	-	-	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 2.2 Strategy 2.2a Objective 7.4 Strategy 7.4b
Strategy 5 – Recreational use of the coastal zone									
RU1	Prepare public domain plan for the Stockton coastal zone study area in consultation with relevant land managers and stakeholders. Public domain plan will build upon the adopted Newcastle Revitalisation Strategy Master Plan.	$30,000	Medium	-	$30,000	-	Public	CN (Ordinary Rates, Revenue)	NCSP 2030 Objective 3.1 Strategy 3.1a Objective 3.1 Strategy 3.1b Objective 3.2 Strategy 3.2a Objective 4.2 Strategy 4.2a Objective 5.4 Strategy 5.4b Objective 7.1 Strategy 7.1a

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe Subject to available funding and resources	Year 1 (estimate)	Year 2-5 (forecast estimate)	Year 6-10 (forecast estimate)	Benefit	Potential Funding Sources	Alignment with IP&R Framework
Strategy 6 – Culture and Heritage									
H1	Incorporate Aboriginal cultural information into CN projects and works	Minimal	Short - Medium				Public	CN (Ordinary Rates, Revenue) Heritage Grants Program	NCSP 2030 Objective 3.2 Strategy 3.2a Objective 3.2 Strategy 3.2b Objective 4.1 Strategy 4.1a
H2	Implement dual naming of sites where appropriate	Minimal	Short - Medium				Public	CN (Ordinary Rates, Revenue) Heritage Grants Program	NCSP 2030 Objective 3.2 Strategy 3.2a Objective 4.1 Strategy 4.1a
H3	Ensure high quality interpretive treatments of heritage items or places that increase understanding of the heritage significance of these items or places	Cost to be determined as part of individual project	Short - Medium				Public	CN (Ordinary Rates, Revenue) Heritage Grants Program	NCSP 2030 Objective 3.2 Strategy 3.2a Objective 3.2 Strategy 3.2b Objective 4.1 Strategy 4.1a Objective 4.1 Strategy 4.1b Objective 4.1 Strategy 4.1c
H4	Prepare Aboriginal Heritage Management Strategy to ensure due diligence processes are followed for CN projects and assessment of development applications	$30 000	Medium		$30 000		Public	CN (Ordinary Rates, Revenue) Heritage Grants Program	NCSP 2030 Objective 3.2 Strategy 3.2a Objective 3.2 Strategy 3.2b Objective 4.1 Strategy 4.1a Objective 5.1 Strategy 5.1a
H5	Interpretation of the history and heritage within the Stockton area is to be integrated into Public Domain Plans.	Minimal	Medium				Public	CN (Ordinary Rates, Revenue) Heritage Grants Program	NCSP 2030 Objective 3.2 Strategy 3.2a Objective 3.2 Strategy 3.2b Objective 4.1 Strategy 4.1a Objective 4.1 Strategy 4.1b
H6	Investigate protection of heritage listed items on public lands from coastal hazards	Minimal	Short - Medium				Public	CN (Ordinary Rates, Revenue) Heritage Grants Program	NCSP 2030 Objective 4.1 Strategy 4.1a Objective 4.1 Strategy 4.1b Objective 5.1 Strategy 5.1a

6.4 Outstanding Issues and Risks

The coastal management actions and implementation plan outlined in the preceding sections aims to address the critical issues identified (refer **Section 2**). It is acknowledged however, that there will inherently be a number of issues or risks that have not been fully addressed either due to the compressed timeframe for the Stockton CMP preparation or the necessary truncation of the spatial extent of the Stockton CMP. It is important to recognise and record these risks to ensure they are addressed in either the Newcastle CMP, or more detailed investigations associated with the detailed design of the elements proposed.

These issues/risks are identified below:

1. Mass nourishment for coastal protection has inherent risks in terms of protection of assets. When beach nourishment is intended for asset protection without buried terminal protection structures, assets would potentially be at risk if any of the following occurred:

- More than one design storm occurs within the renourishment period, or a series of storms with a cumulative impact exceeding the design storm
- A storm larger than the design storm occurs
- Long-term beach recession (underlying recession) exceeds estimated values
- Sea level rise and associated beach recession exceeds estimated values
- Sufficient sand supply cannot be sourced

Other risk considerations include:

- Will a dredger be available when wanted at a future time? What will mobilisation/demobilisation costs be if needed at short notice?
- Will funds be available at a future time?

Risks associated with the calculated mass nourishment volumes (refer **Appendix C** of the CBA Report in **Supporting Document F**). In this assessment it was concluded that at the end of the 10 year nourishment period for the 2.4 M m^3 initial campaign, there would remain sufficient sand volume to accommodate a >200 year ARI storm at the southern end of the beach and a 50 year ARI storm at the northern end of the study area.

It is noted that this risk can be reduced through more frequent smaller renourishment campaigns to avoid the beach becoming depleted at the end of a long renourishment period. Smaller scale more frequent renourishment campaigns from marine sources are generally not economically viable due to mobilisation/demobilisation costs though if a strategic alliance with other existing dredging operations can be created these costs can potentially be offset.

2. The buried terminal protection structures to address immediate risks in the proposed coastal management option (3b) provide protection to assets seaward of the 2025 Zone of Slope Adjustment (ZSA) for the 5% Annual Exceedance Probability (AEP) (rather than assets seaward of the 2025 1% AEP Zone of Reduced Foundation Capacity (in accordance with established 2025 hazard lines).

CN has accepted a distance of 20m from the 2025 ZSA 5% AEP hazard line as a foreshore recession threshold triggering consideration of a range of adaptive risk mitigation strategies in line with the heads of consideration as outlined in **Section 4.1**. The range of adaptive risk mitigation strategies includes emergency works (sand filled geotextile bags), rock bags, built structures, managed retreat and opportunistic sand nourishment. Based on this approach, CN will progress the designs for protection using a range of methodologies to ensure a flexible and appropriate response once triggers are reached.

The 20m trigger distance provides a minimum volume approximately equivalent to the storm erosion demand of an 8 year ARI event. Assuming if deemed necessary it would take a maximum of 3 years from triggering the need for further protection works to completing them, there would be about a 33% chance of that event occurring in that 3 year period putting assets at risk, prior to completion of the protection structures. If any structures or further nourishment can be completed within a shorter timeframe the probability of the storm event occurring and assets being at risk reduces e.g. there is a 24% chance of the 8 year ARI event occurring in a 2 year period.

Buried terminal protection to address immediate risk is not proposed for the Barrie Crescent/Griffiths Avenue intersection road head, rather the creation of traffic management changes in consultation with the community, at the northern end of Barrie Crescent and the eastern end of Griffiths Avenue is proposed to maintain access to all residences. A 4m wide pedestrian pathway adjacent to residential property boundary in this location (refer **Figure 16**) would be incorporated in the design of future works in response to the foreshore recession threshold being met.

3. The results of the 2019 beach nourishment trial showed that sand delivered by terrestrial sources did not match the colour of native beach material at Stockton. This was poorly received by a minority of the Stockton community and has been raised as a concern in the CLG. It is noted that sand delivered to the inner surf zone would be expected to naturally mix with native sand and not show marked colour differences. Nourishment sand colour would be assessed on a case by case basis in line with the Sand Management Guideline.

4. Sand placed in the nearshore off the Stockton CMP area has been assumed to be dispersed in a northerly direction, hence the need for on-going nourishment. The sand lost from the Stockton CMP area may have a benefit in potentially slowing the erosion to the north.

5. Overtopping and coastal inundation as they relate to buried terminal protection structures have not been assessed in detail due to time limitations for the preparation of the Stockton CMP. The buried terminal protection structures proposed are adaptive to accommodate future sea level rise and this risk would be assessed further within the broader Newcastle CMP due for completion in 2021.

6. A shoreline control structure (e.g. a longer groyne or artificial headland) aimed at reducing the rate of sand loss in the Stockton CMP area has not been considered as an option in the Stockton CMP. DHI's (2009) study indicated that such a structure would serve this purpose but would create downdrift impacts. DHI's (2009) study indicated that the optimum location for such a headland would be to the north of the Hunter Water land i.e. outside the current study area. It is noted that the proposed management actions do not preclude this option and that it would provide the additional potential benefit of reducing the rate of loss of nourishment sand and thereby reduce the maintenance nourishment requirements. This option would be assessed within the broader Newcastle CMP due for completion in 2021.

7. The sediment transport study has identified a significant lowering of sub-aqueous beach profile caused by a long-term sediment deficit. This has resulted in an increase in wave energy reaching the shoreline. Without intervention in the form of additional sand, the ongoing sediment loss, beach profile lowering, and subsequent increase in wave energy, is predicted to continue. This will cause accelerated erosion and result in significant and irreversible issues with the existing coastal protection structures as they become undermined and outflanked, hence the need for mass sand nourishment for the protection and amenity of the Stockton CMP area.

7. Coastal Zone Emergency Action Subplan

The CM Act identifies specific emergency management considerations associated with beach erosion, coastal inundation and cliff instability. The CM Act (section 15(1)(e)) outlines that a Coastal Zone Emergency Action Subplan (CZEAS) must be included in a CMP if the local council's Local Government Area contains land within the Coastal Vulnerability Area (CVA), and beach erosion, coastal inundation or cliff instability is occurring on that land.

It is noted that at the commencement of the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP), no Coastal Vulnerability Area Map was adopted and therefore no coastal vulnerability area has been identified. However, it is recognised that Stockton Beach has been impacted by coastal erosion on numerous occasions and it is considered appropriate to develop a CZEAS for this location.

Mandatory requirements for a CMP, including the preparation of a CZEAS where required, have been identified in Part A of the Coastal Management Manual (OEH 2018). Further direction on the preparation of a CZEAS is provided in the 'Guideline for preparing a coastal zone emergency action subplan' (DPIE 2019).

The Stockton Coastal Zone Emergency Action Subplan (Stockton CZEAS) **Appendix A** has been developed in accordance with this guidance and with the agreement of the LEMC**.**

The purpose of the Stockton CZEAS is to outline the roles and responsibilities of all public authorities (including CN) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through ocean storm activity or an extreme or irregular ocean event. All identified public authorities were represented on the LEMC and consulted as part of the development of the CZEAS.

The CZEAS is an accompanying document to the CN Local Emergency Management Plan 2019 (Newcastle EMPLAN), which sets out the responsibilities of combat agencies including the NSW Police, City of Newcastle, NSW Ambulance Service, State Emergency Service (SES), Fire and Rescue NSW (FRNSW) and others.

The Stockton CZEAS replaces Part A, Appendix D of the Newcastle CZMP (2018), the Stockton Coastal Erosion Emergency Action Subplan, however does not replace Part B, Appendix D of the Newcastle CZMP (2018), Newcastle Coastline South of the Harbour Coastal Erosion Emergency Action Subplan, which remains in force.

Picture 3: Emergency Sandbag Protection Works at the Southern End of the Mitchell Street Seawall. May 2020

8. Monitoring Evaluation and Reporting Program

CN is required to implement a monitoring, evaluation and reporting (MER) program as part of the Stockton CMP. The MER identifies key indicators, trigger points and thresholds as measures of success of actions in reducing the threats and maintaining the values of Stockton Beach, as well as mitigation actions should the actions not achieve the desired outcomes.

The CM Act requires CMPs to be reviewed at least once every ten years, however due to the significant hazards identified at Stockton Beach within a five year planning horizon, the Stockton CMP will be reviewed by 2025 to ensure that actions to manage Stockton Beach remain current and relevant.

CN is developing the Newcastle CMP that will encompass the entire Local Government Area (LGA) from Glenrock State Conservation Area in the south to the Northern boundary of the Stockton Cemetery, which is due for completion by December 2021. It is anticipated that actions to mitigate identified threats and issues to Stockton Beach will be included within the Newcastle CMP, triggering replacement of the Stockton CMP upon gazettal of the Newcastle CMP.

CN must maintain sufficient information and records about its management of the relevant parts of the coastal zone to demonstrate how the Stockton CMP has been implemented, and what has been achieved in connection with the Stockton CMP. This includes whether coastal management actions have been carried out within the timeframes identified in the Stockton CMP.

The Integrated Planning and Reporting (IP&R) framework as shown in **Figure 20** is a legislative requirement for councils under the *Local Government Act 1993*. IP&R considers the longer term future of an area and is based around a Community Strategic Plan which reflects the community's aspirations and needs for the future.

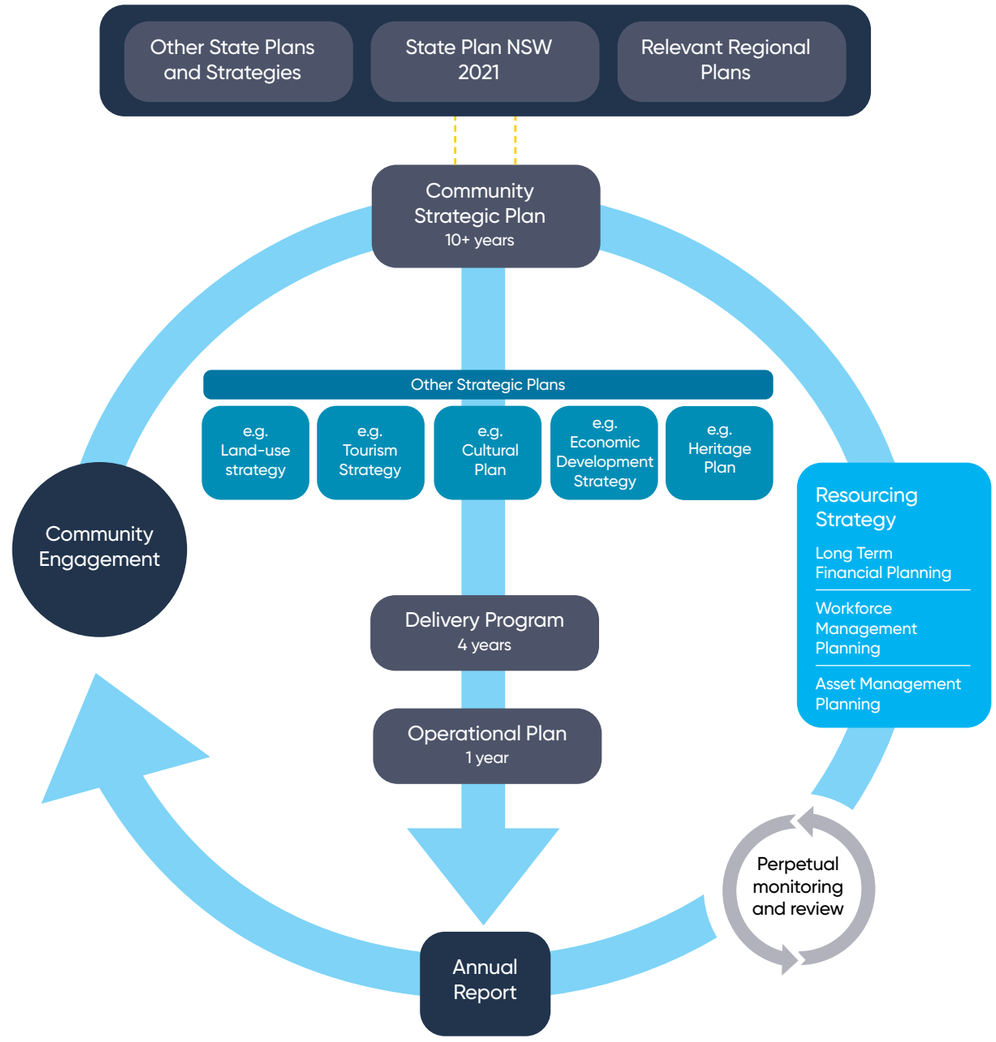

Figure 20: The Integrated Planning and Reporting (IP&R) framework

The IP&R framework consists of four layers of plans:

- The Community Strategic Plan
- The Resourcing Strategy is a 10-year plan describing the resources that council will use to achieve the objectives and strategies detailed in its CSP
- The Delivery Program is a four-year program outlining the commitments and key partnerships required and measures to monitor success in achieving the Strategies
- The Operational Plan outlines in more detail the individual Actions that council will undertake in a financial year in order to meet the commitments made in the Delivery Program

In accordance with the CM Act, the Stockton CMP needs to align with CN's IP&R Framework. This aims to mainstream coastal management into CN's overall service delivery and asset management responsibilities. It is also likely that integrating actions from the Stockton CMP into the service delivery and asset management processes of CN will improve implementation of the Stockton CMP. Generally, the Operational Plan and Delivery Program are updated on a yearly basis (as the Delivery Program is a rolling four-year program), and it is at this stage that actions from the Stockton CMP can and should be incorporated into these documents.

Integrated Planning & Reporting requires the preparation of a Delivery Program that sets out a four-year plan to achieve the objectives of the Newcastle 2030 Community Strategic Plan (NCC, 2018(a)) and supporting strategies such as the Newcastle Environmental Management Strategy 2013 (NCC, 2013). The business plan in **Section 6** outlines how the management actions within the Stockton CMP will meet the objectives and strategies of the Newcastle 2030 Community Strategic Plan.

To support the integration of the Stockton CMP with the day to day operations of CN, it is recommended that 12 months after the Stockton CMP is certified, and at yearly intervals until superseded, a workshop is held between key staff responsible for its implementation and regional DPIE Coastal representative(s), to assess implementation and current status of the Stockton CMP.

CN delivers an Annual Report which demonstrates progress in implementing the Delivery Program and Operational Plan activities over each financial year, and it is recommended that this report provides the main reporting mechanism for the MER program.

Performance measures are included for each action in the Operational Plan, which can be used to gauge whether the Stockton CMP actions have been implemented or not, which can then be reported in the Annual Report. This provides for a yearly evaluation of the implementation status of each action in the Stockton CMP.

Where actions have not been included in the IP&R Framework, a yearly evaluation of those CMP actions by the officer(s) responsible for facilitating implementation of the Stockton CMP is recommended. This may be undertaken through the annual review of the Business Plan or as a separate process.

If an action has not being implemented within the proposed timeframe, CN staff must determine the cause for delay and address as appropriate, e.g. if funding based, seek alternative sources of funding; if resource limited, seek additional assistance from internal or external agencies. Consideration may be given to modifying the timeframe or business case within the CMP, subject to endorsement by all relevant stakeholders.

The Stockton CMP Business Plan (refer **Section 6**) should be updated on an annual basis.

The Business Plan reflects the expected cost of the Stockton CMP over the coming financial year and details the resourcing and financing arrangements to meet these costs, including the contribution from successful grant funding applications to undertake specific actions, and any contribution required from CN.

9. Maps

The following section contains a series of figures presenting modelled beach erosion and shoreline recession hazard areas, for the Stockton CMP area for 2020, 2040, 2060 and 2120 (Bluecoast, 2020a). Figure 21, 22, 23 and 24 are shown below. Figure 25 below indicates the area of Stockton coastline where potential emergency protection works may be required. This represents areas vulnerable to erosion events after the initial immediate risk protection works are completed, at either end of the two existing seawalls.

Stockton Beach - Erosion Hazard Lines
Immediate (2020)

0 100 200 m

bluecoast
CONSULTING ENGINEERS

1% exceedance
10% exceedance
50% exceedance

Seawalls
Assumed protection by seawall*

Horiz. datum: GDA94 MGA56
Vert. datum: AHD
Locality: Stockton
Aerial image: Nearmaps 23/04/2020
Map 1 of 4
Date: 11/06/2020
*Seawall protection maintained by Council

Stockton Beach - Erosion Hazard Lines
2040 Planning Period

0 100 200 m

bluecoast
CONSULTING ENGINEERS

1% exceedance
10% exceedance
50% exceedance

Seawalls
Assumed protection by seawall*

Horiz. datum: GDA94 MGA56
Vert. datum: AHD
Locality: Stockton
Aerial image: Nearmaps 23/04/2020
Map 2 of 4
Date: 11/06/2020
*Seawall protection maintained by Council

Stockton Beach - Erosion Hazard Lines
2060 Planning Period

0 100 200 m

bluecoast
CONSULTING ENGINEERS

1% exceedance
10% exceedance
50% exceedance

Seawalls
Assumed protection by seawall*

Horiz. datum: GDA94 MGA56
Vert. datum: AHD
Locality: Stockton
Aerial image: Nearmaps 23/04/2020
Map 3 of 4
Date: 11/06/2020
*Seawall protection maintained by Council

Stockton Beach - Erosion Hazard Lines
2120 Planning Period

0 100 200 m

bluecoast
CONSULTING ENGINEERS

1% exceedance
10% exceedance
50% exceedance

Seawalls
Assumed protection by seawall*

Horiz. datum: GDA94 MGA56
Vert. datum: AHD
Locality: Stockton
Aerial image: Nearmaps 23/04/2020
Map 4 of 4
Date: 11/06/2020
*Seawall protection maintained by Council

ZONE 1 & 2

1:2000 (A1)

LEGEND

EXISTING ROCK REVETMENT TO BE RETAINED

POTENTIAL LOCATION OF EMERGENCY COASTAL PROTECTION WORKS

ZONE 3 & 4

1:2000 (A1)

C:\Users\220068\Box\PA2395 Stockton CMP\PA2395 Stockton CMP Team\PA2395 Technical Data\E11 Working Drawings\PA2395-RHD-00-M3-MA-1001.dwg

SAVED: 12-Jun-20

DIAL BEFORE YOU DIG www.1100.com.au

AUSTRALIAN HEIGHT DATUM

40 0 40 80 120 160 200m

1:4000 (A3) 1:2000 (A1)

Royal HaskoningDHV
Enhancing Society Together

Figure 25: Potential Location of Emergency Coastal Protection Works

10. Consultation

10.1 Community Consultation

On 12 May 2020 Council resolved to place the draft Stockton Coastal Management (CMP) on public exhibition. The draft Stockton CMP was placed on public exhibition for four weeks, from Wednesday 13 May until 5pm on Wednesday 10 June 2020. In total, CN received 155 community submissions with 10 key themes and 18 issues raised along with 20 agency submissions. CN used a variety of methodologies to ensure the community was informed of the public exhibition period including print and online digital advertising. CN also worked closely with industry stakeholders and the Stockton Community Liaison Group (CLG) to ensure they were provided with accurate and simplified information to update community members on how to provide their feedback. Face to face engagement was not possible due to public health orders enforcing social distancing designed to limit the spread of the global pandemic COVID-19.

There was overwhelmingly support received (73%) for the draft Stockton CMP and an even higher support of 75% amongst Stockton residents. The City presented comprehensive information on the draft CMP on its website, including an animation, videos featuring Stockton Community Liaison Group (CLG) Members, and the full report, together attracting more than 3,000 visitors, over 27,000 views and 436 downloads of the report over the exhibition period. In addition, 2000 information packs including a summary of the plan, Frequently Asked Questions (FAQs) and a reply-paid feedback form and envelope were sent to each property in Stockton to ensure everyone had a chance to have their say. A total of eight posts relating to the Stockton CMP were featured on City of Newcastle's Facebook page during exhibition. All up, they had a combined reach of 77,241 and the posts had a total engagement (people clicking, commenting, liking) of 2,851.

The following update provides a summary of the public exhibition feedback received on the draft Stockton CMP.

10.1.1 Engagement Strategy

The key communication principles of the draft Stockton CMP were to:

- Communicate clearly the complexities of coastal erosion and coastal processes
- Provide accessible options for the community and stakeholders to share their feedback
- Educate the community on the CMP process and the opportunities available to provide their feedback
- Ensure broad sections of the community, including those without computer access or unable to leave their households, were able to access information and share their feedback
- Encourage feedback from the local Stockton community along with the broader Hunter community and stakeholders.

As outlined earlier in **Section 1.4** of the draft Stockton CMP the engagement program was undertaken in three stages. This section is a summary of the engagement outcomes of Stage 2 during the exhibition period of the engagement program.

The engagement strategy for the draft Stockton CMP was developed with consideration for the guidelines for community and stakeholder engagement in coastal management and in accordance with the relevant provisions within the Coastal Management Manual.

Consultation has been undertaken with DPIE on a regular basis to ensure the development of a certifiable draft Stockton CMP in accordance with the legislative requirements of the *Coastal Management Act 2016* and Part A of the Coastal Management Manual. A summary of how the draft Stockton CMP meets these requirements is at Attachment E. The following additional stakeholders were identified as key agencies or organisations that must be consulted throughout the development of the draft Stockton CMP:

- Family and Community Services (FACS)
- Defence Housing Australia
- Hunter Water Corporation
- Crown Lands
- Worimi Local Aboriginal Land Council (LALC)
- Port of Newcastle
- Port Authority of NSW
- Geosurvey of NSW
- NSW Department of Agriculture, Water and the Environment
- NSW Department of Primary Industries – Fisheries
- Transport for New South Wales (TNSW)
- National Parks and Wildlife Service (NPWS)
- Port Stephens Council

CN continued to consult and meet with the Stockton CLG throughout the exhibition period to seek their feedback, listen to the community sentiment expressed by the Stockton CLG members and answer any questions they had. Monitoring of social media was also used to develop relevant content for the regular FAQs information leaflet.

Picture 4: Lord Mayor Nuatali Nelmes & Stockton CLG Members

Additional consultation was undertaken with those agencies and organisations responsible for the delivery of actions under **Appendix A** Coastal Zone Emergency Action Subplan of the Stockton CMP, including:

- NSW Police Service
- NSW State Emergency Service (SES)
- Fire and Rescue

10.1.2 Engagement Outcomes

During the public exhibition period, a Have Your Say webpage was set up to receive submissions and enable downloading of the draft Stockton CMP, supporting documentation, community summary of the CMP, FAQs and interactive Storyboard tool.

This Have your Say webpage was also publicised using social media (Facebook and LinkedIn), through NovoNews, CN intranet and webpages, and with digital and print advertising in the Newcastle Herald.

Hard copies of the draft Stockton CMP were also made available to community members upon request. To respond to COVID-19 restrictions an exhibition copy could be viewed at the Stockton Surf Life Saving Club (SLSC). Members of the Stockton CLG could also collect a copy of the draft Stockton CMP from the Stockton Bowling Club.

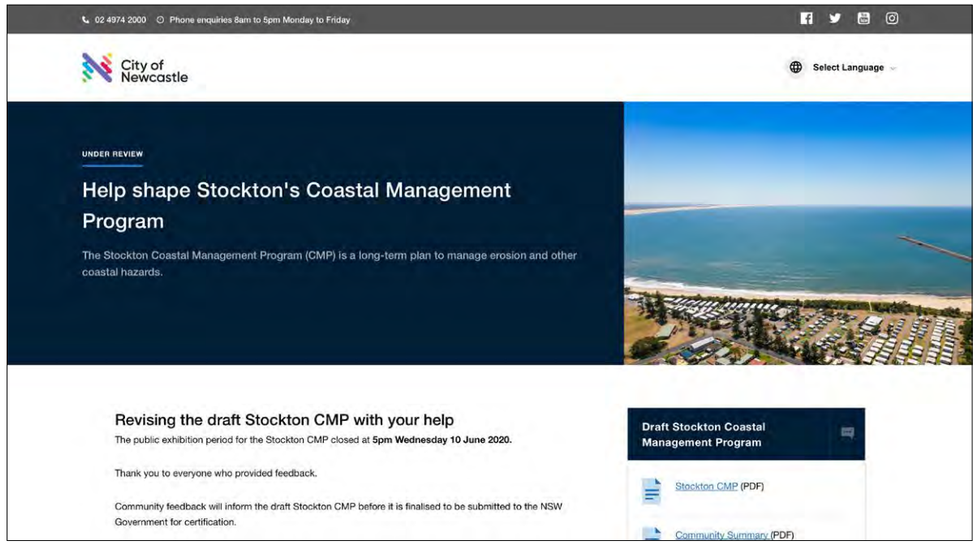

Figure 26: Stockton CMP Have Your Say webpage

10.1.3 Engagement methodology

A comprehensive community engagement program for the public exhibition of the draft Stockton CMP was undertaken, including measures to address the COVID-19 social distancing and isolation measures. Opportunities for information and submissions receipt included:

1. *Postal pack of information, feedback form and return mail to all 2,000 Stockton residences and businesses;*

Figure 27: Examples of hand-written submissions received

2. *Hard copies of the CMP delivered to Stockton residents and businesses and available for collection from the Stockton RSL;*

3. *Website and by phone;*

4. *Animation;*

Figure 28: Animation on the option presented within the CMP

5. *Storyboard;*

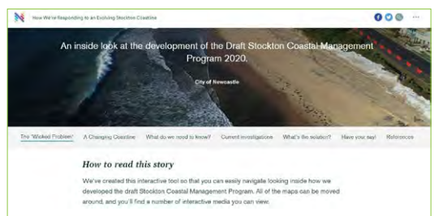

Figure 29: Storyboard

6. *Stockton CLG member group video and individual member videos;*

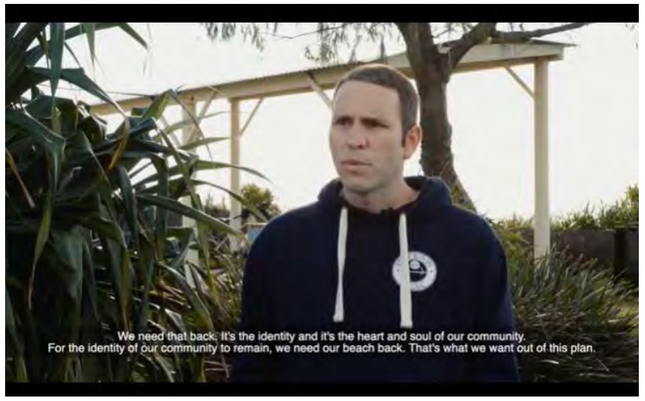

Figure 30: Stockton CLG Member Callan Nickerson

Figure 31: Stockton CLG Chair Barbara Whitcher

7. *Coastal processes educational videos and "Ask an Expert" with Questions & Answers by experts in a series of short videos;*

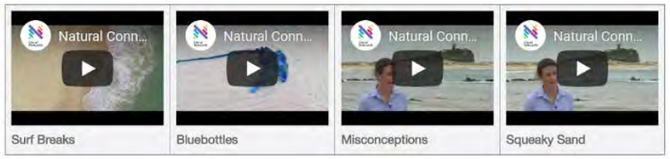

Figure 32: Natural Connection "Ask and Expert" videos

8. *Frequently Asked Questions (FAQs), posters, corflutes and community notice boards;*

Figure 33: Frequently Asked Questions (FAQs)

Figure 34: Corflute encouraging the community in Stockton of the Public Exhibition

Figure 35: Poster encouraging the community in Stockton of the Public Exhibition

9. *Interest group distribution of materials and local newsletters stories;*

10. *Council meeting briefings;*

11. *Agency and stakeholder briefing sessions;*

12. *Print advertising and radio interviews, including numerous print editorials and stories.*

Figure 36: Announcement of State Government Taskforce Social Distancing during COVID-19

13. *An exhibition copy of the draft Stockton CMP was displayed at the Stockton SLSC.*

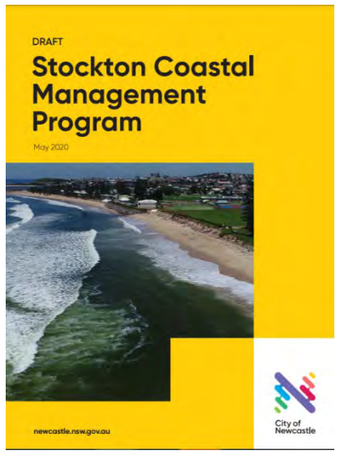

Figure 37: Draft Stockton CMP

To assist community members to easily understand the complexities of coastal planning and the draft Stockton CMP inclusions a range of digital communication tools were used.

Engagement methods were varied and a summary of the reach of these is detailed below.

Printed materials

Community information pack

2,000 Stockton residents and businesses

Draft Stockton CMP

7 hard copies delivered to community members

City News update

Distributed to 90,000 letterboxes on 19 May

Online/social media

Stockton CMP video
18.7K
views

Stockton Beach Taskforce
3.3K
views

Animation
2.2K
views

Stockton CLG members
2K
views

8
posts on City of Newcastle Facebook page relating to the Stockton CMP

77,241
combined reach

2,851
total engagement
(people clicking, commenting, liking)

1
post on LinkedIn

846
impressions

16
likes

Over 3,000
Stockton web page views

485
downloads of the draft Stockton CMP

773
Storyboard views

(Between 13 May to 10 June 2020)

Meetings/consultation

6
Stockton CLG and focus group zoom meetings
(held between 1 March - 10 June 2020)

2
Broad agency stakeholder zoom sessions

Figure 38: An overview of the engagement methods and communication tools used including their reach

Media releases and media monitoring

4
media releases

35
media mentions by media platforms
(newspaper/online news, television, and social media)

Figure 39: Media releases and media monitoring

Feedback Summary

In total, CN received 155 community submissions on the draft Stockton CMP.

The Stockton CMP has been guided by the community via submissions received online and hard copy feedback forms. Feedback from industry has been received online after numerous meetings with agency groups including the Newcastle Coastal Planning Working group (NCPW).

Submissions overview

175 total submissions

155
community submissions received

20
agency submissions received

15
postal submissions

140
received online or via email

73%
submissions were supportive of the draft Stockton CMP

81%
submissions were received from Stockton residents

75%
of Stockton residents were supportive of the draft Stockton CMP

Figure 40: An overview of the submissions received

The themes identified as priorities in community submissions are: mass sand nourishment, alternative protections works and recreational assets. The issues raised for each of these theme areas reflect the aspirations for Stockton's coastline derived from the community during the consultation.

Themes overview

- **Mass sand nourishment**
- **Alternative protection works**
- **Recreational assets**

Figure 41: Themes raised in submissions overview

10.1.4 Community Submissions overview

The community submissions brought a valuable and relatively homogenous set of issues to the draft Stockton CMP review process. There was a genuine sense of excitement coming through the submissions, that a viable long-term solution was being presented that was aligned with the community's aspirations.

The majority of stated supportive submissions agreed on mass nourishment as a central delivery mechanism for protection and amenity for Stockton Beach. Many community members wanted to fast track the approvals processes to ensure mass nourishment from offshore sources could be implemented as soon as possible, and in recognition of this time constraint, supported the need for the proposed works to address immediate current risks.

There was also a number of submissions wanting structures to reduce wave intensity, and/or to allow sand to bypass the harbour walls or trap sand to the north or offshore of Stockton. Some of these issues were addressed in **Supporting Document D**, others that are currently out of this CMP area extent will be collated and referred to Newcastle CMP.

Those unsupportive submissions wanted immediate resolution of such matters as: confirmation of mass nourishment funding mechanisms, changes to legislation and approvals, alternate structural options previously assessed as inappropriate or not supported by the majority e.g. seawalls aligned to erosion scarp or artificial reefs, and alternate sand sourcing for nourishment from currently unavailable sources. Where possible and appropriate these matters were noted for collation and referral to the Newcastle CMP.

Whether supportive or unsupportive, many submissions suggested sand sourcing options. This provided guidance on the need for CMP amendments to provide clarification of the proactive and reactive sourcing of sand to maximise the outcomes of the proposed initial $4M nourishment campaign action from terrestrial (land) sand or other permissible sources. There were also many comments on the positive step the establishment of the Deputy Premier's Beach Taskforce offered, though confirmation of mandate, membership, and timeframes was a source of concern. These details were released during the Public Exhibition period and have now been included in the Final Draft CMP. The provision of recreational assets such as footpaths, beach accessways and open space improvements reflected the need for an overall plan for future works, rather than inclusion on a project by project basis and is included in management actions as well as referred to Newcastle CMP.

A high percentage of submissions acknowledged the constricted timeframes imposed on CN in developing the CMP by June 30 due to the Ministerial direction and the restrictions this placed on CN. The extents of where the Stockton CMP were targeted to was where CN could be confident in the technical integrity of the plan in the time available. It was clear from the submissions that in-lieu of the completed, wider-reaching studies originally intended to inform the Newcastle CMP and further statements of the limitations of the data that was available at the time should be included in the CMP. These larger and more detailed environmental investigations into sediment transport mechanisms and hazards within the Stockton Bight are ongoing and due for completion later in 2020 and for incorporation into the Newcastle CMP.

For an overview of the top issues raised through community submissions see Table 1 and 2 in **Supporting Document G**.

A sample of some of the feedback received is below:

I agree with your CMP plan of actions. As someone who has watched the waves at Stockton large and small for over 40 years I agree with sand nourishment and repairs to the ends of the current seawall. But in conjunction with an artificial reef in front of where the North Stockton Childcare once stood and another in front of the Pines, 300 metres off shore as without them the next large North East swell will wash away the sand you have spent the time and money installing. The two reefs will reduce the power and energy of the waves coming in, long term they will provide fishing and surfing opportunities.

Love the plan overall. Would suggest a last line of defence wall implemented both North and South of the current Mitchell Street seawall. Great work!

We now have the Council and State Government recognising the problem created by the Stockton breakwater. Its man made. Its great to have the Lord Mayor properly enunciating the cause of the problem.

We need to all work together as a strong voice to make it happen! Stockton is an untapped beautiful tourist destination which once tapped could generate a healthier economy. Our restored beach is what we need back to make it happen!

The City of Newcastle (CN) is to be commended for providing a proficient and professional draft CMP on a complex issue in a very short time frame.

The City of Newcastle has correctly identified the Stockton community's desire for mass sand nourishment as the preferred solution for the coastal erosion at Stockton and highlighted this requirement in the draft CMP.

There should be investigation into alternative funding structures...A solution for Stockton Beach could prove to be a pilot for the mitigation of the erosion for many other beaches in Australia. There is an opportunity to work with other stakeholders to find a solution.

I look forward seeing the Newcastle CMP, which I hope addresses the integration of the Fort Wallace housing development and privatisation of the Stockton Centre into the Stockton CMP.

There's no point in replenishing sand if you do not address the underlying issue for the sand loss.

The content of the Supporting Documentation A-H prepared for CN has also been professionally constructed and correctly identifies many of the problems, the relevant data and potential solutions to the coastal erosion problem at Stockton.

..... wishes to support the City of Newcastle Coastal Management Program plan to place sand on the beach seaward of Dalby Oval, and to extend the protection structure at the northern end of the Surf Club seawall.

I am extremely thankful that something will be done to protect our home and community. I am concerned with the stated 10 year period before review assessment. If only the lower quantity of sand is pumped on for nourishment this likely to be completely eroded and the beach back to the current state before further nourishment.

Incorporating a cycle/walk path along the top of a seawall running from the break-wall to past the old preschool would become an asset for the future, please look a little deeper than just sand because the trucks will kill our quiet community. Sand nourishment is a short sighted approach to a big problem, we need long term solutions put in place to reduce the effects created by the break wall.

I like the Stockton Coastal Management Plan. I strongly support the Sand Nourishment Scheme. It is the most economically feasible scheme that has the acceptance of the Stockton residents. The beach is one of our most important amenities and we treasure it. Property also is at risk along the coastline. Work needs to start now if we are going to protect our beach.

While the report is thorough and detailed in many ways it lacks a wider review of other possible solutions like the implementation of groins (small 50m break walls a few hundred metres apart) or placing a bombie / artificial reef 200 metres from the shore to take some of the energy out of the large waves.

Stockton is an important part of Newcastle. It has significant tourism and historical value to the city of Newcastle. I fully support the sand nourishment plan.

As a Stockton resident, the only way forward is sand nourishment via offshore dredging!

Submissions received by location

Most community submissions were received by Stockton residents. Overall 73% of received submissions were in support of the Stockton CMP.

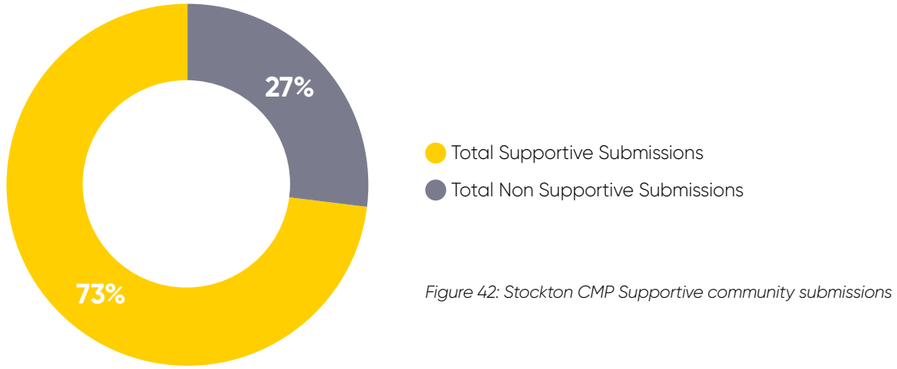

Figure 42: Stockton CMP Supportive community submissions

The majority of submissions (81%) received were from Stockton residents with only 19% of submissions received from outside of Stockton.

Most submissions were received from Stockton residents and 75% of Stockton residents were supportive of the draft Stockton CMP.

Stockton CMP Submissions (Total vs Stockton)

Figure 43: Geographic location of community submissions received

Stockton CMP Supportive Submissions (Suburb - Stockton)

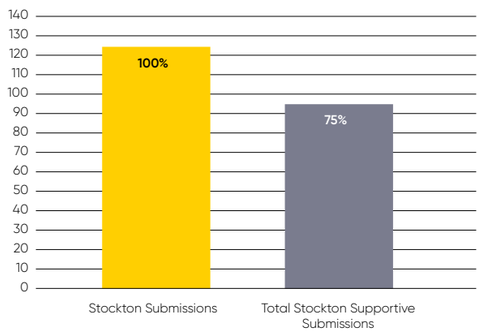

Figure 44: Geographic location of community submissions that received an indication of support

10.1.5 Agency Submission Summary

Consultation and cooperation with relevant government agencies has been ongoing throughout the development of the CMP. Extensive valuable feedback was received from 20 relevant agencies. It must be highlighted in recognition of the restricted timeframe most agencies reviewed and supplied their feedback within the first two weeks of the exhibition period. This is a testament to the professionalism and ongoing positive relationship CN holds with each agency.

All submissions received were supportive of the adaptive approach to coastal management proposed by the Stockton CMP. CN was recognised for the volume of work undertaken in three months to produce a document that would normally take 1-2 years to deliver. As a consequence, there was also wide acknowledgement that the investigations and analysis was based on the best available technical information and any assumptions were valid within the constricted timeframe. Feedback enabled CN to improve the technical integrity of the document and, highlighted and reinforced many considerations that will be address with the completion of the wider Sediment Transport Study and the Newcastle CMP.

All comments focused on improving and supporting the document to achieve and communicate the proposed coastal management strategy. There was general recognition of the importance of sand nourishment to delivering the intended outcomes for Stockton, but caution at the significant work yet to be undertaken to secure ongoing sources of sand particularly in relation to offshore marine. Clarification of roles, responsibilities, funding, assessment and approval requirements were supplied. Submissions reinforced the need for ongoing consultation in the development of options for the area to the north of the Stockton CMP in the Newcastle CMP and the delivery of its proposed actions. All agencies are committed to continuing to assist CN in this process.

An overview of the key themes raised within agency submission comments and any corresponding changes that have been made within the draft Stockton CMP are detailed within Table 4 in Supporting Document G.

10.1.6 Changes made to the draft Stockton CMP in response to community and agency comments

As a result of the feedback supplied from both the community and government agencies, the draft Stockton CMP Section updates summarised in Table 2 & 3 below have substantially improved the clarity, accuracy and compliance of the draft Stockton CMP, in particular:

- The alignment of the draft Stockton CMP with the objects and objectives CM Act and the Mandatory requirements as outlined by the Coastal Management Manual; mandatory requirements and their reflection in the final draft Stockton CMP;
- Reinforcement of the community sense of place and values as a beachside suburb;
- Expanded the background of hazard assessment and risk assessment undertaken. This is reflected in a new "Maps" section;
- Considered acknowledgement of the time constraints imposed by the Ministerial direction to complete the CMP by June 30 was recognised within most submissions, along with credit to CN for meeting such a demanding timeframe with a robust technical and planning outcome. Further clarification of any uncertainty was also included in the final draft Stockton CMP amendments and supporting documents where relevant, as an acknowledgement of this time constraint and the fact that the Stockton CMP was limited to the area where CN could be technically confident in the plan, while the full Stockton Bight sediment transport and hazard assessment studies continue to be progressed for incorporation in the Newcastle CMP;
- Updated the Options Assessment process to include improved, though insignificant change in BCR for option 2, and include benefit distribution for the final Business Plan;
- Amended sand sourcing for nourishment Supporting Document E and in a number of sections of the CMP, to ensure clarity in opportunities that are incorporated in CMP actions. This included recognition of the desk top review undertaken by Geological Survey NSW into potential offshore sand sources;
- The Management Strategy was edited to remove any ambiguity in relation to protection structures and reinforce the rationale of the associated actions. This reflected the level of support for mass nourishment protection and amenity outcomes over the 5-year planning period from submissions.
  No material difference to CMP strategy and actions was required;
- Clarification of approval requirements and assessment considerations in the implementation of works;
- Clarification of the roles and responsibilities;
- Deputy Premier's Stockton Beach Taskforce announcements during the exhibition period have been included and further support CMP strategy and actions.
- Public consultation and exhibition outcomes now included in Section 10.

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12. Glossary

The contents of this glossary are included with acknowledgement of the Coastal Management Glossary developed by State of NSW and Office of Environment and Heritage (2018).

This glossary provides definitions of terms that are in common use when describing coastal processes and coastal management. It is not a comprehensive dictionary of coastal terminology. It supplements definitions provided in the *Coastal Management Act 2016* (CM Act) and State Environment Planning Policy (Coastal Management) 2018 (CM SEPP).

The definitions used in the glossary are sourced from the US Army Corps of Engineers and from glossaries provided in relevant Standards, as well as from other coastal management guidelines in current use in Australia.

Acceptable risk – a risk that, following an understanding of the likelihood and consequences, is sufficiently low to require no new treatments or actions to reduce risk further. Individuals and society can live with this risk without feeling the necessity to reduce risks further. Positive and negative risks are negligible or so small that no risk treatments are needed.

Accretion – as the build-up of sediments to form land or shoaling in coastal waters or waterways. It may be either natural or artificial. Natural accretion is the build-up of land on the beach, dunes, or in the water by natural processes, such as waves, current and wind. Artificial accretion is a similar build-up of land resulting from built structures such as groynes or breakwaters, or activities such as filling and beach nourishment, or also aggradation. (USACE)

Adaptation – adjustment in natural or human systems in response to actual or expected climate change or its effect, to moderate harm or to take advantage of beneficial opportunities.

Alongshore or Longshore – parallel to and near the shoreline.

Ambulatory – in relation to the coastal foreshore, this means the movement of the foreshore seaward or landward over time, in response to coastal processes and sediment budgets. The movement of the foreshore may occur at different rates or in different directions along a beach or within a sediment compartment.

Annual Exceedance Probability (AEP) – the probability (expressed as a percentage) of an exceedance (e.g. large wave height or high water level) in a given year.

Artificial nourishment – see 'beach nourishment'

Asset – something of value and may be environmental, economic, social, recreational or a piece of built infrastructure.

Audit – independent appraisal of social, financial and environmental performance.

Average Recurrence Interval (ARI) – the average time between which a threshold is reached or exceeded (e.g. large wave height or high water level) of a given value. Also known as Return Period.

Back beach or back shore – the zone of the shore or beach lying between the foreshore and the coastline comprising the berm or berms and acted upon by waves only during severe storms, especially when combined with exceptionally high water.

Bathymetric data – measurements of the shape of the bed or the depth of a body of water.

Beach – the CM Act defines beach as an area that is generally composed of sand or pebbles or similar sediment that extends landward from the lowest astronomical tide to the line of vegetation or bedrock or structure.

Beach erosion – refers to landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers; wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.

Beach fluctuation zone – CM Act defines beach fluctuation zone as 'the range of natural locations a beach profile occupies from its fully accreted condition to its fully eroded condition, with a landward limit defined by the escarpment resulting from the erosion associated with a 1% storm event or a more extreme event of record, whichever is the greater landward limit, and a seaward limit that is the 40m depth seaward of the highest astronomical tide for the open coast and 10m depth seaward of the highest astronomical tide for estuaries or tidal coastal lakes.'

Beach material – granular sediments, usually sand or shingle moved by the sea.

Beach nourishment – beach restoration or augmentation using clean dredged or fill sand. Dredged sand is usually hydraulically pumped and placed directly onto an eroded beach or placed in the littoral transport system. When the sand is dredged in combination with constructing, improving, or maintaining a navigation project, beach nourishment is a form of beneficial use of dredged material.

Beach plan shape – the shape of the beach in plan; usually shown as a contour line, combination of contour lines or recognisable features such as beach crest and/or the still water line.

Beach profile – a cross-section taken perpendicular to a given beach contour; the profile may include the face of a dune or seawall, extend over the backshore, across the foreshore, and seaward underwater into the nearshore zone.

Beach ridge – a nearly continuous mound or ridge of beach material (including sand, shell, coral and gravel) that has been shaped by wave or other action. Beach ridges may occur singly or as a series of approximately parallel deposits. A beach ridge plain is composed of a series of parallel beach ridges. The ridges may be of different heights and spacing. They provide evidence of changes to deposition and erosion rates over time.

Beach scraping – also referred to as 'nature assisted beach enhancement' (NABE) is a mechanical intervention to speed up the natural processes of berm and foredune recovery after a storm event.

Beach system – the CM Act defines as 'the processes that produce the beach fluctuation zone and the incipient foredunes and foredunes landward of the relevant beach'. In general, this means coastal lands, composed of sand, gravel or shell, between a seaward limit of 40 metres depth in the State coastal waters and a landward limit at the lee side of the dunes.

Bedrock – a general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

Beneficial uses – placement or use of dredged material for some productive purpose. May involve either the use of the dredged material or the placement site as the integral component of the use.

Benthic – of, pertaining to, or related to, the bottom of a stream or other body of water.

Berm – on a beach, a nearly horizontal plateau on the beach face or backshore, formed by the deposition of beach material by wave action or by means of a mechanical plant as part of a beach renourishment scheme. Some natural beaches have no berm, others have several.

Breaker zone – the zone within which waves approaching the coastline commence breaking, typically in water depths of between five and 10 metres for ocean coasts, but sometimes in shallower water.

Breakwater – a man-made structure protecting a shore area, harbour, anchorage or basin from waves.

Bruun Rule – a commonly used method for estimating the response of a sandy shoreline to rising sea levels.

Bypassing, sand – hydraulic or mechanical movement of sand from the accreting up–drift side to the eroding down-drift side of an inlet or harbour entrance. The hydraulic movement may include natural movement as well as movement caused by humans.

Catchment area – the area which drains naturally to a particular point on a river, thus contributing to its natural discharge.

Cliff – a high, steep face of rock; a precipice.

Climate – the characteristic weather of a region, particularly regarding temperature and precipitation, averaged over some significant interval of time (years).

Climate change – occurs naturally in response to long-term variables, but often used to describe a change of climate that is directly attributable to human activity that alters the global atmosphere, increasing change beyond natural variability and trends.

Closure depth – do not detect vertical seabed changes, generally considered the seaward limit of littoral transport (collected over several years). The depth can be determined from repeated cross-shore profile surveys or estimated using formulas based on wave statistics. Note that this does not imply the lack of sediment motion beyond this depth.

Coast – a strip of land of variable width that extends from the shoreline inland to the first significant landform that is not influenced by coastal processes (such as waves, tides and associated currents).

Coastal asset – includes natural features of the coastal zone, including landforms, ecosystems and species; and built assets such as infrastructure, public and private buildings or structures.

Coastal dune – vegetated and unvegetated sand ridges built-up at the back of a beach. They comprise dry beach sand that has been blown landward and trapped by plants or other obstructions. Stable sand dunes act as a buffer against wave damage during storms, protecting the land behind from salt water intrusion, sea spray and strong winds. Coastal dunes also act as a reservoir of sand to replenish and maintain the beach at times of erosion.

Coastal engineering – a branch of civil engineering that applies engineering principles specifically to projects within the coastal zone (nearshore, estuary, marine, and shoreline).

Coastal environment – the landscape, functions and communities in the coastal zone.

Coastal environment area – land identified in the CM Act as land containing coastal features such as coastal waters of the State, estuaries, coastal lakes, coastal lagoons and land adjoining those features, including headlands and rock platforms. The CM SEPP maps the extent of the coastal environment area for planning purposes.

Coastal forcing – the natural processes which drive coastal hydro and morpho-dynamics (e.g. winds, waves, tides, etc.).

Coastal hazard – defined in the CM Act to mean the following:

- beach erosion
- shoreline recession
- coastal lake or watercourse entrance instability
- coastal inundation
- coastal cliff or slope instability
- tidal inundation

erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

Coastal inundation – coastal inundation occurs when a combination of marine and atmospheric processes raises the water level at the coast above normal elevations, causing land that is usually 'dry' to become inundated by sea water. Alternatively, the elevated water level may result in wave run-up and overtopping of natural or built shoreline structures (e.g. dunes, seawalls).

Coastal Management Area – any one of four areas that make up the coastal zone as defined in the CM Act. These are the coastal wetlands and littoral rainforests area, coastal vulnerability area, coastal environment area, and the coastal use area.

Coastal management objectives – specific objectives identified in the CM Act for each of the four coastal management areas.

Coastal management program – a long-term strategy for the coordinated management of land within the coastal zone, prepared and adopted under Part 3 of the CM Act.

Coastal management units – may be identified for the purposes of coastal management at a local or community level. They are sections of the coast that are affected by similar coastal hazards and risks or have several important social and economic features in common.

Coastal model – model of a coastal area. Often a movable bed model used to reproduce coastal sediment transport; or a model of estuary circulation.

Coastal processes – marine, physical, meteorological and biological activities that interact with the geology and sediments to produce a particular coastal system.

Coastal protection works – the CM Act defines coastal protection works as:

- beach nourishment
- activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.

Coastal risk – a risk that relates to the likelihood and consequences of coastal hazards or threats affecting coastal values.

Coastal sediment compartment – an area of the coast defined by its sediment flows and landforms. Coastal sediment compartments may be mapped at primary, secondary or tertiary (local) scales.

Boundaries are generally defined by structural features related to the geologic frameworks that define the planform of the coast.

Coastal threat – a process or activity that is putting pressure on or impacting on the health or function of a coastal ecosystem, or on the amenity and social or cultural value of the coastal landscape. Examples include the discharge of effluent or poor-quality stormwater into coastal lakes and lagoons, discharges from acid sulfate soils, or the spread of invasive species. High recreational demand can also be a threat to coastal ecosystem health.

Coastal use area – land identified by the CM Act and CM SEPP as being land adjacent to coastal waters, estuaries, coastal lakes and lagoons where development is or may be carried out (now or in the future). The CM SEPP maps the extent of the coastal use area for planning purposes.

Coastal vulnerability area – defined in the CM Act as land subject to seven coastal hazards.

Coastal wetland – wetlands are areas that are inundated cyclically, intermittently or permanently with fresh, brackish or saline water and have soils, plants and animals in them that are adapted to, and depend on, moist conditions for at least part of their lifecycle. Coastal wetlands include marshes, mangroves, swamps, melaleuca forests, casuarina forests, sedgelands, brackish and freshwater swamps and wet meadows.

Coastal zone – as defined in the CM Act and CM SEPP: the area of land comprised of the following coastal management areas: the coastal wetlands and littoral rainforest area, the coastal vulnerability area, the coastal environment area and the coastal use area.

Coastal zone (general) – the transition zone where the land meets water, the region that is directly influenced by marine and lacustrine hydrodynamic processes. Extends offshore to the continental shelf break and onshore to the first major change in topography above the reach of major storm waves. On barrier coasts, includes the bays and lagoons between the barrier and the mainland.

Coastal zone management – the integrated management of issues affecting the coastal zone. Coastal zone management is not restricted to coastal protection works, but includes also development and activities to manage the economical, ecological, cultural and social values of the coast.

Coastal zone management plan – a management plan for the open coast, an estuary or a coastal lake, prepared under the *Coastal Protection Act 1979*.

Community objectives – local scale objectives for management of the coast, based on the aspirations and priorities of local communities. When included in a coastal management program, these objectives will be based on, and must align with, the objectives expressed in a council's Community Strategic Plan.

Conceptual model – a simplified representation of the physical hydro-geologic setting. This includes the identification and description of the geologic and hydrologic framework, media type, hydraulic properties, and sources and sinks of flow.

Consequence – the outcome or impact of a hazard or threat.

Cost analysis – evaluation of the specific cost elements of a contract or proposal to appraise their statutory compliance, distribution, and reasonableness.

Cross-shore transport – refers to the sediment moved in a cross-shore direction to the coastline induced by water motions due to waves and currents.

Current, coastal – one of the offshore currents flowing generally parallel to the shoreline in the deeper water beyond and near the surf zone; these are not related genetically to waves and resulting surf, but may be related to tides, winds, or distribution of mass.

Current, littoral – any current in the littoral zone caused primarily by wave action; e.g. longshore current, rip current.

Current, longshore – the littoral current in the breaker zone moving essentially parallel to the shore, usually generated by waves breaking at an angle to the shoreline.

Cusp (or beach cusp) – one of a series of short ridges on the foreshore separated by

crescent-shaped troughs spaced at more or less regular intervals. Between these cusps are hollows. The cusps are spaced at somewhat uniform distances along beaches. They represent a combination of constructive and destructive processes.

Design storm – a hypothetical extreme storm with waves that coastal protection structures will often be designed to withstand. The severity of the storm (i.e. return period) is chosen in view of the acceptable level of risk of damage or failure. A design storm consists of a design wave condition, a design water level and a duration.

Design wave – in the design of harbour works, coastal protection works etc., the type or types of waves selected as having the characteristics against which protection is desired.

Diffraction of water waves – the phenomenon by which energy is transmitted laterally along a wave crest. When a part of a train of waves is interrupted by a barrier, such as a breakwater, the effect of diffraction is manifested by propagation of waves into the sheltered region within the barrier's geometric shadow.

Drowned river valley – a type of wave-dominated estuary, usually a deep bedrock embayment, with a wide, deep mouth.

Dune – underwater: flow-transverse bedform with spacing from under one metre to over 1000 metres that develops on a sediment bed under unidirectional currents.

Dune – subaerial (see coastal dune).

East Coast Low – an intense low-pressure system that occurs off the east coast of Australia, bringing storms, high waves and heavy rain. East coast lows generally occur in autumn and winter off NSW, southern Queensland and eastern Victoria.

Economic evaluation – an assessment that helps decision-makers to understand the socioeconomic implications of adopting alternative management options and to make choices that will provide net benefits to the community. Cost-benefit analysis is a type of economic evaluation that considers and evaluates a wide range of costs and benefits associated with a proposal, in qualitative or quantitative (monetary) terms (with future costs and benefits reduced to today's prices), compared with a base case. It may be used in conjunction with other criteria (such as technical feasibility, community acceptance or environmental impact) to select optimal management responses. A multi-criteria assessment is not an economic evaluation but may assist decision-making in other ways.

Ecosystem – the living organisms and the non-living environment interacting in an area, encompassing the relationships between biological, geochemical, and geophysical systems; or a community and its environment including living and non-living components.

El Niño southern oscillation (ENSO) – a year to year fluctuation in atmospheric pressure, ocean temperatures and rainfall associated with El Niño (warming of the oceans in the equatorial eastern and central Pacific). El Niño tends to bring below average rainfall.

Environment – surroundings, the physical and biological system supporting life, including humans and their built environment. Includes cultural features of archaeological or historical interest.

Eolian or Aeolian processes – pertaining to the wind, especially used with deposits such as loess and dune sand, and sedimentary structures like wind-formed ripple marks.

Erosion – the wearing away of land by the action of natural forces. On a beach, the carrying away of beach material by wave action, tidal currents, littoral currents, or by deflation.

Escarpment (storm bite) – the landward limit of erosion in the dune system caused by storm waves. At the end of a storm the escarpment may be nearly vertical; as it dries out the sand slumps to a typical slope of one vertical to 1.5 horizontal.

Essential infrastructure – CM Act defines to include infrastructure for the following purposes: electricity generation, transmission and distribution, telecommunications, rail, roads, gas, sewerage systems, water supply systems or stormwater management systems, airports, ports shipping and harbours.

Essential services – those services that are considered essential to the life of communities and include energy, transport, health services, sanitation services, water and welfare institutions *(State Flood Plan and Essential Services Act 1988)*.

Essential utilities – those services that are considered essential to public safety and organised communities. Such services include electricity, gas, water, sewerage, sanitation, telecommunications and waste collection *(State Flood Plan and Essential Services Act 1988)*.

Estuary – CM Act defines as any part of a river, lake, lagoon, or coastal creek whose level is periodically or intermittently affected by coastal tides, up to the highest astronomical tide.

Estuary inundation – flooding around the shoreline of an estuary or coastal lake, by a mixture of tidal water and catchment flood water.

Exposure – the potential for assets to be impacted by a hazard based on data or modelling of the hazard.

Extreme storm event – storm for which characteristics (wave height, period, water level etc.) were derived by statistical 'extreme value' analysis. Typically, these are storms with average recurrence intervals (ARI) ranging from one to 100 years.

Fit for purpose – right for the job it is intended to do. A fit for purpose assessment considers the level of data detail and the types of consultation required to make a reasonable management decision. In general, the detail and consultation required will increase with risk, complexity and impact.

Foredune – the larger and more mature dune lying between the incipient dune and the hind-dune area. Foredune vegetation is characterised by grasses and shrubs. Foredunes provide an essential reserve of sand to meet the erosion demand during storm conditions. During storm events, the foredune can be eroded back to produce a pronounced dune scarp.

Foreshore – the part of the shore, lying between the crest of the seaward berm (or upper limit of wave wash at high tide) and the ordinary low water mark, that is ordinarily traversed by the uprush and backrush of the waves as the tides rise and fall; or the beach face, the portion of the shore extending from the low water line up to the limit of wave uprush at high tide. The CM Act defines the foreshore as 'the area of land between highest astronomical tide and the lowest astronomical tide'.

Gabion – steel wire mesh basket to hold stones or crushed rock to protect a bank or bottom from erosion; or structures composed of masses of rocks, rubble or masonry held tightly together usually by wire mesh to form blocks or walls. Sometimes used on heavy erosion areas to retard wave action or as a foundation for breakwaters or jetties.

Geomorphology – that branch of physical geography which deals with the form of the earth, the general configuration of its surface, the distribution of the land, water, etc.; or the investigation of the history of geologic changes through the interpretation of topographic forms.

Geotechnical investigations – subsurface investigation of soils, rock, and other strata for the purposes of engineering design.

Geotextile – a synthetic fabric which may be woven or non–woven and used as a filter.

Global warming – the increase in the earth's temperature due to the emissions of greenhouse gases.

Groyne – a shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion of the shore; or a narrow, roughly shore normal structure built to reduce longshore currents, and/or to trap and retain littoral material. Most groynes are of timber or rock and extend from a seawall, or the backshore, well onto the foreshore and rarely even further offshore.

Hard defences (protection) – general term applied to impermeable coastal defence (protection) structures of concrete, timber, steel, masonry, etc., which reflect a high proportion of incident wave energy.

Hazard – a process, or activity that affects an asset or value. See also 'coastal hazards' which are the specific hazards defined in the CM Act.

Highest astronomical tide (HAT) – the highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions. In Australia HAT is calculated as the highest level from tide predictions over the tidal datum epoch (TDE), this is currently set to 1992 to 2011.

The HAT and the **Lowest Astronomical Tide (LAT)** levels will not be reached every year. LAT and HAT are not the extreme water levels which can be reached, as storm surges may cause considerably higher and lower levels to occur.

Holocene – an epoch of the Quaternary period, from the end of the Pleistocene, about 8000 years ago, to the present time.

Hydrodynamic – relates to the specific scientific principles that deal with the motion of fluids and the forces acting on solid bodies immersed in fluids, and in motion relative to them.

Impacts – include damage, harm or losses to exposed communities, property, services, livelihoods, access, use and amenity, heritage, ecosystems and the environment because of exposure and sensitivity. Impacts may also be positive.

Incipient dune – the most seaward and immature dune of the dune system. Vegetation characterised by grasses such as spinifex. On an accreting coastline, the incipient dune will develop into a foredune.

Inshore zone – in beach terminology, the zone of variable width extending from the low water line through the breaker zone.

Interdecadal Pacific Oscillation (IPO) – an irregular interdecadal sea surface temperature in the Pacific Ocean that modulates the strength and frequency of the El Niño Southern Oscillation.

Intertidal – that land area between mean low water and mean high water that is inundated periodically by tides.

King tides – any high water level that is well above the average, commonly applied to two spring tides that are the highest for the year, one during summer and one in winter.

La Niña – the opposite state to El Niño, occurring when the SOI is positive. La Niña tends to bring above average rainfall over much of Australia.

Lagoon – a shallow body of open water, partly or completely separated from the sea by a coastal barrier or reef. Sometimes connected to the sea via an inlet.

Likelihood – the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically (such as a probability or a frequency over a given time period).

Littoral – of or pertaining to a shore, especially of the sea. Often used as a general term for the coastal zone influenced by wave action, or, more specifically, the shore zone between the high and low water marks.

Littoral transport rate – rate of transport of sedimentary material parallel or perpendicular to the shore in the littoral zone. Usually expressed in cubic metres per year. Commonly synonymous with longshore transport rate.

Local council – for the purposes of the coastal management manual, a council that is wholly or partly within the coastal zone of NSW.

Longshore transport (littoral drift) – refers to the sediment moved along a coastline under the action of wave-induced longshore currents (Dean and Dalrymple, 2002). The net drift is the sum of the positive (conventionally northwards direction in NSW) and negative (southwards in NSW) direction. The gross drift is the sum of the drift magnitudes (absolute values). The differential drift is the difference between the net drift into and out of a coastal compartment. Both gross and net drift are typically averaged over a year and expressed in m^3/yr.

Macro-invertebrates – large invertebrates which may be found in waterways and consisting largely of larval insects, worms, and related organisms.

Maintenance dredging – the recurrent dredging of sediment from a waterway, including existing navigation channels, approaches and berths, to allow safe navigation by commercial or recreational boating traffic.

Managed retreat – also referred to as managed realignment or planned retreat. For the coastal zone (generally the coastal vulnerability area), managed retreat allows the shoreline to migrate landward unimpeded. It allows an area that was not previously exposed to coastal processes and hazards to become exposed, for instance by removing or breaching coastal protection works. Managed retreat may involve the relocation landward, out of a coastal risk area, of homes and infrastructure under threat from coastal erosion, recession or inundation. It may also involve the deliberate setting back (moving landward) of the existing line of sea defence to obtain engineering or environmental advantages. During a managed retreat process, a new foreshore area or new intertidal habitat may be created.

Marine sediment – sediment originating from the sea.

Mean high water mark – the line of the medium high tide between the highest tide each lunar month (the springs) and the lowest tide each lunar month (the neap) averaged over out over the year. In NSW, the methods for determining the position of the MHWM are outlined in the Crown Directions to Surveyors - No. 6 Water as a Boundary.

Mean sea level – the arithmetic mean of hourly heights of the sea at a tidal station, observed over a long period of time.

Multi-criteria analysis – a logical and structured decision-making tool for complex problems involving multiple factors or criteria, where a consensus is difficult to achieve. It may involve processes such as ranking, rating (with relative or ordinal scales) or pairwise comparisons. The process allows participants to consider, discuss and test complex trade-offs among alternatives

Natural character – includes all-natural aspects of the land and sea, including the underlying ecological, hydrological and geomorphological processes that shape landforms (including underwater features) and the natural movements of water and sediment. Natural character also includes aspects of the environment that affect human experience including the natural darkness of the night sky, the sounds and smell of the coast, and the context and setting of natural places.

Natural coastal processes – the coastal processes over which people have no control, such as wind, waves and tides.

Natural heritage – the natural living and non-living components, that is, the biodiversity and geodiversity, of the world that humans inherit.

Near shore – the area of ocean close to the coast that is affected by waves, tides and longshore currents.

NSW Coastal Council – established under Part 4 of the CM Act. A group of three to seven coastal experts, appointed by the Minister to provide advice on coastal management issues.

Outflanking or end effects – erosion behind or around the land-based end of a groyne, jetty or breakwater or the terminus of a revetment or seawall, usually causing failure of the structure or its function.

Overfill ratio - also known as the **overfill** factor, describes the volume of borrow sediment that, in theory, will ultimately yield a residual unit volume of sediment on the beach, after grain sorting and losses.

Overwash – the part of the wave uprush that runs over the crest of a berm or structure and does not flow directly back to the ocean or lake. When waves overtop a coastal protection structure, they often carry sediment landwards which is then lost to the beach system. Also defines a process in which waves penetrate inland of the beach, which is common on low barriers.

Pollution – the condition caused by the presence of substances of such character and in such quantities that the quality of the environment is impaired; or the human-induced alteration of the chemical, physical, biological or radiological integrity of an aquatic ecosystem.

Probabilistic hazard assessment – a risk-based approach to managing coastal hazard that takes uncertainty into account by considering both the likelihood and consequence of hazard occurrence. It applies a stochastic simulation to evaluate coastal processes. The technique uses a distribution of values for each parameter to account for expected variation, or uncertainty, rather than single values.

Parameters are then combined by a monte-carlo technique to produce a probabilistic forecast of future shoreline position. This is quite different to traditional deterministic hazard assessments that produce single values for beach erosion and shoreline recession.

Probabilistic model – mathematical model in which the behaviour of one or more of the variables is either completely or partially subject to probability laws.

Progradation – the building forward or outward toward the sea of a shoreline or coastline (as with a beach, delta, or fan) by nearshore deposition of river-borne sediments or by continuous

accumulation of beach material thrown up by waves or moved by longshore drifting.

Public Authority – defined in the CM Act as a Minister of the Crown of the State, a State-owned corporation, an electricity supply authority, a department or instrumentality of the State, a local council and any other public or local authority constituted by or under any Act and includes any prescribed body.

Recession – a continuing landward movement of the shoreline; or a net landward movement of the shoreline over a specified time.

Reflection – the process by which the energy of the wave is returned seaward.

Refraction – the process by which the direction of a wave moving in shallow water at an angle to the contours is changed. The part of the wave advancing in shallower water moves more slowly than that part still advancing in deeper water, causing the wave crest to bend toward alignment with the underwater contours; or the bending of wave crests by currents.

Residual risk – the risk which remains after managing and reducing risks. It may include for example, risks due to very severe storms or from unexpected hazards.

Resilience – the ability of a system (human or natural) to adapt to changing conditions (including hazards or threats, variability and extremes), and rapidly recover from disruption due to emergencies. Resilient systems or communities have the capacity to 'bounce back' after a disrupting event such as a major storm or an extended heat wave, to moderate potential damages, take advantage of opportunities, maintain or restore function or to cope with the consequences.

Revetment or seawall – a type of coastal protection work which protects assets from coastal erosion by armouring the shore with erosion–resistant material. Large rocks/boulders, concrete or other hard materials are used, depending on the specific design requirements.

Rip – a narrow, strong shore normal current in the nearshore area of most wave-dominated beaches (i.e. most beaches along the open coast of NSW). They are fed by along shore feeder currents initiated by the deflection of waves at the shoreline. There are diverse types of rip on NSW beaches and they affect beach safety.

Riparian – pertaining to the banks of a body of water, such as an estuary.

Risk – effect of uncertainty on planning and management objectives, usually characterised by reference to potential hazards, their consequence and their likelihood. Consequence combines the concepts of magnitude, sensitivity and duration.

Sand drift – the movement of sand by wind. On the coast, this generally describes sand movement resulting from natural or human-induced degradation of dune vegetation, resulting in either nuisance or major sand drift (dune transgression).

Sea level rise – an increase in the mean level of the oceans. Relative sea level occurs where there is a local increase in the level of the ocean relative to the land, which might be caused by ocean rising, the land subsiding, or both. In areas with rapid land level uplift (e.g. seismically active areas), relative sea level can fall.

Sediment cells (tertiary) – small and relatively contained sediment compartments. A tertiary sediment cell may apply to a single beach/ embayment.

Sediment transport – the process whereby sediment is moved offshore, onshore or along shore by wave, current or wind action.

Sensitivity – the degree to which a built, natural or human system is directly or indirectly affected by changes in hazards, threats or climate conditions.

Shoreline recession – refers to continuing landward movement of the shoreline, that is, a net landward movement of the shoreline, generally assessed over a period of several years. As shoreline recession occurs the beach fluctuation zone is translated landward.

Southern Oscillation Index – the normalised mean atmospheric pressure difference between Tahiti and Darwin, measured at sea level. The SOI is negative during El Niño and positive during La Niña.

Stakeholder – a person or organisation with an interest or concern in something.

State objectives – the state's objectives for the coast are set out in the CM Act.

Storm surge – the increase in coastal water level caused by the effects of storms. Storm surge consists of two components – the increase in water level caused by the reduction in barometric pressure and the increase in water level caused by the action of wind blowing over the sea surface (wind set-up).

Storm tide – an abnormally high water level that occurs when a storm surge combines with a high astronomical tide. The storm tide must be accurately predicted to determine the extent of coastal inundation.

Strategic management of the coast – planning and management that is wide-ranging, considers multiple issues at multiple spatial scales and multiple timeframes. It identifies the opportunities and constraints of different broad options to achieve

big-picture objectives and defines the best way forward.

Surf zone – defined in CM Act as the area from the line of the outer most breaking waves to the limit of wave run-up on the beach.

Sustainable management – develops and implements proposals that meet the needs of present communities without compromising the ability of future generations to meet their own needs.

Swash zone – the zone of wave action on the beach, which moves as water levels vary, extending from the limit of run down to the limit of run-up.

Swell waves – ocean waves that travel beyond the area where they are generated.

Threats – see Coastal threats. In the coastal management context, a threat is a process or activity which puts pressure on one or more coastal assets or values. Threats may include land uses (e.g. urban, recreation), land management, climate change, industrial discharges, stormwater runoff, overfishing, invasive species as well as the pressures from coastal hazards.

Threshold – can be identified for aspects of coastal systems, to highlight tipping points for irreversible change.

An ecological threshold is the point at which there is an abrupt change in the structure, quality, or functioning of an ecosystem or where external changes produce large and persistent responses in an ecosystem. A species threshold may disrupt aspects of the species population, productivity, reproduction, or habitat in response to a stressor.

Such 'tipping points' can lead to unwanted changes in ecosystems and may slow the recovery of ecosystems or limit their ability to achieve more resilient states following a disturbance.

Similarly, a social or economic threshold of change in a coastal community indicates the point at which the structure, function, social connectedness, equality or economic activity of the community changes beyond recovery.

Thresholds can also be defined for coastal water levels as they relate to the resilience of certain types of development.

Tidal channel – a major channel followed by tidal currents, extending from offshore into a tidal marsh or a tidal flat; tidal inlet.

Tidal circulation – the movement of fresh water and seawater that are mixed by currents and flows in an estuary, in response to ocean tides.

Tidal delta – where an inlet of a barrier estuary or open coastal lake is dominated by tidal processes, a flood tide delta develops inside the entrance, as tidal currents transport marine sand into the estuary. Ebb tide deltas may also occur, outside the mouth of an estuary.

Tidal inundation – the inundation of land by tidal action under average meteorological conditions and the incursion of sea water onto low lying land that is not normally inundated, during a high sea level event such as a king tide or due to longer-term sea level rise.

Tidal limit – the maximum upstream location on a watercourse at which a tidal variation in water level is observed.

Tolerable risk – a risk that, following an understanding of the likelihood and consequences, is low enough to allow the exposure to continue, and at the same time high enough to require new treatments or actions to reduce risk. Society can live with this risk but believe that as much as is reasonably practical should be done to reduce the risks further. Note that individuals may find this risk unacceptable and choose to take their own steps, within reason, to make this risk acceptable. Residual risks are considered tolerable only if risk reduction is impractical.

Training walls – walls constructed at the entrances of estuaries and rivers to improve navigability.

Trigger – pre-negotiated decision-making points and commitments, so that action on coastal risks is taken when necessary, and when it is most convenient and affordable for the affected community

Tropical cyclone – intense low-pressure system in which winds of at least 63km/hour whirl in a clockwise direction, in the southern hemisphere around a region of calm air.

Tsunami – a long period water wave caused by an underwater disturbance such as a volcanic eruption or earthquake. Sometimes (incorrectly) called a 'tidal wave'.

Unacceptable risk – a risk that, following an understanding of the likelihood and consequences, is so high that it requires actions to avoid or reduce the risk. Individuals and society will not accept this risk and measures should be put in place to reduce risks to at least a tolerable level.

Vulnerability – a function of exposure and sensitivity of assets to a hazard, which determines the potential impacts of the hazard. For instance, the vulnerability of coastal assets may be influenced by the extent and impact of environmental, social and economic factors such as saline contamination of soils from flooding, erosion of built-up and natural areas, loss of vegetation, disruption to use, or access, or continuity of service, or loss of amenity, corrosion of built structures, undermining of foundations or damage to contents. Vulnerability also considers the adaptive capacity which is the capacity to adapt or the resilience in the system to manage the impacts and changes.

Wave amplitude – the magnitude of the displacement of a wave from a mean value. An ocean wave has an amplitude equal to the vertical distance from the still water level to wave crest. For a sinusoidal wave, amplitude is one–half the wave height. (USACE).

Wave climate – the seasonal and annual distribution of wave height, period and direction.

Wave-dominated coast – the coast of south eastern Australia is a wave-dominated system. This affects the beach type and the types of estuaries that occur in the landscape.

Wave energy – the capacity of waves to do work. The energy of a wave system is theoretically proportional to the square of the wave height; a high–energy coast is characterised by breaker heights greater than 50 centimetres and a low–energy coast is characterised by breaker heights less than 10 centimetres. Most of the wave energy along equilibrium beaches is used in shoaling and in sand movement. The NSW coast is a high wave energy coast.

Wave run-up – the vertical distance above mean water level reached by the uprush of water from waves across a beach or up a structure.

Wave set-up – the rise in the water level above the still water level when a wave reaches the coast. It can be very important during storm events as it results in further increases in water level above the tide and surge levels.

Wind waves – ocean waves resulting from the action of the wind on the surface of the water.

Zone of profile fluctuation – the area within which the subaerial beach profile can be expected to fluctuate under the current patterns of climate and weather conditions (i.e. including storms and decadal scale cycles).

Zone of slope adjustment – the area landward of an escarpment cut by storm bite, which may be affected by slumping to the angle of repose of the sand as it dries.

13. Abbreviations

Abbreviation	Meaning
CM Act	Coastal Management Act 2016
CM SEPP	State Environmental Planning Policy (Coastal Management) 2018
CMP	Coastal Management Program
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CZMP	Coastal Zone Management Plan (a plan prepared under the former Coastal Protection Act 1979)
DPIE	NSW Department of Planning, Industry and Environment
GIS	Geographical Information System
IAP2	International Association of Public Participation
IP&R	Integrated Planning and Reporting (in accordance with the Local Government Act 1993)
ISO	International Organisation for Standardization
LGA	Local Government Area
OEH	NSW Office of Environment and Heritage
SEPP	State Environmental Planning Policy

Appendix A

Stockton Coastal Zone Emergency Action Subplan

City of Newcastle

August 2020

Acknowledgment

City of Newcastle acknowledges that we operate on the grounds of the traditional country of the Awabakal and Worimi peoples.

We recognise and respect their cultural heritage, beliefs and continuing relationship with the land and waters, and that they are the proud survivors of more than two hundred years of dispossession.

Council reiterates its commitment to address disadvantages and attain justice for Aboriginal and Torres Strait Islander peoples of this community.

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1. Introduction

In response to coastal erosion and relocation of assets at Stockton Beach, on 17 February 2020 the Minister for Local Government issued a direction under section 13 of the Coastal Management Act 2016 (CM Act) that City of Newcastle Council submit a draft Coastal Management Program in accordance with the requirements under Division 2 of the CM Act for the coastline at Stockton Beach, to the Minister administering the CM Act by 30 June 2020.

The CM Act identifies specific emergency management considerations associated with beach erosion, coastal inundation and cliff instability. The CM Act (section 15(1)(e)) outlines that a Coastal Zone Emergency Action Subplan (CZEAS) must be included in a Coastal Management Program (CMP) if the local council's Local Government Area contains land within the Coastal Vulnerability Area (CVA), and beach erosion, coastal inundation or cliff instability is occurring on that land.

While noting that at the commencement of the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP), no Coastal Vulnerability Area Map was adopted and therefore no coastal vulnerability area has been identified, it is recognised that Stockton Beach has been impacted by coastal erosion on numerous occasions and it is considered appropriate to develop a CZEAS for this location.

Mandatory requirements for a CMP, including the preparation of a CZEAS where required, have been identified in Part A of the Coastal Management Manual (OEH 2018). Further direction on the preparation of a CZEAS is provided in the "Guideline for preparing a coastal zone emergency action subplan" (DPIE 2019). The Stockton Coastal Zone Emergency Action Subplan (Stockton CZEAS) has been developed in accordance with this guidance.

The purpose of the Stockton CZEAS is to outline the roles and responsibilities of all public authorities, including the City of Newcastle (CN) in response to emergencies immediately preceding, during and after periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event.

The Stockton CZEAS is intended to be a supporting document to the City of Newcastle Local Emergency Management Plan 2019 (Newcastle EMPLAN). The Newcastle EMPLAN sets out the responsibilities and coordinating arrangements for a range of emergencies, between combat agencies including the NSW Police, CN, Ambulance Service, New South Wales State Emergency Service (NSW SES), Fire and Rescue NSW and others.

Part A, Appendix D of the Newcastle Coastal Zone Management Plan 2018 (CZMP) contains the Stockton Coastal Erosion Emergency Action Subplan, which was written to meet the requirements of the CM Act and NSW Coastal Management Manual, Part B (the Manual) . The CZMP was certified and gazetted in August 2018 and encompasses the entire coastline of the Newcastle Local Government Area.

Annexure D of the Newcastle EMPLAN lists the Stockton Coastal Erosion Emergency Action Subplan from the CZMP as a supporting document. Additional draft Stockton Erosion Consequence Guidelines (2019) have been developed internally to guide Council's own emergency management actions.

The Stockton CZEAS replaces both Part A, Appendix D of the Newcastle CZMP (2018), the Stockton Coastal Erosion Emergency Action Subplan, and the draft Stockton Erosion Consequence Guidelines (2019), for Zones 1 – 4 of Stockton Beach (prefer to Section 6 for a map and description of the Zones). However, both Part A, Appendix D of the Newcastle CZMP (2018), the Stockton Coastal Erosion Emergency Action Subplan, and the draft Stockton Erosion Consequence Guidelines (2019) remain in force for Zones 5 – 7. The Stockton CZEAS does not replace Part B, Appendix D of the Newcastle CZMP (2018), Newcastle Coastline South of the Harbour Coastal Erosion Emergency Action Subplan, which remains in force for the coastline south of Newcastle Harbour.

2. Objective

The purpose of the Stockton CZEAS is to identify and facilitate the implementation of appropriate emergency responses for emergencies related to coastal hazards that will:

- Protect human life and public safety
- Minimise damage to property and assets
- Minimise impacts on social, environmental and economic values
- Not create additional hazards or risks

Actions in the Stockton CZEAS aim to reduce risk:

- In areas where CN has chosen not to implement other coastal protection works to reduce coastal hazard risks, which have been evaluated as tolerable or acceptable
- Where coastal hazard risks have not been reduced or eliminated because an agreed action in the Stockton Coastal Management Program (Stockton CMP) has not yet been implemented
- Where coastal hazard risks remain after other actions have been implemented (residual risk)
- When rare and very large or unexpected events occur, outside the design criteria or capacity of agreed management actions in the Stockton CMP

3. Planning and Legislative Context

3.1 State Emergency and Rescue Management Act 1989

The overarching framework for emergency management in New South Wales is established by the *State Emergency and Rescue Management Act 1989 (SERM Act)*.

The SERM Act defines an emergency as follows:

(1) *In this Act: emergency means an emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) which:*

> ***(a)*** *endangers, or threatens to endanger, the safety or health of persons or animals in the State, or*
>
> ***(b)*** *destroys or damages, or threatens to destroy or damage, property in the State, or*
>
> ***(c)*** *causes a failure of, or a significant disruption to, an essential service or infrastructure, being an emergency which requires a significant and coordinated response.*

(2) *For the purposes of the definition of emergency, property in the State includes any part of the environment of the State. Accordingly, a reference in this Act to:*

> ***(a)*** *threats or danger to property includes a reference to threats or danger to the environment, and*
>
> ***(b)*** *the protection of property includes a reference to the protection of the environment.*

The SERM Act outlines roles and responsibilities for all emergency management in New South Wales.

The Act specifies:

- That emergency management committees are established at the state, regional and local levels
- That emergency management plans (EMPLANs) are prepared and reviewed at the state, regional and local level
- Arrangements for controlling emergency operations
- Responsibilities of emergency operations controllers

Arrangements established by the SERM Act are explained in Emergency Management Arrangements for NSW (NSW Government 2016) and on the NSW Emergency website. The NSW State Emergency Management Plan 2018 (NSW EMPLAN) describes the NSW approach to emergency management, the governance and coordination arrangements, and roles and responsibilities of agencies.

The objectives of the NSW EMPLAN are to:

- Provide clarity as to command and control, roles and coordination of functions in emergency management across all levels
- Emphasise risk management across the full spectrum of prevention, preparation, response and recovery
- Emphasise community engagement in the development and exercise of plans as well as in their operational employment
- Ensure that the capability and resourcing requirements of these responsibilities are understood

The NSW SES is the designated combat agency for management of floods, tsunami and storms, including severe storms which can be associated with coastal erosion.

The NSW SES prepare the State Storm Plan, State Flood Plan and State Tsunami Plan, which are subplans to the NSW EMPLAN.

Coastal erosion caused by storm activity is within the scope of the NSW Storm Plan (2018); which clarifies the respective roles of the NSW SES and local government in relation to coastal erosion; as follows:

- Local Government is to activate Coastal Zone Erosion Emergency Action Sub Plans as required (Action 5.2.10)
- Local Government is to implement emergency works - including construction of physical works (Action 5.3.6.b)
- NSW SES coordinate the protection (relocation/removal) of readily moveable household and commercial contents where time and resources permit when property is at risk from coastal erosion (Action 5.3.6.a)
- NSW SES will control and coordinate the evacuation of affected communities/properties when there is a risk to public safety (Action 5.7.2)

Under Action 1.4.3 of the NSW Storm Plan, the emergency management of coastal erosion that is not caused by storm activity will be controlled and coordinated by the Local Emergency Operations Controller (LEOCON).

3.2 Coastal Management Act 2016

The CM Act identifies specific emergency management considerations associated with beach erosion, coastal inundation and cliff instability. The CM Act (section 15(1)(e)) outlines that a Coastal Zone Emergency Action Subplan (CZEAS) must be included in a CMP if the local council's Local Government Area contains land within the coastal vulnerability area (CVA), and beach erosion, coastal inundation or cliff instability is occurring on that land.

While noting that at the commencement of the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP), no Coastal Vulnerability Area Map was adopted and therefore no coastal vulnerability area has been identified, it is recognised that Stockton Beach has been impacted by coastal erosion on numerous occasions and it is considered appropriate to develop a CZEAS for this location.

Mandatory requirements for a CMP, including the preparation of a CZEAS where required, are identified in Part A of the Coastal Management Manual (OEH, 2018). Further direction on the preparation of a CZEAS is provided in the "Guideline for preparing a coastal zone emergency action subplan" by the Department of Planning, Industry and Environment (DPIE, 2019).

Relevant statutory provisions from the CM Act 15 Matters to be dealt with in coastal management program

(1) *A coastal management program must:*

> *(e) if the local council's Local Government Area contains land within the coastal vulnerability area and beach erosion, coastal inundation or cliff instability is occurring on that land, include a coastal zone emergency action subplan.*

(3) *A coastal zone emergency action subplan is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event. For the purposes of this subsection, those roles and responsibilities include the carrying out of works for the protection of property affected or likely to be affected by beach erosion, coastal inundation or cliff instability.*

(4) *A coastal management program must not include the following:*

> ***(a)*** *matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 in relation to the response to emergencies*
>
> ***(b)*** *proposed actions or activities to be carried out by any public authority or relating to any land or other assets owned or managed by a public authority, unless the public authority has agreed to the inclusion of those proposed actions or activities in the program*

Relevant mandatory requirements of the Coastal Management Manual Part A Requirements for preparing a CMP which includes a proposed or mapped coastal vulnerability area

10. *Where coastal hazards have been identified in a coastal management area, a CMP must identify proposed coastal management actions for those hazards.*

11. *If the CM Act requires that a coastal zone emergency action subplan be prepared, it must identify any requirements for how emergency coastal protection works, within the meaning of the CM SEPP, are to be carried out.*

Note: Clause 19(4) of the CM SEPP defines emergency coastal protection works to mean *'works comprising the placement of sand, or the placing of sandbags for a period of not more than 90 days, on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land'.*

3.3 City of Newcastle Local Emergency Management Plan 2019

Annexure C of the City of Newcastle Local Emergency Management Plan 2019 (Newcastle EMPLAN) provides a summary of hazards that have risk of causing loss of life, property, utilities, services and/or the community's ability to function within its normal capacity, i.e. identified as having the potential to create an emergency.

The risk associated with coastal erosion is described as "Major beach erosion certain and dunal recession likely. Potentially dangerous inundation of eastern areas of Stockton, possible building damage or collapse as a result of undermining of foundation or wave action". Coastal erosion is rated as "Likely", with "Major" consequence, resulting in a "High" risk prioritisation.

The probabilistic hazard assessment undertaken for Stage 2 of the Stockton CMP, in accordance with the Manual, indicates that Stockton Beach is currently at high to extreme risk, with public assets at immediate threat requiring urgent protection.

Annexure D of the Newcastle EMPLAN contains a table which lists eight supporting documents, including:

- The Stockton Coastal Erosion Emergency Action Subplan, as prepared by CN for the CZMP (2018)
- The City of Newcastle Flood Emergency Subplan (2013) prepared by the NSW SES

It is recommended that these documents are reviewed and updated as necessary, including reference to the Stockton CZEAS.

4. Criteria for Initating Coastal Erosion Response

Both the Newcastle EMPLAN (p17, 2018) and the City of Newcastle Flood Emergency Sub Plan 2013 (SFESP) reiterate that during periods of coastal erosion, Council will 'activate the Coastal Zone Management Plan – Emergency Action Plan'. This is consistent with the NSW State Storm Plan (2018, action 5.2.10).

This is consistent with the NSW State Storm Plan (2018, action 5.2.10) and the New South Wales State Flood Emergency Sub Plan (2018, action 3.3.2). Action 1.4.3. of the same plan indicates that the emergency management of coastal erosion that is not caused by storm activity will be controlled and coordinated by the Local Emergency Operations Controller (LEOCON). Action 4.2.2.c requires the NSW SES to develop review and maintain storm Sub Plans and Local Flood Plans which include local level emergency response planning for coastal erosion and/or coastal inundation where required.

The New South Wales State Flood Emergency Sub Plan (2018) (SFESP) sets out the state level emergency management arrangements for prevention, preparation, response and initial recovery for flooding at the strategic level. In this plan a flood is defined as a relatively high water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.

The SFESP describes agreed roles, responsibilities, functions, strategies and management for the preparation for, and conduct of, flood operation. The SFESP also covers arrangements for the management of coastal erosion in the LGA, and identifies the NSW State Emergency Service as the Combat Agency primarily responsible for controlling emergency responses.

The Bureau of Meteorology (BOM) provide severe weather warnings for potentially hazardous or dangerous weather include damaging or destructive winds, heavy rain, abnormally high tides, damaging waves and blizzards in Alpine areas. When the waves are expected to be powerful enough to cause damage to property or significant erosion to beaches the BOM will issue a Severe Weather Warning for Damaging or Dangerous Surf.

The BOM specifies the following thresholds for issuing warnings for 'severe storms':

- Rainfall of sufficient intensity to cause flash flooding (generally equal to or exceeding the one in 10-year average recurrence interval)
- waves equal to or exceeding five metres height in the surf zone
- storm surge (see Section 2.2.8 of the 2018 State Storm Plan)

Section 3.3.2 of the SFESP identifies that emergency response operations will be initiated by the NSW SES City of Newcastle Local Controller:

- On receipt of a BOM Preliminary Flood Warning, Flood Warning, Flood Watch, Severe Thunderstorm Warning or a Severe Weather Warning for flash flooding or severe ocean conditions
- When other evidence leads to an expectation of flooding or coastal erosion within the Council area.

If an emergency has developed and neither of these warnings have been issued it is expected that CN will contact NSW SES with a request to be on standby to provide assistance with matters where NSW SES has jurisdiction.

Section 10 describes actions to be undertaken in the prevention phase to align any SES NSW evacuation plans with Council intelligence around warnings and triggers for emergency response. These will be updated within CN's accompanying Stockton Emergency Management Operational Procedures.

In the absence of a BOM severe weather warning, and prior to contacting NSW SES to initiate response to a potential coastal emergency, CN must consider:

- Predicted wave conditions (height, direction, period, duration and set-up)
- Predicted tidal range and tidal anomaly generated by storm surge
- Condition of the beach
- Condition of dune vegetation
- Presence and influence of adjacent headlands and coastal protection structures

5. Roles and Responsibilities

5.1 NSW State Emergency Service

- The role of the NSW SES in emergencies is outlined in Annexure B of the Newcastle EMPLAN, and includes:
- To protect persons from dangers to their safety and health, and to protect property from destruction or damage, arising from floods, storms and tsunamis
- To act as the Combat Agency for damage control for storms and to co-ordinate the evacuation and welfare of affected communities

Action 5.3.6 of the NSW State Storm Plan (2018) gives the NSW SES the role to coordinate the protection (relocation/removal) of readily moveable household and commercial contents where time and resources permit when property is at risk from coastal erosion. Action 5.7.2 of the NSW State Storm Plan (2018) outlines that the NSW SES will control and coordinate the evacuation of affected community properties or potentially dangerous places created by coastal erosion.

Both the State Emergency Service (SES) and CN are noted in Annexure C of the Newcastle EMPLAN (2019) as the Combat Agencies with responsibilities in relation to coastal erosion hazards.

As noted in Section 4, the SES are identified in the SFESP as the primary Combat Agency, and that the NSW SES City of Newcastle Local Controller is responsible for initiating coastal erosion emergency response operations.

The SES is not authorised to undertake coastal emergency protective works (such as placement of rocks or sand filled geotextile containers) of any form.

5.2 City of Newcastle

City of Newcastle (CN) is the designated coastal authority with responsibility for care of public land within its care, control and management. The carrying out (or authorising and coordinating) of emergency coastal protective works to protect public assets from coastal erosion and inundation is the role of CN, if measures are elected to be undertaken.

CN may choose to undertake physical erosion protection measures to protect public assets from coastal erosion and inundation if considered appropriate (assuming appropriate environmental assessment and approval has been obtained).

Private landholders are responsible for their own land parcels and CN does not have a positive obligation to take particular action to protect private property from erosion events. However, CN has a statutory obligation to consider development applications for coastal protection works lodged by property owners.

CN is noted in Annexure C of the Newcastle EMPLAN (along with the SES) as the Combat Agency primarily responsible for controlling the response to a coastal erosion emergency. As further described in Annexure B, during a coastal erosion emergency CN is to:

- Establish and maintain a Local Emergency Operations Centre (LEOC) for the Local Emergency Operations Controller (LEOCON – see Section 4.3)
- Provide support staff for the LEOC
- Provide human resources, plant, equipment, materials and services, as required in dealing with an incident or emergency
- Provide support to combat agencies and functional area agencies as required including:

  reconnaissance of the area effected by the emergency
- post disaster damage assessment
- Assist, at their request, the Police Service, Fire and Rescue NSW, Ambulance Service and NSW SES in dealing with any incident or emergency
- Assist in any other emergency management prevention, preparedness or recovery operations, including emergency management training, for which the CN's training and equipment is suitable
- At the request of the LEOCON, coordinate disaster recovery operations, excluding welfare assistance to disaster victims for whom Department of Family and Community Services – Community Services is responsible

Provide engineering resources required for response and recovery operations including:

- damage assessment
- clear and re-establish roads and bridges demolish and shore-up buildings
- remove debris
- construct and maintain temporary levees and evacuation routes, when appropriate
- erection of barricades and fences for public protection
- Provide a liaison officer and executive support to the LEOC and LEOCON or Combat Agency Controller
- Provide an appropriately qualified officer to assist the District Environmental Functional Area Coordinator in relation to environmental emergency management matters

If a "Severe Weather Warning for Damaging Surf" or "Severe Weather Warning for Storm Tides" has been released, or NSW SES was mobilised in some other manner as the combat agency, CN would assist NSW SES as required, or as resources permit.

There are four possible scenarios described below under which coastal erosion may occur without a severe weather warning being issued, which in turn does not trigger the EMPLAN and the NSW SES are not mobilised. In these situations, there is no designated combat agency, but CN would be the lead agency to manage the response.

Heavy Swell - Swell formed at a distance from the coast may impact on coastline with little or no warning. May result in damaging surf producing large scale erosion and/or inundation. Long-range swell may erode the dune system resulting in landward recession of the erosion escarpment.

Depleted Beach Profile - Following beach erosion events the local beach profile may be depleted such that a low or moderate swell coinciding with a high tide may erode the dune system resulting in landward recession of the erosion escarpment.

Slumping of Erosion Escarpment - Following erosion of the dune system a sheer and rear vertical erosion escarpment may remain. As the sand dries the escarpment will slump to a more stable slope. Natural processes may further flatten the escarpment.

Slumping of Coastal Protection Works - Large coastal erosion events may undermine the structural stability of coastal protection works. Slumping of works may occur some time after the event has passed and may result in landward recession of the erosion escarpment.

CN may undertake some of the activities that would otherwise by conducted by NSW SES (where resources allow though not obligated), but CN cannot order evacuation. If required, CN could request NSW SES take on a combat agency role if an emergency is occurring.

Typical tasks that CN may undertake (where required) before, during and after a coastal erosion/inundation event (besides considering the need for and potentially implementing protective works on public land) are outlined in **Section 10**.

5.3 Local Emergency Operations Controller

As noted in the Newcastle EMPLAN, the Local Emergency Operations Controller (LEOCON), appointed by the Regional Emergency Operations Controller (REOCON), is a police officer stationed within the region in which the Local Government Area is located.

The LEOCON is responsible, when requested by a combat agency, to co-ordinate the provision of resource support. LEOCONs would not normally assume control from a combat agency unless the situation can no longer be contained. Where necessary, this should only be done after consultation with the REOCON and agreement of the combat agency and the appropriate level of control.

Under the NSW Storm Plan (2018), Action 1.4.3. indicates that the emergency management of coastal erosion that is not caused by storm activity will be controlled and coordinated by the LEOCON. As described in Section 5.2, CN would provide a range of support for the LEOCON.

5.4 NSW Police

As described in Annexure B of the Newcastle EMPLAN, during a coastal erosion emergency the NSW Police Force is responsible for the following functions:

- Is the designated Combat Agency for law enforcement
- Is the designated Combat Agency for search and rescue
- As necessary, control and coordinate the evacuation of victims from the area affected by the emergency
- Maintain law and order, protect life and property, and provide assistance and support to a Combat Agency, Functional Areas, and other Organisations as required. This may include:
    - Reconnaissance of the area effected by the emergency
    - Traffic control, and crowd control, including the control of evacuations if required
    - Access and egress route security and control
    - Identifying the dead and injured, and notifying next of kin
    - Establishing temporary mortuaries
    - Maintaining the security of property
    - Statutory investigative requirements
    - Preparation of a Public Information and Inquiry Centre capable of providing general information on incidents and emergencies to members of the public
- Respond accredited "rescue units" to general and specialist rescue incidents, and control and coordinate rescue operations
- As determined by the State Rescue Board, provide accredited "rescue units"
- Some members of the NSW Police may also be appointed as Emergency Operations Controllers. Police would typically become involved in a coastal erosion event as follows
- Assisting NSW SES where required (e.g. controlling and coordinating evacuation) when NSW SES was acting in its combat agency role
- If NSW SES was not mobilised, Police may undertake or coordinate activities such as evacuation, barricading, removal of the contents of buildings and the like

In either case (if NSW SES was or was not the combat agency) it is possible that Police may act according to their statutory powers to protect life and property including authorising emergency protective works. However, it is expected that in making such a decision, Police would need to recognise the combat agency's authority (if applicable), ensure appropriate approvals are in place for any proposed works, and seek proper advice prior to acting.

5.5 Fire and Rescue NSW

As described in Annexure B of the Newcastle EMPLAN, Fire and Rescue NSW (FRNSW) has a Memorandum of Understanding with the NSW SES and would have a support role during a coastal erosion emergency, providing the following functions:

- Provide Primary and Secondary Accredited General Land Rescue Units as determined by the State Rescue Board
- Assist in any other response or recovery operations for which the FRNSW training and equipment is suitable, for example, the provision of emergency water supplies and pumping equipment
- During flood and storm provide assistance to the NSW SES in accordance with the Memorandum of Understanding between FRNSW and SES
- Provide a liaison officer to the LEOC or Combat Agency Operations Centre as appropriate

5.6 Department of Primary Industry and Environment

The Department of Primary Industry and Environment (DPIE) is the NSW Government authority responsible for advising on coastal zone management.

5.7 Bureau of Meteorology

The Bureau of Meteorology (BOM) is Australia's national weather, climate and water agency, and provides regular forecasts, warnings, monitoring and advice including drought, floods, fires, storms, tsunami and tropical cyclones.

The release of "Severe Weather Warning for Damaging Surf" or "Severe Weather Warning for Storm Tides" by the BOM is a key trigger for initiation of response operations for a coastal erosion/inundation event (see Section 4).

6. Physical Extent of the Stockton CZEAS

The Stockton CZEAS builds upon the previous CZMP, and adopts the same spatial extent for seven coastal zones so that emergency actions can be coordinated in both a holistic and site-specific manner. Please note that the Stockton CZEAS applies to Zones 1 – 4 of Stockton Beach. Part A, Appendix D of the Newcastle CZMP (2018), the Stockton Coastal Erosion Emergency Action Subplan, and the draft Stockton Erosion Consequence Guidelines (2019) remain in force for Zones 5 – 7, shown in Figure 1, and described as:

- Zone 1 – Breakwater to Surf Life Saving Club (SLSC) revetment
- Zone 2 – SLSC to Mitchell Street revetment
- Zone 3 – Mitchell Street revetment
- Zone 4 – Barrie Crescent and Eames Avenue frontage (Stone Street to Meredith Street)
- Zone 5 – Griffiths Avenue to Corroba Oval (northern boundary)
- Zone 6 – Hunter Water
- Zone 7 – Hunter Water (northern boundary) to LGA boundary

Figure 1: Coast Zones for Stockton CZEAS, with zones managed within the Stockton CZEAS bordered in green.

7. Definition of Coastal Emergencies

7.1 Beach Erosion

Beach erosion occurs when wind, waves, currents or elevated ocean water levels are removing the sediment that comprises the beach and frontal dune system, landward of the fully accreted condition.

Storm driven beach erosion may result in:

- Erosion on sandy beaches, including berms and frontal dunes, either directly because of undermining, or indirectly because the foundation capacity of the remaining dune adjacent to the eroded area has been reduced
- High, unstable, near-vertical back-beach erosion escarpments
- Damage to poorly designed or maintained coastal protection works

Beach erosion can create risks to public and private assets and present public safety risks. Not all beach erosion occurring during a storm event will trigger a coastal emergency.

7.2 Coastal Inundation

Coastal inundation occurs when a combination of marine and atmospheric processes raises water levels at the coast above normal elevations, causing land that is usually 'dry' to be inundated by seawater. It is often associated with storms resulting in elevated still water levels (storm surge), wave set-up, wave run-up and over-wash flows.

Overtopping and inundation can occur on:

- Beaches and coastal dunes, causing erosion, slumping or movement of large objects
- Seawalls, revetments and entrance training structures (breakwaters), causing structural instability and safety issues with the movement of large objects
- Cliffs and bluffs (in extreme storm conditions)

Storm surge and powerful waves can also penetrate estuaries giving rise to strong currents or seiching. This may result in inundation of roads and low-lying land adjacent to estuaries and waves created by vehicle movement in these locations.

7.3 Cliff Instability

Cliff instability refers to a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps and landslides. It may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows. Instability may occur during or following a coastal storm event but may also occur at other times. There may be very little warning that a cliff instability incident is imminent.

These hazards may endanger life and property at the site of the process (e.g. through collapse of a lookout platform or walking track, or undermining of dwellings), and at the toe of the cliff or bluff (rock platform or beach). They may result in risks to boaters and fishers in adjacent marine areas.

Note: Cliff instability is not a consideration for this Stockton CZEAS.

8. Approvals Required for Coastal Protection Works

Section 27 of the CM Act contains provisions dealing with the granting of development consent to development for the purpose of coastal protection works, while Section 4 (1) of the CM Act defines coastal protection works to mean:

(a) beach nourishment activities or works, and

(b) activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.

Section 19 of the CM SEPP states that development for the purpose of coastal protection works may be carried by or on behalf of a public authority;

(a) without development consent—if the coastal protection works are;

(i) identified in the relevant certified Coastal Management Program (or Coastal Zone Management Plan), or

(ii) beach nourishment, or

(iii) the placing of sandbags for a period of not more than 90 days, or

(iv) routine maintenance works or repairs to any existing coastal protection works, or

(b) with development consent—in any other case.

The CM SEPP also provides that development for the purpose of emergency coastal protection works is exempt development if it is carried out by or on behalf of a public authority in accordance with a Coastal Zone Emergency Action Subplan. Emergency coastal protection works means works comprising the placement of sand, or the placing of sandbags for a period of not more than 90 days, on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land.

If proposed public or private works do not fit into any of these categories a development application would be required, and a Joint Regional Planning Panel with coastal expertise would be the consent authority.

9. Assets and Hazards by Zone

9.1 Emergency Hazards

Typical hazards relevant to most zones of the Stockton frontage include:

- Unstable vertical dune erosion scarps (that can collapse suddenly creating a hazard to persons/ property at crest and near toe of scarp)
- Public safety in areas of wave overtopping/ inundation
- Unsafe beach accessways due to erosion
- Vehicles driving on sealed surfaces e.g. roadway/ carpark were founding material has been eroded or undercut
- Trees destabilised by erosion
- Submerged objects e.g. tank traps

The sections below outline the built assets and infrastructure in each zone that are within the identified 2025 Zone of Reduced Foundation Capacity (ZRFC) hazard line (Bluecoast 2020). The main emergency hazards associated with these assets and infrastructure are also identified.

CN's accompanying Stockton Emergency Management Operational Procedures will contain maps and asset information for a number of the assets and infrastructure items listed in the zones below, and will be updated as necessary.

9.2 Zone 1 – Northern Breakwater to SLSC

Zone 1 comprises the following coastal assets and infrastructure in the ZRFC:

- Holiday Park frontage
- Office, residence and commercial building (previously "Lexie's")
- The carpark and civil drainage
- Beach access ways
- SLSC amenities/storage facility
- The SLSC building

The main emergency hazards in the zone are:

- Erosion of dunes fronting Holiday Park and oceanic inundation threatening cabins/vans/ facilities;
- Outflanking of the SLSC revetment threatening temporary and permanent buildings at the southern end
- Overtopping of SLSC revetment affecting carpark
- Loss of beach accessways
- Loss of civil drainage infrastructure
- Loss of dune habitat and native vegetation

9.3 Zone 2 – SLSC to Mitchell Street Revetment

Zone 2 comprises the following coastal assets and infrastructure in the ZRFC:

- The Hereford Street Monument and associated loop roadway/parking area
- Private property
- Beach accessways
- Mitchell Street roadway

The main emergency hazards in this zone are:

- Erosion of dunes and oceanic inundation
- Exposure of historic civil infrastructure and infill material
- Outflanking of the SLSC revetment threatening SLSC building/areas of Dalby Oval at the northern end
- Erosion of dune and outflanking of Mitchell Street revetment threatening Mitchell Street roadway / parking area adjacent to revetment and private property
- Loss of beach accessways
- Loss of dune habitat and native vegetation

9.4 Zone 3 – Mitchell Street Revetment

Zone 3 comprises the following coastal assets and infrastructure in the ZRFC:

- The Mitchell Street rock revetment
- Timber access stairways connecting the Mitchell Street
- Footpath to the revetment
- Mitchell Street roadway and footpath
- Recreational furniture

The main emergency hazards in this zone are:

- Overtopping of revetment causing damage behind the revetment
- Damage or outflanking of Mitchell Street revetment
- Loss of beach accessways

9.5 Zone 4 – Barrie Crescent and Eames Avenue frontage (Stone Street to Meredith Street)

Zone 4 comprises the following coastal assets and infrastructure in the ZRFC:

- Barrie Crescent roadway
- Carpark, road drainage
- Dune systems at the end of Griffiths Street
- Beach accessways
- Beach accessways and dune fencing

The main emergency hazards in this zone are:

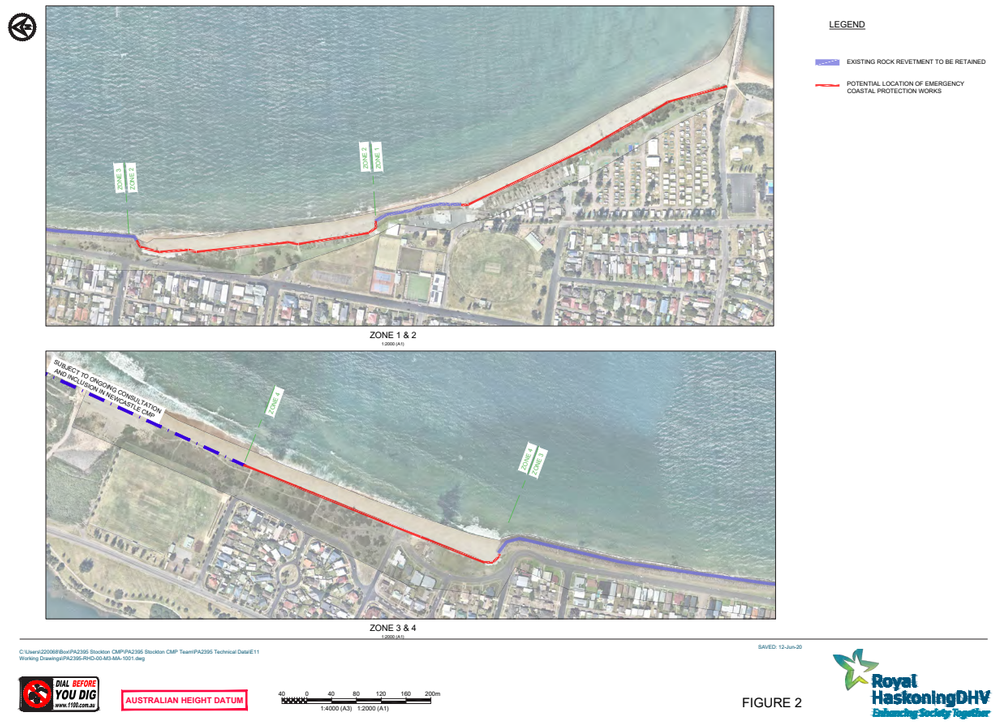
- Outflanking of Mitchell Street revetment threatening Barrie Crescent and Stone Street roadway adjacent to revetment
- Erosion of dune and destabilisation open space
- Private property
- Erosion and collapse of seaward end of Griffiths Street and associated civil drainage systems
- Loss of beach accessways and dune fencing

Loss of dune habitat and vegetation

10. Action Plan

Potential locations for placement of emergency coastal protection works are shown in Figure 2. The exact location(s) requiring placement of Emergency Coastal Protection Works during an event will be dependent on a range of variables including (but not limited to) swell size, swell direction, current state of the beach, etc.

Figure 2 – Potential location of Emergency Coastal Protection Works



As noted in Section 8, the CM SEPP provides that development for the purpose of emergency coastal protection works is exempt development if it is carried out by or on behalf of a public authority in accordance with a Coastal Zone Emergency Action Subplan. Emergency coastal protection works means works comprising the placement of sand, or the placing of sandbags for a period of not more than 90 days, on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land.

In addition, the Stockton CMP describes potential use of alternative coastal protection measures, including the placement of rock and/or large rock filled bags at locations shown on **Figure 2**. If consent has been sought and granted, these works may be permissible under SEPP Coastal Management 2018.

Tables 1 to 4 outline the timelines, triggers and management actions for the following phases of an emergency:

1. Prevention
2. Preparation
3. Response
4. Recovery

Table 1 includes preventative actions to improve capability and capacity for emergency response and resilience. The implementation of actions detailed in Tables 1 to 4 are dependent on a number of factors including ensuring the WH&S requirements of personnel, available resources, obtaining necessary agreements and approvals, budget and time constraints. All factors will be considered in determining whether the emergency actions will be reasonable and feasible to implement.

Detailed information and spatial data to operationalise the actions outlined in Tables 1 to 4 will be included within CN's accompanying Stockton Emergency Management Operational Procedures. These procedures will set out internal delegations for actions within the Tables below against current roles within the organisation, and will be reviewed and updated as necessary.

Prevention and mitigation measures in relation to infrastructure works, asset management, land use and development controls are assessed and implemented in accordance within the Stockton Coastal Management Program (2020). They are not within the scope of Stockton CZEAS.

Table 1 – Emergency Response Actions Phase 1 – Prevention

Action ID	Timing	Responsibility (Support)	Action /Reporting
1.1	Within 12 months	LEMO	Through the Local Emergency Management Committee: Work with NSW SES / Police / NSW FRS to develop, align and review agency specific emergency incident action'; evacuation and communication plans for Stockton, to be consistent with this Stockton CZEAS. Keep a revision log for the next scheduled review of the Newcastle EMPLAN (2018)
1.2	Within 12 months	LEMO	Investigate feasibility of adopting the principles of the Australasian Inter-service Incident Management System (AIIMS) within CN emergency systems.
1.3	Ongoing	Assets and Projects Manager (LEMO)	Maintain CN's internal Stockton Emergency Management Operational Procedures to guide CN's response to coastal hazards and events across the disaster management cycle. This procedure will include specific spatial and asset data, set out internal delegations, resourcing, training, testing and post action reviews and documentation to support any Common Operating Platform for CN. Monitor and evaluate the implementation of the Operational Procedures after an emergency event and amend where necessary.
1.4	Within 3 months and ongoing	Manager - Major Events and Corporate Affairs (MECA) (Support Asset Services – Coordinator Environment; LEMO)	Prepare communications strategy that provides information to the community before, during and after emergency events This strategy is to: • Establish CN contacts and roles for the strategy • Confirm internal authorisation arrangements for media/spokesperson roles • Setout how and when consultation with other agencies will occur – including operational contacts (email, mobile number) to LEMO for EMPLAN events. Prepare templates and draft collateral to enable ready deployment of this strategy to provide timely public safety and emergency information, including CN's intended emergency responses to coastal erosion. Provide ongoing information to residents and property owners about safe recreational usage, coastal erosion and inundation hazards. Promote a clear single point of contact and information source for all public enquiries.
1.5	Within 6 months	Strategic Planning	Advise owners of affected properties that their dwellings may be at risk in a severe storm event.
1.6	Within 12 months	Assets and Projects Manager or delegate	Investigate partnering with NSW SES to provide general information to Stockton residents and owners about coastal erosion and inundation hazards. Investigate partnering with NSW SES to engage with subset of potentially impacted residents build local community resilience, e.g. by supporting residents to have their own household and neighbourhood emergency plans.
1.7	Ongoing	Assets and Projects Manager or delegate	Support leaseholders of CN properties to prepare emergency response and /or business continuity plans. Provide best available coastal hazard and warning information to leaseholders for the purposes of these plans.

Table 2 – Emergency Response Actions Phase 2 – Preparation

Action ID	Timing	Responsibility (Support)	Action /Reporting
2.1	Ongoing	Assets and Projects Manager or delegate	Weekly monitoring of conditions including weather (measurements, warnings and forecasts), wave forecasts (height and direction), water level (tidal) predictions, real time wave data (height, period and direction), real time water level data (including consideration of elevated water levels due to storm surge), and beach behaviour (extent of erosion, beach width, understanding of historical beach behaviour at times of storms). Monitor and assess the erosion escarpment in relation to development at key locations. Report significant change in condition and/or weather forecast to management.
2.2	Every 6 months	LEMO	Maintain and distribute up to date contact list with after-hours emergency phone contacts for early warning purposes in case of a storm event (including but not limited to; internal CN contacts, NSW SES, NSW Police, FRNSW, Stockton SLSC, Holiday Park, Hunter Water, DPIE, designated Public Information Officer or similar contact details).

2.3	Ongoing	Assets and Projects Manager or delegate	Maintain procedures and guidance for monitoring, emergency inspection, damage assessments, "make safe" and reactive works to ensure public and worker safety including:
			• site inspections of relevant assets and hazard areas (Section 9)
			• management of storm debris (potentially containing asbestos)
			• installing, monitoring, maintaining exclusion zones and other "make safe" measures (barriers, fences and signage):
			  • public accessways to the beach and dune fencing
			  • beach facilities and open space
			  • roads and footpaths
			  • emergency works sites
			• removal and dismantling of the above exclusion and "make safe" measures

2.4	Ongoing	Assets and Projects Manager or delegate	Maintain the portfolio describing relevant details of all properties and assets adjacent to Stockton Beach, including Lot and DP, ownership, foundation type and depth, and notation of which properties and assets may require evacuation.
2.5	Ongoing	Assets and Projects Manager or delegate	Ensure site suitable barriers, fencing and signage are available and ready for deployment to effectively close or "make safe" CN managed: • public accessways to the beach • beach facilities and open space • roads and footpaths • emergency works sites
2.6	Within 12 months	Assets and Projects Manager or delegate	Undertake necessary environmental assessments and approvals for potential emergency coastal protection works.
2.7	Every 6 months	Assets and Projects Manager or delegate	Prepare logistics and supply chain contingency plans for likely resources needed to implement potential emergency works, for example, geo-textile products, sandbags and ancillary equipment and sand. Review the list of suppliers for, and availability of, non-stockpiled materials which may be required for intended emergency actions, such as sand or rock.

Table 3 – Emergency Response Actions Phase 3 – Early Warning and Response

Trigger	Action ID	Responsibility (Support)	Action /Reporting
BOM issues a "Severe Weather Warning for Damaging Surf" OR "Severe Weather Warning for Storm Tides" OR CN staff identify a likely coastal erosion event	3.1	Assets and Projects Manager or delegate	Undertake regular monitoring and reporting of weather, wave forecasts and beach conditions.
	3.2	Assets and Projects Manager or delegate	Undertake regular on-ground monitoring of environmental conditions and beach behaviour and close all potentially impacted areas.
	3.3	Assets and Projects Manager or delegate (LEMO)	In accordance with Stockton Emergency Management Operational Procedures: Notify relevant internal staff that coastal erosion event is possible or likely. Confirm availability of labour, resources for "make safe" arrangements and inspections for duration of the event, including early warning, response and early recovery phases. Confirm and circulate emergency contact details.
	3.4	MECA	Deliver early warning and response components of communications strategy as situation develops. Consultation with LEMO/other agencies as required.
	3.5	Assets and Projects Manager or delegate	Identify areas where "make safe" measures are needed and deploy. Consider where potential emergency coastal protection measures may be required (such as pre-emptive sandbag revetments in high risk areas), and deploy as necessary. Note: approval processes already prepared.
Significant erosion escarpment forms and predicted increase in storm threat Note: Actions as a result of this trigger are to be applied to all trigger responses below	3.6	Assets and Projects Manager or delegate	Increase frequency of web-based monitoring and keep records of any weather warnings/reports of erosion.
	3.7	Assets and Projects Manager or delegate	Gather evidence of erosion escarpment. Evidence to be provided to coordinator. Respond with "make safe" or site management as required and practical.
	3.8	Assets and Projects Manager or delegate	If access is required to facilitate emergency actions or actions under the direction of the Combat Agency, implement necessary temporary access works.
	3.9	Assets and Projects Manager or delegate	Monitor and assess roads, and if considered unsafe organise temporary closure through barricades and safety signage.
	3.10	Assets and Projects Manager or delegate	Notify all appropriate stakeholders – including LEMO – with request to be on standby for possible emergency meeting.

Table 3 – Emergency Response Actions Phase 3 – Early Warning and Response (continued)

Trigger	Action ID	Responsibility (Support)	Action /Reporting
Top of erosion escarpment within 20m of built asset with predicted increase in storm threat, OR Wave overtopping/coastal inundation is affecting private or public land, OR Predicted increase in storm threat by BoM (waves exceeding 7m and tides exceeding 1.6m or storm surge greater than 0.6m)	3.11	Assets and Projects Manager or delegate (LEMO)	Notify all appropriate stakeholders including LEMO to gather for emergency meeting.

Top of erosion escarpment within 15m of a built asset with a predicted increase in storm threat, OR
 	
Significant wave overtopping/ coastal inundation is affecting private or public land
	3.12	Assets and Projects Manager or delegate
		
		(LEMO, MECA)
			If the EMPLAN is invoked, and as required:
			• establish and maintain a Local Emergency Operations Centre (LEOC) for the Local Emergency Operations Controller (LEOCON – see **Section 4.3**)
			• provide support staff for the LEOC
			• provide human resources, plant, equipment, materials and services, as required in dealing with an incident or emergency
			• provide support to combat agencies and functional area agencies as required including:
			  • reconnaissance of the area effected by the emergency
			  • post disaster damage assessment
			• assist, at their request, the Police Service, Fire and Rescue NSW, Ambulance Service and NSW SES in dealing with any incident or emergency
			• assist in any other emergency management prevention, preparedness or recovery operations, including emergency management training, for which the CN's training and equipment is suitable
			• at the request of the LEOCON, coordinate disaster recovery operations, excluding welfare assistance to disaster victims for whom Department of Family and Community Services – Community Services is responsible
			• provide engineering resources required for response and recovery operations including:
			  • damage assessment
			  • clear and re-establish roads and bridges
			  • demolish and shore-up buildings
			  • remove debris
			  • construct and maintain temporary levees and evacuation routes, when appropriate
			  • erection of barricades and fences for public protection
			• provide a liaison officer and executive support to the LEOC and LEOCON or Combat Agency Controller
			• provide an appropriately qualified officer to assist the District Environmental Functional Area Coordinator in relation to environmental emergency management matters

Table 3 – Emergency Response Actions Phase 3 – Early Warning and Response (continued)

Trigger	Action ID	Responsibility (Support)	Action /Reporting
	3.13	Assets and Projects Manager or delegate (LEMO)	Gather evidence and/or coastal and geotechnical engineering advice from suitably qualified person(s) where required, of erosion escarpment/inundation including location and other appropriate information. Evidence to be provided to emergency meeting stakeholders (3.12).
	3.14	Assets and Projects Manager Manager, Property and Facilities) and delegates (LEMO)	Hold emergency meeting with relevant stakeholders to determine whether Evacuation Plan or actions should be triggered / implemented for private / Council buildings
	3.15	Assets and Projects Manager or delegate (LEMO, MECA)	Inform residents/occupants of the issue Commence evacuation of all persons from buildings determined by stakeholder meeting to be at risk; and in accordance with any evacuation plan arrangements.
	3.16	Assets and Projects Manager or delegate	Revisit need to trigger or update emergency access (3.7) or road closures (3.8).
	3.17	Assets and Projects Manager or delegate Manager, Property and Facilities) and delegates	Contact utility service providers to request disconnection of electrical services to the affected area; plus sewage/water if required.
	3.18	Manager, Property and Facilities	Liaise with managers of NRMA Stockton Beach Holiday Park to: • assist with barricading and fencing the caravan park's beach accesses • assist with traffic management • authorise closure and opening of caravan parks in coordination with caravan park managers • assist the NSW SES/Police, if requested, in the evacuation of residents as required.
Decision is made during emergency meeting to implement emergency coastal protection works	3.19	Assets and Projects Manager or delegate	Transport all necessary materials and equipment for "make safe" erosion control or inundation protection to locations where emergency response works are required.
	3.20	Assets and Projects Manager or delegate	Restrict public access where emergency coastal protection works are to be implemented.
	3.21	Assets and Projects Manager or delegate	Implement temporary emergency coastal protection works (this may include Crown Land with appropriate permissions) to facilitate emergency actions or actions under the direction of the Combat Agency if required, and record all actions taken. Placement of measures are to be undertaken in consultation with suitably qualified coastal or geotechnical engineer. Temporary access works may include a range of activities e.g. placing sand filled geotextile bags, erecting temporary barriers, emergency vehicle access etc.

Table 4 – Emergency Response Actions Phase 4 –Recovery

Tigger	Action ID	Responsibility (Support)	Action /Reporting
Storm and erosion event has abated and safe to conduct post-storm activities	4.1	Asset Services Coordinators-Support and Environment and delegates	Built and natural asset inspections and damage assessments. Define clean-up needs and workorders including for: • beach debris • updated "make safe" works requests (including signage/exclusion) • short and medium repairs to damaged infrastructure and assets, access ways • short and medium term repairs to dune systems and vegetation Seek professional advice as needed. Scope and implement short - medium term remedial actions as required. Implement once safe /coastal system has sufficiently recovered, with reference to preventative works under the Stockton CMP.
	4.2	Asset Services Coordinators-Support and Environment and delegates	Monitor performance of emergency coastal protection works and tasks identified in 4.1. Take remedial action where required.
	4.3	MECA	Deliver early and medium term recovery components of communications strategy. Release warnings of any persisting hazards e.g. high, unstable or near vertical erosion escarpments collapsing without notice.
	4.4	Assets and Projects Manager	Ensure power, sewerage and water services are safely reconnected within Council facilities.
		Property and Facilities Manager and delegates	Contact utility service providers to request reconnection of electrical services to the affected area.
	4.5	Assets and Projects Manager	Request written damage assessments by suitably qualified professionals to confirm any evacuated CN facilities are safe.
		Property and Facilities Manager and delegates	Co-ordinate return of evacuated people and belongings to CN facilities and areas deemed safe.
Storm and erosion event has abated and safe to conduct post-storm activities	4.6	Assets and Projects Manager or delegate	Restock emergency materials and supplies for future erosion events.
	4.7	Assets and Projects Managerr or delegate LEMO	Post event debrief with emergency response team, review lessons learned, opportunities for improvement.
	4.8	MECA	Communicate with the community on further outcomes and actions to be undertaken.
Review of emergency actions	4.9	LEMO (Assets and Projects Manager and delegates)	Post emergency review of SCZEAS and CN Stockton Emergency Management Operational Procedures; track and update documents as required.
	4.10	Assets and Projects Manager or delegate	Review and collate records of the event, actions taken, issues identified and retain for reporting or future reference.

11. Communication Before, During and After an Emergency Event

If an event is anticipated, CN will liaise with the NSW SES and other emergency services to ensure consistent messages are being delivered by all to reinforce public safety advice. CN's emergency communication strategy will identify how CN staff will liaise with the combat agency. If an event occurs each combat agency and CN are each responsible for their own external media.

Before and during an emergency event CN will erect appropriate signage, including where temporary access works, barricades and fencing are in place, and provide information to the community, including community groups, visitors and tourists, regarding:

- The nature and extent of the emergency
- Risks associated with the emergency e.g. collapse of sand dunes, wave overtopping
- Likely impacts e.g. closure/loss of beach access
- CN's emergency actions
- Ways to minimise risk to personal and public safety e.g. avoid the hazard areas, heed safety warnings
- It is envisaged that the following media/outlets will be utilised, depending on their suitability at the time:
- CN's website and social media posts
- Local radio
- Local newspapers
- Signage
- Hard copy fact sheets/brochures
- Community group contacts

After an emergency event, CN will participate in a debrief with the emergency response team to review lessons learned and note opportunities for improvement. CN will provide information to the community as to the recovery process, including further outcomes and actions to be undertaken; and ongoing need for "make safe" arrangements.

12. Stockton CZEAS Implementation and Review

This Stockton CZEAS applies from the date of gazettal of the Stockton CMP. CN will monitor and evaluate the implementation of the Stockton CZEAS after an emergency event, and amend where necessary.

Operational changes and adjustments will be made to CN's accompanying Stockton Emergency Management Operational Procedures – as set out in **Section 10**.

13. References

City of Newcastle Flood Emergency Sub Plan (2013) (SFESP)

NSW State Emergency Service

Newcastle Coastal Zone Management Plan 2018 (CZMP)

City of Newcastle

Newcastle Local Emergency Management Plan (2019) (Newcastle EMPLAN)

City of Newcastle

New South Wales State Emergency Management Plan (2018) (NSW EMPLAN)

State Emergency Management Committee

New South Wales State Flood Plan (2018)

State Emergency Services

New South Wales Storm Plan (2018)

State Emergency Management Committee

Appendix B

Letters of Support

City of Newcastle

WORIMI LOCAL ABORIGINAL LAND COUNCIL

ABN: 51 352 201 603

PO Box 56
Tanilba Bay NSW 2318

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Williamtown NSW 2318

Phone: 02 4033 8800
Fax: 02 4033 8899

info@worimi.org.au

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09th June 2020

Chief Executive Officer
Attn: Project Management Engagement – Coastal Management
City of Newcastle, PO Box 489
NEWCASTLE NSW 2300

Via email: mail@ncc.nsw.gov.au

RE: WLALC submission to the CN – 'draft' 2020 Draft Stockton CMP

Thank you for the opportunity to provide feedback on the 'draft' Stockton Coastal Management Plan. Having reviewed the draft; we provide the following comments however in doing so, acknowledge the complexity of issues and highlight that CN have communicated these exceptionally well, providing a comprehensive CMP for public consideration.

First and foremost; we agree with the identified need for mass sand nourishment (as a solution for the coastal erosion at Stockton) and expect that numerous submissions will provide an opinion and/or recommendations on the topic including but not limited to, budgets and offshore dredging and terrestrial resources (i.e. from the northern end a.k.a the Worimi Conservation Lands).

Sand Nourishment and Resources:

We refrain from making any direct suggestion at this time; other than to note our acceptance of the requirement and, in doing so highlight the following concerns:

1. Resources from the Worimi Conservation Lands (i.e. a northern supply) is a 'conflict of interest' to the WLALC and any consideration is a discussion for Registered Worimi Aboriginal Owners, NPWS and the WLALC collectively;

2. Marine Sand / offshore dredging poses potential risk to the destruction of Aboriginal artefacts and we request consultation with the Registered Aboriginal Parties;

3. Current sand extraction operations owned by the WLALC have strict planning controls and limits and is unlikely to be a viable resource however, this is a discussion for our community Members; &

4. We have little objection to resources being acquired from the Port of Newcastle and/or other identified resources *acquired from 'off country'* however, recommend that CN liaise with the Aboriginal Community stakeholders and/or Land Councils, within other key identified areas.

Undetermined Aboriginal Land Claims

The WLALC currently has three (3) undetermined Aboriginal Land Claims situated within the draft Stockton CMP footprint, located in Zones 4 & 5 (see imagery and schedule below):

Aboriginal Land Claim Schedule:

Claim No	Land	Date of Claim	Status
19383	Lot 1 Sec 41 DP758929	24 August 2009	Undetermined
19564	Lot 1 Sec 42 DP758299	24 August 2009	Undetermined
5720	Closed road off Meredith St and lot 1 DP178933	16 November 1995	Undetermined

We give attention to Section 4 and the proposed Stage 1 buried protection works.

In our view; the initial Stage 1 works DO NOT impact on the land(s) directly other than to suggest, that they do not go far enough to offer any confidence of the land assets and interests being adequately protected.

Nonetheless; we do not have any objections to the Stage 1 – Buried Terminal Protection Structures, being proposed, nor do we oppose any proposal to complete a road closure at the adjoining points of Griffith Avenue and Barrie Crescent (should this be deemed necessary).

In respect to **Stage 2 Sand Nourishment** and project activities (i.e. truck movements and other machinery, including barricade etc), these items 'are likely to have an impact on the undetermined Aboriginal Land Claims' and (if so) we request that we be notified of the proposed works (methodology) so that we clearly understand the impacts. In doing so; we recognise the need for the works to commence (sand nourishment) and (should it be necessary), may be in accordance with the Crown Lands Act Schedule 2 Part 2 'Land Subject to Aboriginal Land Claim (ALC).

Stockton Caravan Park – Cabin Relocation (Lot 2 in DP1249904)

Although this issue is not in direct correlation to the draft Stockton CMP; it is a serious matter that needs to be addressed and resolved immediately (was created as a result of the Stockton erosion issues).

During a site meeting with CN Mayor and key CN staff, it was agreed that the cabins would be removed from the temporary site (better known as Lot 2 in DP1249904).

Recent site inspections identified that the Cabins have not been relocated and we request a response to explain CN's actions? The WLALC demonstrated an 'act of good faith' with CN and has not (to date) sought any Penalty Infringement for the 'illegal actions' undertaken. Short of a reasonably response to our query and concerns; we are considering reinitiating our complaint with the Dept. Planning.

We wish CN all the success as you navigate these challenging and unprecedented times and we respect the commitment and desire to correct the Stockton Beach erosion issues.

Yours sincerely,

Andrew Smith
Chief Executive Officer
Worimi Local Aboriginal Land Council

Jeremy Bath
CEO, City of Newcastle.

P.O Box 489 Newcastle
Newcastle NSW 2300

Our ref: DOC20/493234

Your ref: Stockton CMP

File: EF20/1119

26 June 2020

Dear Mr Bath

Department of Regional NSW support for the Stockton Coastal Management Program

I write to confirm that the Department of Regional NSW (DRNSW) will assume primary responsibility for the delivery of action CH31 within the Stockton Coastal Management Program (CMP).

Specifically, DRNSW will undertake a program of seafloor surveying and sampling in NSW state waters within Stockton Bight to identify any marine sand resources that would be suitable for beach nourishment at Stockton.

DRNSW will allocate up to $1 million in funding for this program, which may include:

- mapping the sediment distribution on the seafloor using multi-beam and LIDAR
- mapping the vertical thickness of the sand layers using sub-bottom profiling (low-powered seismic surveying)
- confirming near-surface sediment grainsize and composition by collecting sediment grab samples
- confirming the thickness and properties of the sand layers by collecting sediment core samples
- collection of some baseline environmental data, including water turbidity measurements and bottom-tow video.

DRNSW is pleased to support the City of Newcastle Council in the implementation of the Stockton CMP and in its efforts to identify a sustainable solution to the severe beach erosion issues at Stockton.

Should you have any questions relating to the proposed surveying and sampling program, please contact Dr Chris Yeats, Executive Director of the Geological Survey of NSW within the Mining, Exploration and Geoscience group of DRNSW via email to chris.yeats@planning.nsw.gov.au.

Yours sincerely,

Gary Barnes

Secretary

Stockton Coastal Management Program 2020 - Comments Port Stephens Council

Jessica Morris <Jessica.Morris@portstephens.nsw.gov.au>
To Official Mail
Cc Philippa Hill

Reply | Reply All | Forward | ...

Fri 5/06/2020 9:19 AM

This message was AutoForwarded.

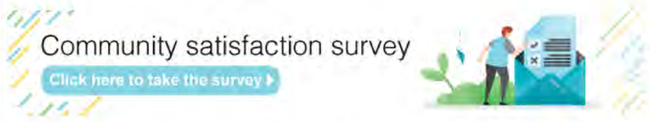
Thank you for the opportunity to comment on the Stockton Coastal Management Program. Port Stephens Council has reviewed the CMP and, as the area of interest finishes well before the Port Stephens LGA boundary, has no concerns in regard to any possible impacts to our shared sediment compartment or managed lands.

As a key stakeholder for the Stockton CMP, we reiterate our commitment to ongoing engagement and our interest in the studies that will underpin the final CMP. As an adjacent Council with a shared sediment compartment, we look forward to seeing the outcomes of the planned sediment transport study to be completed as part of the broader Newcastle CMP.

Overall, Port Stephens Council is happy to support the management option of the Stockton CMP that the City of Newcastle and their community find to be most feasible. We look forward to collaborating further on both the Port Stephens CMP and Greater Newcastle CMP to fulfil our management responsibilities with regard to the Stockton Bite.

PORT STEPHENS COUNCIL

Jessica Morris
Environmental Officer
p 02 4988 0288 | w portstephens.nsw.gov.au



Internal Memo

City of Newcastle

TO: Draft Stockton Coastal Management Program public submission, c/o City of Newcastle

FROM: Jeremy Bath, Chair - Local Emergency Management Committee

DATE: 15 June 2020

SUBJECT: Draft Stockton Coastal Zone Emergency Sub Plan

The draft Stockton Coastal Zone Emergency Action Sub Plan (Plan) was distributed to the Local Emergency Management Committee (LEMC) on 24 April 2020 as per the following email:

Subject: For Urgent Review: Draft Coastal Erosion Emergency Action Subplan

Hi LEMC members,

Attached is the draft version of the Coastal Erosion Emergency Action Subplan for Stockton. I appreciate it's a tight turn around however can you please provide any feedback or comments by 4 May 2020 so that the document can go on public exhibition.

We appreciate everyone's focus on COVID-19 however this subplan is important to ensure appropriate preparedness and community engagement for the ongoing erosion issues at Stockton.

If you could please reply to this email address (emergency@ncc.nsw.gov.au) even if nil feedback just to ensure we have captured everyone's responses.

Regards

Responses were received from Police, Fire and Rescue NSW, NSW State Emergency Services (SES), Port Authority, and Hunter Local Land Services with all parties understanding their responsibilities but with no further additions or suggestions.

The SES drew attention to the Flood Plan referencing and requested that the document be amended to replace the reference from *Local Flood Sub Plan* to *NSW State Flood Plan 2018*. This amendment will be incorporated into the final Plan.

The Plan will go to the LEMC in July for formal ratification.

Please contact our Emergency Management Coordinator at emergency@ncc.nsw.gov.au if you have any questions.

Jeremy Bath
LOCAL EMERGENCY MANAGEMENT COMMITTEE CHAIR

DOC20/134735

Chief Executive Officer
City of Newcastle
C/o Philippa Hill
Coastal Management Program Advisor

By email: phill@ncc.nsw.gov.au
cc: stuart.m.young@environment.nsw.gov.au

Dear Philippa

Draft Stockton Coastal Management Program as amended 17 June 2020 (Revision 2)

Thank you for your email, dated 17 June 2020, in which the amended Action Table (Revision 2) for the draft Stockton Coastal Management Program (CMP) was provided for review. As is required under section 15(4)(b) of the *Coastal Management Act 2016* (CM Act), the City of Newcastle is seeking agreement to the actions in the CMP that would be carried out by the Department of Planning, Industry and Environment – Crown Lands (Crown Lands), or that relate to land or assets owned and/or managed by Crown Lands.

The department's review of the CMP has noted there are key issues that have not been addressed in the Stockton CMP, including matters relevant to Crown land in zone 5 of the Stockton Beach study area. In addition, there is a degree of uncertainty surrounding the strategy of offshore mass beach nourishment proposed in the CMP, and the management response that may be required should this strategy fail to realise the outcomes that are envisaged. It will be important that these issues are addressed in the broader Newcastle CMP, to be developed by City of Newcastle in the year ahead.

Notwithstanding these limitations, the City of Newcastle is to be commended on preparing the CMP and developing a strategic response to the challenging coastal management issues at Stockton Beach. Subject to the CMP being amended in accordance with the Action Table (Revision 2), as emailed to the department on 17 June 2020, Crown Lands provides formal agreement to the CMP under section 15(4)(b) of the CM Act. This agreement does not exclude or replace the need for authorities to undertake the various planning, regulatory and approval processes that may be required under the *Crown Land Management Act 2016* as part of implementing the CMP.

The department looks forward to working with the City of Newcastle during the implementation phase of the CMP and the development of the Newcastle CMP. If you have any questions, please do not hesitate to contact Catherine Knight, A/Manager Coastal Management Unit on 0428 967 997.

Yours sincerely,

JAMIE MURRAY
A/ EXECUTIVE DIRECTOR GREATER SYDNEY & COMMERCIAL
DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT – CROWN LANDS

18 June 2020

437 Hunter Street Newcastle NSW 2300
PO Box 2185 Dangar NSW 2309
Tel: 1300 886 235 www.crownland.nsw.gov.au ABN: 72 189 919 072

RELEVANT EXCERPT OF FINAL DRAFT STOCKTON CMP AS SUPPLIED TO DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT - CROWNLAND ON 17 JUNE 2020
Excerpt Table 9 - Management Actions to Address Coastal Hazards

Action #	Approach	Zone	Management Action	Primary Responsibility	Supporting Partners1	Cost Estimate (Funding Source)	Evaluation Method	Timeframe
CH44	Planning	4	Adaptive risk mitigation strategy including design and approval of coastal protection works upon erosion triggers, for the identified risk potential at Griffith Ave and Barrie Cres. See Section 9 Mapping for potential locations for adaptive risk mitigation	CN		$35,000 (CN)	Design and approval of coastal protection works	Short-Medium
CH45	On-ground Works	4	Construction of approved coastal protection works upon reaching threshold, for the identified risk potential at Griffith Ave and Barrie Cres	CN		$100,000 initial budget Final budget variable	Construction of approved coastal protection works	Short-Medium

PORT of NEWCASTLE

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portofnewcastle.com.au

NEWCASTLE, 18 JUNE 2020

JEREMY BATH
Chief Executive Officer
City of Newcastle PO Box 489
NEWCASTLE NSW 2300

Sent via email: mail@ncc.nsw.gov.au

Attention: Philippa Hill

STOCKTON COASTAL MANAGEMENT PROGRAM 2020: IDENTIFIED ACTIONS

Dear Mr Bath

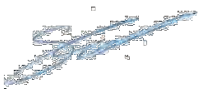
Reference is made to the draft Coastal Management Program 2020 for Stockton Beach and the three identified actions that relate to Port of Newcastle, defined in the table below:

CH13	On-ground works	Port of Newcastle to place suitable sand from maintenance dredging activities from harbour entrance offshore of Stockton Beach in accordance with concurrence issued by Office of Environment and Heritage (to be revised Feb 2022).
CH36	Planning	Undertake annual inspection of the northern breakwater as per the PON lease area and assess potential issues from coastal hazards
CH44	Partnerships	Continue to consult with Port of Newcastle and capital dredging proponents to request excess suitable sand from capital dredging projects is placed offshore of Stockton Beach

In accordance with the requirements of the *Coastal Management Act 2016*, I can confirm that Port of Newcastle are supportive of the three actions identified and will continue to work collaboratively with City of Newcastle on this important matter.

Should you have any questions regarding this letter please contact PON Manager Environment Sustainability and Planning Jackie Spiteri at Jackie.spiteri@portofnewcastle.com.au

Yours sincerely,



Glen Hayward
Executive Manager Marine and Operations

newcastle.nsw.gov.au