WATER TECHNOLOGY
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Final Report

Tweed Coastal Management Program Stage 1 Scoping Study

Tweed Shire Council

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EXECUTIVE SUMMARY

The coastline and estuaries of the Tweed are major social, environmental and economic assets for the region. However, the system is facing increasing pressure from population growth, urbanisation and climate change. Under the NSW Coastal Management Framework, Tweed Shire Council is preparing a series of Coastal Management Programs (CMPs) in order to address current and future risks, and enhance the coordinated management of the coastal zone within their Local Government Area.

This Scoping Study represents the first of five stages in the CMP Process. The purpose of this study is to review the history of managing the coastal zone, develop a shared understanding of the current situation, and identify the focus of Councils new CMPs.

The Scope of a CMP

A total of three (3) CMPs will be developed for the different geographical areas of Tweed Coastal Zone: The Tweed River Estuary, The Cobaki and Terranora Broadwaters, and The Tweed Coast and Coastal Estuaries. The first of these, for the Tweed River Estuary, is currently being finalised. The remaining two CMPs will be developed over the next few years in a staged process.

Roles and Responsibilities

This scoping study has included an audit of historical coastal management arrangements across the LGA. Governance of the Tweed coastal zone is multi-layered, with the waterways and foreshores owned and managed by a wide variety of stakeholders across multiple levels of government. Stakeholders include Tweed Shire Council, NSW National Parks and Wildlife Service, Crown Lands, the Department of Primary Industries - Fisheries, Transport for NSW, Tweed Byron Local Aboriginal Land Council, North Coast Local Land Services and the Tweed River Entrance Sand Bypassing Project.

Pressures and Threats facing the Tweed Coastal Zone

A review of historical coastal/estuary plans and a first-pass risk assessment has identified a number of key issues and priority threats to the environmental, social and economic values of the Tweed coastal zone.

These include land use intensification, resource use and conflict, natural hazards, public safety, governance ambiguity and information gaps.

Benefits of a CMP

The potential benefits of preparing the CMP are substantial. The stakeholder engagement activities undertaken as part of this scoping study demonstrated significant support for the development of CMPs across a broad range of local and state government agencies. The CMPs will provide an opportunity to develop a strategic, long-term approach to coastal management, and improve coordination across local and state government agencies. The CMPs will enable the funding and implementation of projects that will provide tangible benefits to the local community - through ensuring safe and sustainable access to the coastal zone, protecting public and private assets from current and future coastal hazards, and maintaining healthy ecosystems and biodiversity.

Stakeholder and Community Engagement

The development of the program will include extensive engagement with the local community and user groups, relevant government agencies, and neighbouring Councils. As part of this Scoping Study, a Stakeholder and Community Engagement Plan has been prepared for the remaining stages of the CMP development process.

The Way Forward

This study has developed a business case and forward plan for CMP progression. It is estimated that each CMP will take around 2.5 years to progress through Stages two to four. The fifth and final Stage will involve the ongoing implementation of each program over a 10-year period thereafter.

The programs can be developed concurrently where resourcing and funding allows. The estimated cost to develop these two CMPs is around $540,000 (for both), and they are eligible for financial assistance from the NSW Coastal and Estuary Grants Program, administered by DPIE.

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1 INTRODUCTION

1.1 Background

This study has been prepared on behalf of Tweed Shire Council (Council) with funding and technical support from the NSW Department of Planning, Industry and Environment (DPIE), in consultation with various state agencies and other relevant stakeholders.

The report documents a Scoping Study for the entire coastal zone of the Tweed Shire LGA. The Scoping Study represents the first Stage of the CMP process, and this report has been prepared in accordance with the requirements outlined in the Coastal Management Manual (OEH, 2018a).

1.2 The NSW Coastal Management Framework

The NSW coast provides a multitude of values and uses for the community. However, the coastal zone is under increasing pressure from a growing population, urbanisation, natural hazards and climate change. In order to plan for development, protect environmental assets and manage coastal hazards across the state, the NSW Government has implemented the *NSW Coastal Management Framework*, which includes new legislation and planning policy - and aims to provide an integrated framework for coastal management across the state. Central to the framework is the:

- ***Coastal Management Act 2016*** (CM Act): An act that provides for the integrated management of the coastal environment of New South Wales, consistent with the principles of ecologically sustainable development, for the social, cultural and economic wellbeing of the people of the state.
- ***Marine Estate Management Act 2014*** (MEM Act): An act that provides for the management of the marine estate of New South Wales in a manner that promotes a biologically diverse, healthy and productive marine estate and which facilitates the economic cultural, social and recreational use of the marine estate.
- **Coastal Management State Environmental Planning Policy 2018** (CM SEPP): One of the key environmental planning instruments for land-use planning in the coastal zone. It gives effect to the objectives of the CM Act 2016 and delivers the statutory management objectives of the act by specifying how development proposals are to be assessed if they fall within the coastal zone.
- The advent of **Coastal Management Programs** (CMPs): A five stage coastal management process intended to set the long-term strategy for the coordinated management of the coastal zone for a given region.
- The **NSW Coastal Management Manual** (The Manual): A manual that sets forth mandatory requirements and provides guidance to coastal councils in connection with the preparation, development, adoption, implementation, amendment, and review of CMPs.
- The **NSW Coastal Council**: Which is responsible for advising the Minister on coastal issues, as well as reviewing and approving Local Council CMPs.
- The **NSW Coastal and Estuary Grants Program**: Which provides technical and financial support to local government to help manage the coastal zone.

A schematic of the NSW Coastal Management Framework is provided in Figure 1-1.

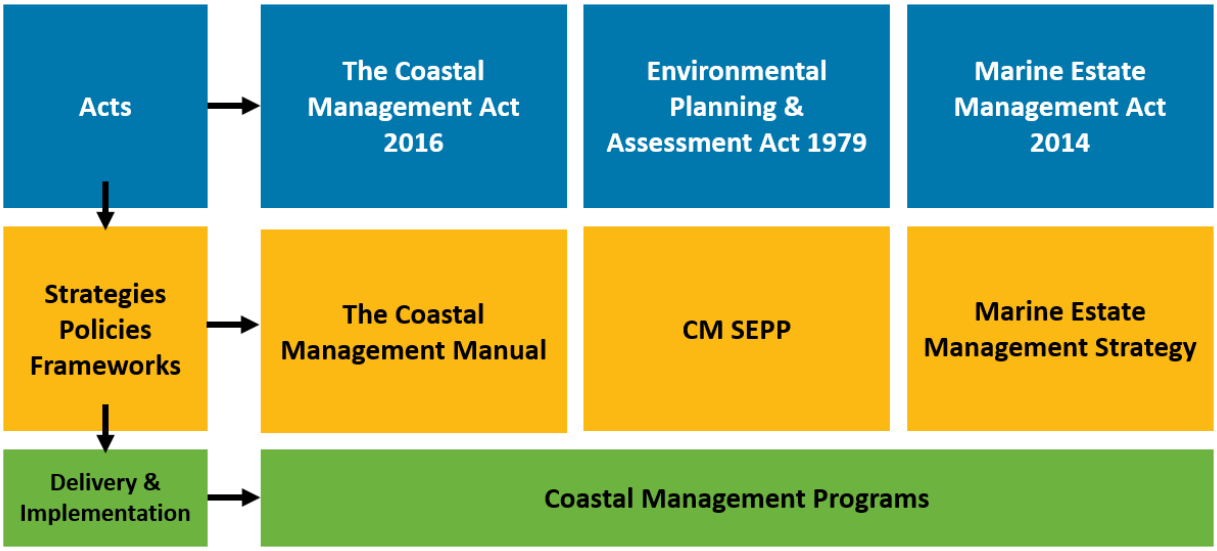

FIGURE 1-1 THE NSW COASTAL MANAGEMENT FRAMEWORK

1.3 The Tweed Shire CMP Scoping Study

The purpose of a CMP is to set the long-term strategy for the coordinated management of the coastal zone of a given area, with a focus on achieving coastal management objectives at a local level whilst also achieving the objects of the CM Act (OEH, 2018a). It provides an opportunity for councils, public authorities and local communities to clearly identify and balance competing interests and priorities in the coastal zone.

More broadly, a CMP may be prepared by one or more local Councils for a given area. The area that a CMP covers may comprise all or part of the coastal zone of one local government area (LGA). Alternatively, a CMP may be prepared for adjoining council areas working together, where important physical or ecological features such as coastal sediment compartments or estuaries cross local government boundaries (OEH, 2018a).

A CMP is prepared through a five stage risk management process as described in the NSW Coastal Management Manual and depicted in Figure 1-2. This process is intended to help councils and their communities to identify and manage risks to the environmental, social and economic values of the coast (OEH, 2018b). The Manual sets forth mandatory requirements for CMPs, and provides guidance regarding their preparation, development, adoption, implementation, and review.

The Manual provides information to help councils to evaluate and select management actions that are feasible and effective in managing the coastal environment. These actions are then incorporated

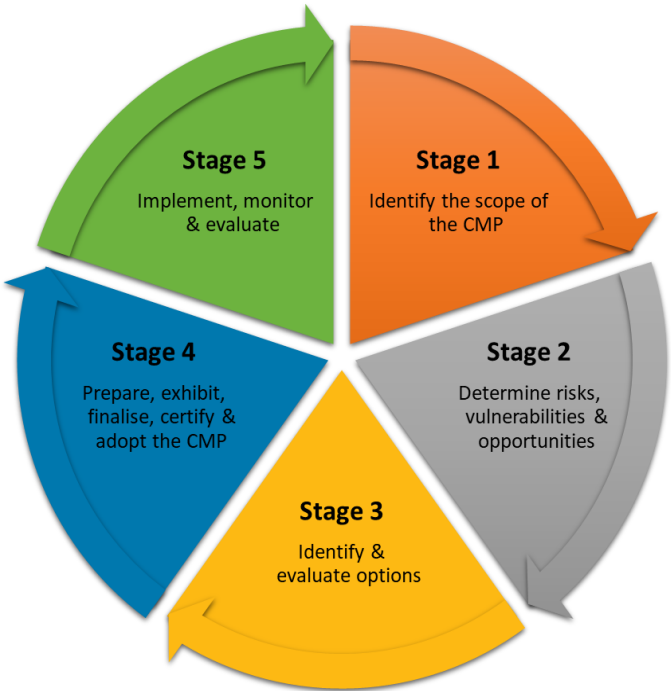

FIGURE 1-2 THE CMP PROCESS

FIGURE 1-3 THE COASTAL MANAGEMENT MANUAL

into councils' land-use planning instruments and Integrated Planning and Reporting (IP&R) Framework, established in the *Local Government Act 1993*.

Under the NSW Coastal Management framework, Tweed Shire Council may (or must do so if director by the Minister) prepare a CMP, or a series of CMPs, for its coastline and coastal estuaries.

Council is commencing their CMP process, and this scoping study is the first stage. The primary purpose of a Stage 1 Scoping Study is to:

- Review the history of managing the coastal zone;
- Develop a shared understanding of the current situation; and
- Identify the focus of the new CMP.

Stage 1 builds on and integrates with previous work, including existing plans and strategies, technical studies and stakeholder input (OEH, 2018b). It guides council in formulating appropriate strategies and actions in later stages of the process (Stages 2 to 5).

Stage 1 includes establishing the strategic context and scope of the CMP (see Sections 3 and 4), and establishing current governance arrangements across the coastal zone (see Section 6). It includes a preliminary risk assessment that identifies key issues (see Section 7); a gap analysis to identify further work to undertake in Stage 2 (see Section 8); a preliminary business case to identify the value of investing in the CMP process (see Section 9), and a forward plan to outline the subsequent stages of preparing a CMP for the subject areas (see Section 10).

Effective engagement and communication are important aspects of a successful CMP. A key component of this Scoping Study is the development of a Community and Stakeholder Engagement Plan (provided in Appendix A). This plan outlines which organisations should be involved in the review, preparation and implementation of the CMP, how they will be offered engagement opportunities and how their input will be incorporated into the planning process.

1.4 The Study Area

The Tweed coastline occupies a unique location on the Australian east coast. It is located in a world-renowned tourist area that stretches from Byron Shire in the south to the Gold Coast of Queensland in the north. The Tweed Shire LGA open coastline is around 37 kilometres long and comprises a series of long sandy beaches encompassed by rocky headlands and punctuated by estuary entrances. The 12 council managed beaches that span the open coastline are depicted in Figure 1-10 and comprise (from North to South):

- Duranbah Beach
- Letitia Beach
- Fingal Head Beach
- Dreamtime Beach
- Kingscliff Beach
- South Kingscliff Beach
- Casuarina Beach
- Bogangar Beach
- Cabarita Beach
- Cudgera Beach
- Pottsville Beach
- Mooball Beach
- Wooyung Beach

FIGURE 1-4 KINGSCLIFF BEACH (LEFT) AND HASTINGS POINT (RIGHT)

The LGA coastal zone also comprises a series of wave dominated barrier estuaries, comprising (from North to South):

- Cudgen Creek
- Cudgera Creek
- Mooball Creek

Cudgen Creek is a brackish barrier lake estuary with an open, trained entrance (see Figure 1-5). The estuary is relatively shallow, with an average depth of just over a metre, and a catchment of around 70 km^2. The estuary entrance is located at Kingscliff.

FIGURE 1-5 CUDGEN CREEK (SOURCE: DPIE, 2019)

Cudgera Creek is an intermittently closed and open coastal lagoon (ICOLL) estuary with an open entrance. It is also relatively shallow, with an average depth of less than one metre. Its relatively small estuary area (0.5 km^2) when compared to its catchment (60 km^2) results in only very infrequent entrance closures. The estuary entrance is located at Hastings Point.

Mooball creek is a wave dominated interbarrier estuary with an open, trained entrance. Like the other estuaries, it drains a large catchment (110 km^2) relative to its estuary size (0.5 km^2). The estuary entrance is located at Pottsville.

FIGURE 1-6 TWEED RIVER ESTUARY (SOURCE: DPIE, 2019)

The Tweed LGA also encompasses the ***Tweed River Estuary***, the catchment of which has an area of 1,300 km^2 and is almost entirely encompassed within the Tweed Shire. The Tweed River Estuary runs approximately 35 km from the Bray Park Weir to its confluence with the ocean at Tweed Heads.

The estuary is a mature, wave dominated barrier estuary with a permanently open, trained entrance managed jointly by the NSW and QLD Governments through the Tweed River Entrance Sand Bypassing Project. Major in-stream structures that impact flows are Clarrie Hall Dam and Bray Park Weir which supply potable water to the Shire (Hydrosphere, 2019).

The CMP for the Tweed River Estuary has been developed and is to be finalised in 2020 (Hydrosphere, 2019). Whilst this Scoping Study document will cover the Tweed River Estuary and its associated catchment for the purposes of delivering a holistic, LGA wide Stage 1 Scoping Study – the remaining Stages of the CMP for the Tweed River Estuary will be delivered through that program.

FIGURE 1-7 TWEED SAND BYPASS JETTY

The ***Tweed River Entrance and Bypassing System*** (TSB) has been in operation since 2001 and is a sand transport system that collects sand from the southern side of the Tweed River entrance at Letitia Spit, and pumps it under the river to outlets on the northern side. The system is designed to transport the natural quantities of sand that move northwards along the coast (TSB, 2019).

FIGURE 1-8 TERRANORA BROADWATER (SOURCE: OEH, 2019)

Within the LGA there also exists the ***Terranora and Cobaki Broadwater's*** - two shallow estuarine lakes that discharge into Terranora Creek (see Figure 1-8). The broadwater systems are fed, in total, by four main tributaries and six sub-catchments. Both are influenced by tidal flows from the Tweed River estuary and freshwater inputs from the western sub-catchments. The Broadwaters are shallow, at around 0.5-1.5 m depth, and act as the receiving waters for the freshwater catchment.

Whilst these broadwaters will be included in this Stage 1 Scoping Study, the remaining Stages (2 to 5) for these estuaries will be delivered through a separate CMP.

1.5 The Tweed Shire CMP Structure

The geographical distribution of CMPs within or across a given Council LGA is based consideration of a number of environmental, social and governance issues. Under the CM Act, CMPs are required to take a "systems" approach to coastal management. This means that the study area for the CMP(s) needs to recognise that important physical and ecological systems extend across the catchment, coastline and estuaries of the Tweed Shire LGA – including hydrological, ecological, social and governance processes. However, the study area should not be so large that it lacks the required granularity and cannot adequately identify and address smaller, localised issues. Consideration also needs to be given to Council resources and capacity to undertake on a CMP, or multiple CMPs, at a particular time.

The determination the spatial scale of a CMP should aim to balance these considerations. To this end, Tweed Shire Council have determined that the CMP process for their LGA should comprise a suite of three (3) discrete programs as depicted in Figure 1-9 below.

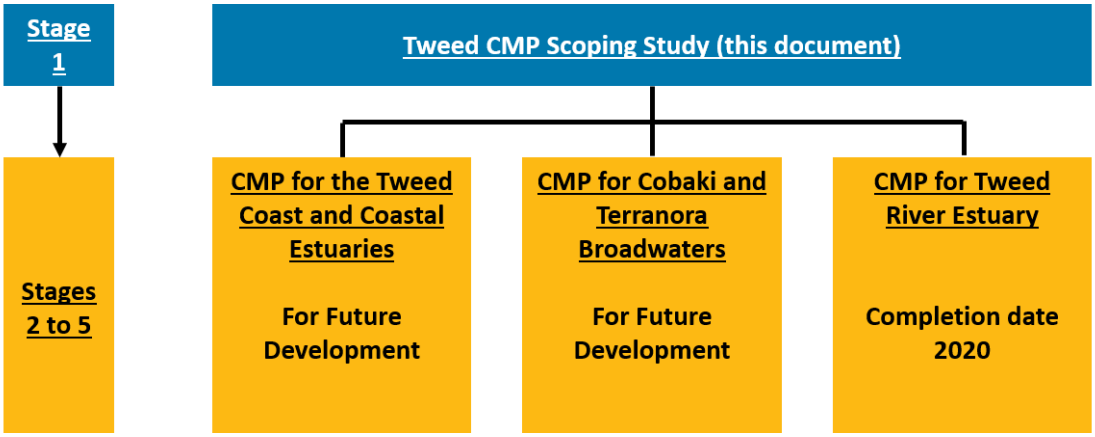

FIGURE 1-9 STRUCTURE OF TWEED CMPS

This discretisation of the CMP process is based on the following rationale:

- A single CMP that covers the entirety of the LGA coastal zone (including the coastline and estuaries) would be too large in scale to adequately address smaller scale issues, without being broken down into a series of smaller sub-plans/programs.
- The Tweed River Estuary is one of the largest estuary systems in northern NSW, in terms of both water area and length of foreshore (Roy, 2001; Roper et a, 2010). Whilst the estuary system maintains permanent connectivity to the open coast, the issues facing the estuary are relatively different in nature to those affecting the open coastline, particularly with regards to the environmental, social and economic values of the system. Therefore, a stand-alone CMP for the Tweed River Estuary has been developed and is to be finalised in 2020 (Hydrosphere, 2019). However, the development of the draft Tweed River CMP has been affected by the timeframe over which the NSW coastal reforms were developed and initiated. As a result, a comprehensive scoping study has not been completed for the Tweed River CMP. In order to deliver a holistic, LGA wide, Stage 1 Scoping Study, this Scoping Study document will cover the whole Tweed Shire coastal zone including the Tweed River Estuary and its associated catchment. This Scoping Study considers the adequacy of the Tweed River CMP in addressing key risks and threats as identified in this Scoping Study, however will not prescribe Stage 2 studies, Stage 3 management options assessment, or Stage 4 CMP preparation unless gaps or inadequacies are identified with the Tweed River CMP.
- The Cobaki and Terranora broadwaters maintain permanent connectivity to the Tweed River Estuary, including the interplay of a number of physical and environmental systems. Therefore, a number of key commonalities exist between the broadwaters and the Tweed River Estuary in relation to key issues affecting those systems. However, a separate CMP is to be developed for the broadwaters for a number of reasons. In the first instance, the intention is to maintain a manageable study area size. Furthermore, management of the broadwaters has historically been undertaken through their own Coastal Zone Management Plan (CZMP), and the efficacy of this CZMP has been recognised by the Tweed Coast and Waterway Committee in appropriately managing these areas (Hydrosphere, 2019).
- The Tweed coast and coastal estuaries (Cudgen, Cudgera, and Mooball Creeks) have historically been addressed in separate management plans. However, the CMP represents an opportunity to produce a more holistic management program for the Shires coastal and estuary systems. There are a number of key hydrodynamic, morphological and ecological processes that are affected by the connectivity and exchange between the open coast and these estuaries. Therefore, a combined CMP for the open coast and coastal estuaries is considered appropriate to capture these processes whilst maintaining sufficient granularity to address localised issues.

The distribution of CMP development for the Tweed Shire LGA is mapped in Figure 1-11.

NOTE
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Contains NSW Spatial Data © State of NSW

Catchment Boundary
Waterways / Waterbodies

0 2.5 5 10 Kilometers

1:175,000 at A3

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Locality Plan
Tweed Coastal Management Program

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FIGURE 1-10 LOCALITY PLAN

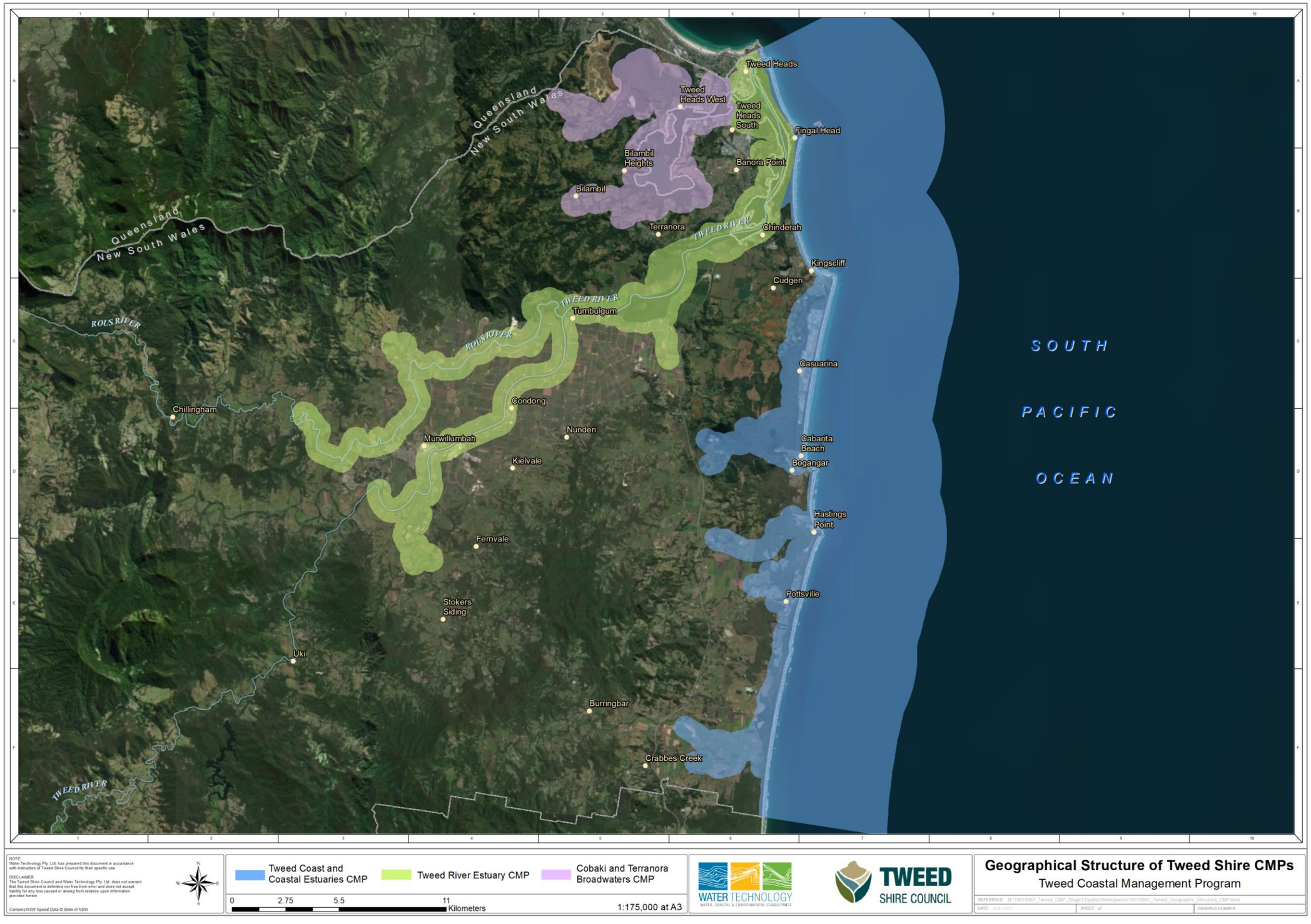

FIGURE 1-11 GEOGRAPHICAL STRUCTURE OF TWEED CMPS

2 PURPOSE, VISION AND OBJECTIVES

2.1 Purpose

The purpose of the CMP is to set the long-term strategy for the coordinated management of the Tweed Shire LGA coastal zone. The CMP seeks to achieve the objects of the CM Act through a program to identify coastal management issues, pressures, risks and opportunities - and the actions required to address these issues in a strategic and integrated way.

2.2 Vision

A local vision statement has been developed to help stakeholders identify with the future of the Tweed Shire LGA Coastal Zone, encourage a sense of community ownership of the actions in the CMP, and foster commitment to its preparation and implementation. The Vision Statement for this CMP has been developed in consultation with Tweed Shire Council, and is consistent with the Vision Statement prepared for the Tweed River Estuary CMP (Hydrosphere, 2019):

"The Tweed Coastal Zone is a special place: a healthy ecosystem supporting lifestyles, culture and productivity"

2.3 Objectives

A suite of objectives has been developed for the CMP, in order to ensure that the outcomes of the CMP are consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the Shire. They have been developed ensuring consistency and compatibility with the objectives set forth in the following earlier works:

- Tweed Coastline Management Plan (Umwelt, 2005);
- The NSW Coastal Management Act (2016);
- The Coastal Management State Environmental Planning Policy (CM SEPP);
- The North Coast Regional Plan 2036;
- The Tweed Shire Council Strategic Plan 2017-2027;
- The Tweed Coast Regional Crown Reserve Plan of Management (2006)
- The CMP for the Tweed River Estuary;
- The NSW Water Quality and River Flow Objectives (for the Tweed Region);
- The Marine Quality Objectives for NSW Ocean Waters;
- The NSW Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (OEH, 2019)

The objectives of the CMP have been outlined in broad terms, to establish the overall strategic direction of the program. It is anticipated that these objectives will undergo further refinement in consultation with the local community during later stages of the CMP.

The objectives of the CMP are:

a) to protect and enhance natural coastal processes and coastal environmental values across the Tweed Shire coastal zone for current and future generations;

b) to support the NSW Water Quality and River Flow Objectives for the Tweed River;

c) to support the social and cultural values of the Tweed Shire coastal zone and maintain recreational and scenic amenity, and public health, safety and wellbeing;

d) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the Tweed Shire coastal zone and to protect local indigenous cultural heritage;

e) to recognise the Tweed Shire coastal zone as a vital economic resource for the region and to support sustainable coastal economies;

f) to facilitate ecologically sustainable development across the coastal zone and promote sustainable land use planning that is consistent with the North Coast Regional Plan and the Tweed Shire Council Community Strategic Plan;

g) to foster the use of the NSW Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions;

h) to mitigate and manage current and future risks (environmental, social and economic) from coastal hazards, taking into account the effects of climate change;

i) to ensure co-ordination of the policies and activities of the relevant government and public authorities relating to the Tweed Shire coastal zone - and to facilitate the proper integration of their management activities across all levels of government;

j) to maintain meaningful engagement with the community, and to support public participation in coastal management and planning, and to foster greater public awareness, education and understanding of coastal processes and management actions;

k) to encourage and facilitate research and monitoring – and to maintain scientific and educational values and high conservation values; and

l) to support the objects of the Marine Estate Management Act 2014.

3 STRATEGIC CONTEXT

In order to understand and address coastal management issues in a risk framework, there needs to be a clear understanding of the internal and external context in which a CMP is undertaken. Therefore, as part of the Scoping Study, a review has been undertaken of the strategic context for coastal management in the Tweed Shire LGA – in order ensure that subsequent stages of the CMPs address relevant management issues, and that the overall direction of the program is carefully considered.

The ***strategic context*** for the CMPs has been broken down into a series of categories which are outlined in Table 3-1 below. For each of these categories, a high-level overview has been undertaken based on literature review and stakeholder engagement. Whilst these issues will be studied in further detail at later stages of the CMPs, it is important to have a broad understanding at the project outset.

TABLE 3-1 ESTABLISHING THE STRATEGIC CONTEXT OF THE TWEED CMPS

Context	Description of Strategic Context Drivers
Environmental	*What are the environmental features and processes affecting the coastal zone?* ▪ Local coastal processes, including waves, water levels, winds, extreme events, sediment transport, coastal erosion and storm tide inundation. ▪ Local coastal zone ecology, habitat extent and health, and catchment characteristics. ▪ Potential climate change impacts.
Governance	*What is the governance context of the CMP?* ▪ The political and governance context and the relationships between the council, adjoining councils and other public authorities.
Policy	*What is the relevant legislation and policy governing the coastal zone?* ▪ The relevant local, state and federal legislation and policies, land tenure and land managed as national park or crown reserve.
Management and Planning	*What is the strategic planning framework that the CMP must fit within?* ▪ Are there relevant coastal and estuary management plans in place across the study area? ▪ What other state, regional and local plans are relevant to the development of the CMP?
Economic	*What is the economic importance of the coastal zone?* ▪ The economic value of the coastline – including economic activity dependant on the coastal zone, such as tourism, commercial and recreational fishing, aquaculture and charter boating.
Social and Cultural	*What are the social and heritage values of the coastal zone?* ▪ Population growth and seasonal demographic changes. ▪ Local social use of the coastal zone – such as equity, distribution of wealth, willingness to pay and the reliance of the community on coastal related tourism or other coast-dependent businesses such as aquaculture. ▪ Whether there are any barriers within council or its community that may constrain or add complexity to the CMP planning process. ▪ The community's historical attitude to risk, including what level of risk is considered acceptable, tolerable and unacceptable – based on previous CZMP work. ▪ The significance and sensitivity of coastal values and issues in the local council area.

Context	Description of Strategic Context Drivers
Land Use and Development Context	*What is the current and future land usage across the coastal zone and contributing catchment?* ▪ The current land usage types across the catchment ▪ Identification of any significant changes to land usage across the catchment over the forward planning period, including significant urban developments.

3.1 Environmental Context

3.1.1 Geomorphology

From a geological perspective, the study area is located on the seaward margin of a coastal plain which is characterised by straight beaches and narrow, low-relief coastal dunes, backed by swampy sand flats and floodplains which infill the generally small coastal valleys (Roy, 1975; Gordon et al, 1975).

The present-day coastline from Kingscliff south to Cape Byron has resulted from the accretion of sand by marine processes deposited during the latter stages of sea level rises (marine transgressions) and the following interglacial periods (Roy, 1975). In the Tweed Coast region, it is believed that the majority of present day sediments were deposited during the Pleistocene and Holocene epochs – which generated the two major sand dune barrier units found in the study area (Knight et al, 2013) termed the Inner Barrier and the Outer Barrier (Thom, 1965). The Pleistocene sand deposits are termed inner barrier sands. The Holocene outer barrier dunes were generated through the delivery of marine quartzose sands from the continental shelf associated with the Pleistocene-Holocene sea level rise (Roy and Crawford 1977; Roy and Thom 1981; BMT WBM 2013b) - which began some 18,000 years ago (WBM Oceanics, 2001).

The CMP study area lies wholly within the wider *Point Danger–Cape Byron* coastal sediment compartment, which extends from Point Danger in the north to Cape Byron in the south (Thom et al, 2018; CM Act, 2016).

The coastline is characterised by ***long stretches of sandy beaches*** interspersed by wave dominated barrier estuaries, and rocky headlands. The beaches occur within compartments bounded by rocky headlands, and comprise relatively long, straight, east facing beaches composed of fine to medium grained sand. The beaches are generally backed by narrow vegetated dune systems, and whilst there are areas of localised of coastal development, there are also significant expanses of undeveloped coastal reserve along the LGA.

Bedrock headlands and low submarine rock reefs occur at Fingal Head, Norries Head, Hastings Point, and Pottsville. Basalts which originated from the now extinct Mount Warning volcanic centre overlie the bedrock material in the southern part of the study area. (Roy, 1975).

Three ***wave dominated estuaries*** punctuate the coastal zone - Cudgen in the north, Cudgera, and Mooball in the south – and flow northwards behind the coastal sand dune barrier. The creeks lie between the two coastal barrier sand deposits of different ages and are considered interbarrier estuaries (Thom, 1978). Key estuary classification details for each of these estuaries from Roy et al (2001) are provided in Table 3-2. The Tweed River estuary is a mature, wave dominated barrier estuary with a permanently open, trained entrance.

TABLE 3-2 ESTUARY CLASSIFICATIONS (ROY ET AL, 2001)

Estuary	Estuary Group	Estuary Type	Evolution stage	Water Area (km^2)	Approx. Catchment Area (km^2)	Length of foreshore (km)
Tweed River	Wave Dominated	Barrier estuary	Mature	17.9	1300	246
Cudgen Creek	Wave Dominated	Brackish barrier lake	Youthful	1.95	70	22.7
Cudgera Creek	ICOLL	Small coastal creeks	Semi-mature	0.24	60	14.0
Mooball Creek	Wave Dominated	Interbarrier estuary	Intermediate	0.49	110	13.2

3.1.2 Physical Processes

Wave Climate

The regional wave climate is a dominant factor amongst local coastal processes. The deep-water wave climate of the northern NSW coast comprises a highly variable wind wave (local seas) climate, combined with a persistent long period, moderate to high energy ***east to south-easterly Tasman Sea swell***. The range of offshore wave heights and directions are presented in Figure 3-1. Modal offshore significant wave heights are in the range of 0.5-2.0m, with spectral peak periods predominantly in the range 7-12 seconds (Jacobs, 2017). There is seasonal variability in the wave climate, with summer and autumn months generally being the most energetic. During winter months, the wave climate is mostly influenced by swell. Consequently, the average peak wave period is longer during these months and the energy-weighted wave direction is more southerly compared to other seasons. Prevailing wind waves are incident from a wider range of directions, consistent with the wind climate for the region, and range from small short period local 'sea' conditions to larger waves in excess of 6-7m significant wave height generated by tropical cyclones and east coast lows (Jacobs, 2017).

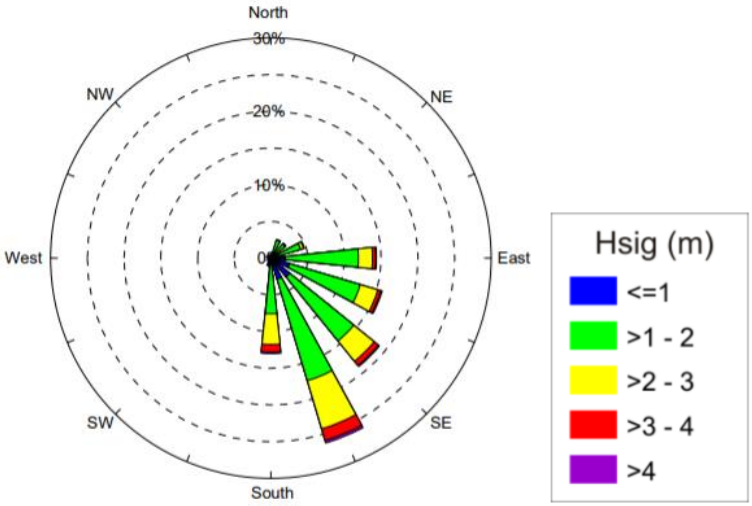

FIGURE 3-1 BYRON BAY WAVE ROSE (SOURCE: KULMAR, 2013)

Sediment Transport and Coastal Erosion

Regionally, the Tweed Shire Coastline is part of a long coastal compartment that experiences a ***continuous northerly longshore transport*** of sand extending from Cape Byron in the south to Point Danger in the north (CoastAdapt, 2019). This strong net northward littoral drift of around 500,000 m^3 per year is driven by the prevailing south-easterly swell (Hoffman, 1979; PWD, 1982, BMT WBM, 2013) and whilst the headlands locally anchor the overall coastal alignment, they do not protrude sufficiently to present a significant impediment to the average net northward littoral drift that dominates the region (Gordon et al, 1988).

While this average net longshore transport may bypass a headland over a period of years, there is potential for temporary, shorter term fluctuations in the supply of sand past natural headlands to downdrift beaches. These perturbations are typically greater at the more prominent headlands (e.g. Cape Byron), where periods of strong longshore transport past headlands are usually associated with large powerful swells and storm events with high wave energy (Gordon et al, 1978). As a result, sand movements past headlands tend to occur as episodic 'slugs' of relatively large quantities of sand during short term events, whereas longshore transport at adjacent beaches tends to be more continuous at lower rates (Gordon et al, 1988; WBM Oceanics, 2001).

Where there is an alongshore differential in longshore sediments transport, long term shoreline recession may occur. Previous studies such as WBM Oceanics (2000, 2001) have indicated an approximate regional shoreline retreat rate for the Tweed Coast of about 0.1 m/yr.

In the early 1900s, the New South Wales government constructed ***training walls*** at the mouth of the Tweed River. These walls were extended in 1962 and had an inevitable effect of disrupting the local longshore transport – resulting in erosion of the downdrift beaches on the southern Gold Coast. In 2001, a sand bypassing system started operating to deliver sand across the Tweed River bar so that it could be pumped to southern Gold Coast beaches.

Cross-shore sand transport occurs in the offshore direction during ***storm induced beach erosion events***, and in the onshore direction during ambient swell conditions. During storm events, beach sediments become suspended by breaking wave action and are directed offshore by undertow and rip currents and deposited in offshore bars. Gordon (1987) undertook an assessment of beach fluctuations and shoreline change along the NSW coast - assessing storm demand volumes in terms of the loss of sand from above mean sea level (AHD). This study found that storm bite volumes up to 250m^3/m have been identified but are more typically around 150-200m^3/m. During ambient wave conditions, this sediment is then directed back onshore by wave action, specifically due to asymmetry in wave orbital motions. For this reason, the beaches of the LGA experience cyclic periods of erosion and accretion driven by cross-shore transport.

Tides and Storm Tides

Tides are caused by the relative motions of the Earth, Moon and the Sun, and their gravitational attractions. The tides at the study area are ***semi diurnal*** with diurnal inequalities. That is, there are two high tides and two low tides per day that are generally at different levels (i.e. the two high tide levels are different in any one day). The tide range is around 2.0m at the coastline, with HAT around +1.1mAHD – see Table 3-3. The tide range within the various estuaries generally reduces with distance upstream. Within the Tweed River Estuary, the tide range reduces to around 1.4m at Tumbulgum (OEH, 2012), with the river's tidal influence reaching to the Bray Park Weir, around 5km upstream from Wollumbin St Bridge in Murwillumbah. Cudgen, Cudgera, and Mooball Creeks are wave dominated estuaries, with the presence of flood tide deltas at their respective entrances acting as hydraulic constrictions that reduce the tidal range inside the estuary (compared to the open coast). The extent of the flood tide delta generally controls the tide range, and as ICOLL's these estuaries periodically close off to the ocean, temporally disconnecting them from tidal processes.

Information regarding the tidal limits of the various estuaries is provided in MHL (2005) and is summarised herein (the reader is directed to that document for further detail regarding the tidal limits of each estuary and associated tributaries). Within the Cudgen Creek Estuary, the tidal limit generally reaches around 13-14km from the entrance through Clothiers Creek and Reserve Creek to the Pacific Highway. In Cudgera Creek, the tidal limit generally extends around 5-6km inland to the west and south, and via the Christies Creek tributary. Within Mooball Creek, the tidal limit extends around 9-11km from the entrance, with the Mooball and Burringbar Creek tributaries generally extending farther than Crabbes Creek.

Additionally, elevated water levels occur during storms as a combination of storm tide (tide plus surge due to barometric pressure and wind setup, including potential effects of climate change), wave setup and wave runup. Wave setup on the Tweed Shire coastal zone affects all tidal inlets except the Tweed River - where little wave setup will be apparent upstream of the mouth. Wave runup will occur on the beach/dune slope and

may result in dune overtopping where dune heights are sufficiently low. Storm tide levels (excluding wave set-up) provided by GHD (2013) are reproduced in Table 3-3

TABLE 3-3 TIDAL PLANES AND DESIGN STORM TIDE LEVELS AT THE TWEED OPEN COAST (SOURCE: MHL, 2012 AND MHL, 2018)

Tide/Storm Tide Level	m AHD
100 yr ARI	1.49
20 yr ARI	1.43
Highest Astronomical Tide (HAT)	1.08
Mean High Water Springs (MHWS)	0.69
Mean High Water Neaps (MHWN)	0.38
Mean Sea Level (MSL)	0.0
Mean Low Water Neaps (MLWN)	-0.38
Mean Low Water Springs (MLWS)	-0.69
Lowest Astronomical Tide (LAT)	-0.98

Currents

The nearshore current regime along the LGA coastline comprises a complex interaction of meteorological conditions, tides, shelf/ocean currents and waves. ***Wave-driven longshore currents*** are generated when waves break in front of the shoreline at an angle. These surf-zone currents may reach up to 1m/s and generally occur in a zone of up to about 2-3 metres water depth (Gordon et al, 1978; Hyder et al., 1997). Tidal currents along the coast are generally low, and less than 0.1m/s. However, tidal currents within the various estuaries are generally higher, and ebb and flow with the tides with velocities reaching up to 0.3m/s (Jacobs, 2017).

The East Australian Current (EAC) has a significant influence on nearshore currents in the study area - particularly outside the surf zone at Point Danger, the Tweed River entrance, Letitia Spit and Fingal. Recorded measurements (Helyer et al., 2011, Royal HaskoningDHV, 2017) suggest typical flow velocity of 0.3-0.4m/s. The EAC may periodically interact with the headland at Point Danger, generating circulation cells that can interact with tidal currents from the Tweed River entrance, and influence sand transport around the jetty and river training walls (Jacobs, 2017).

Catchment Hydrology

Flooding in many of the upstream estuarine regions of the coastal zone is governed by ***catchment flooding*** resulting from intense rainfall events. The coastal zone contains a significant area of floodplain, including the Tweed River downstream of Byangum, and the lower reaches of the Broadwater tributaries. The Tweed River valley comprises a wide floodplain of alluvial sediments contained by higher ground of bedrock (BMT WBM, 2009). The townships of Murwillumbah, Condong, Tumbulgum, Chinderah and Tweed Heads have frequently experienced inundation from floodwaters. The February 1954 flood, the largest flood on record for Chinderah and Tweed Heads, caused major inundation in all flood prone regions. The April 2017 flood was the largest on record for Murwillumbah and Tumbulgum.

A system of levees currently protects the main townships of Murwillumbah and Tweed Heads South from more frequent floods. Other flood mitigation measures such as the installation of floodgates on creeks and farm drains, the raising of the natural levee banks in some areas and the construction of drainage systems have also been undertaken (BMT WBM, 2009).

Key catchment hydrology parameters, as adopted from Roper et al (2011) are provided in Table 3-4 below.

TABLE 3-4 ESTUARY CATCHMENT HYDROLOGY (ROPER ET AL, 2011)

Estuary Catchment	Annual Catchment Rainfall (mm/yr)	Approx. Average Annual Flow (ML/yr)	Approx. Catchment Area (km^2)
Tweed River	1,400	490,000	1,050
Cudgen Creek	1,470	35,000	70
Cudgera Creek	1,470	29,000	60
Mooball Creek	1,460	52,000	110

The largest use of water from the Tweed River is for town water supply for the growing urban area of Tweed Heads. Other water users extract water for irrigation, stock and domestic use. Horticultural crops include tropical fruits, avocados, macadamias, stone fruit, tomatoes, and other vegetables. Irrigation of the river flats is carried out for dairying, while large areas adjacent to the estuary are used for sugarcane farming.

Storm Events

The Tweed Shire coastal zone is periodically exposed to storm activity originating in the sub-tropics of the north and the mid-latitudes of the south. To the north are tropical cyclones, which occur during the summer months and depressions developing into easterly troughs. Further south, low pressure systems such as cut-off lows, migratory lows and east coast lows are a major source of severe weather, particularly in the colder months (WBM Oceanics, 2001). These systems are all capable of generating storm surges, severe wave conditions, storm erosion and catchment flooding across the coastal zone.

FIGURE 3-2 EROSION AT LETITIA SPIT DURING THE MAY 2009 EAST COAST LOW (SOURCE: GOLD COAST BULLETIN)

It is now recognised that the erosion events of 1954, 1967, 1974 and 2009 were some of the most severe experienced in recent history. The two most notable major erosion events on record for northern NSW and southern Queensland, being June/July 1967 and 6th February 1974, occurred in conjunction with spring tides. Detailed coastal assessments of the state-wide impacts of these storms were undertaken by the NSW Public Works Department (PWD) in the late 1970s and early 1980s (Foster and Gordon, 1975).

From ***February to June 2009***, the Tweed-Byron region experienced a cluster of storms that generated significant erosion along the coastline. The combined effects of energetic waves, coastal flooding, spring tides and pre-eroded conditions of the beaches during the May 2009 storm led to the worst erosion seen on the Tweed-Byron and Gold coasts in many years – see Figure 3-2. Coastal erosion and inundation associated with the June 2016 ECL event was reported along the whole NSW coastline. However, wave heights and recorded storm surges were not as severe along the Tweed LGA compared to regions farther south. The event produced between a 1- and 10-year ARI wave height at the Byron Bay Waverider Buoy, with a maximum recorded Hs of 5.0 m (Burston et al, 2017).

3.1.3 Coastal Zone Ecology and Biodiversity

The Tweed Coast Estuaries and wetland areas provide a diversity of habitats for a range of terrestrial and aquatic species, and the coastline supports some significant natural assets such as Nature Reserves and State protected wetlands and rainforest. About half of the Tweed Shire LGA is covered by bushland, which comprises over 50 distinct vegetation communities. However, many of these are considered to be depleted,

or inadequately conserved and many are also listed as Endangered under the NSW Threatened Species Conservation Act 1995 (TSC Act). Around 80% of The Shire's bushland has high conservation status – and much of this occurs outside of National Parks and along the coastal strip (TSC, 2019a).

Most of the national parks and reserves in the Tweed valley are part of the ***Gondwana Rainforests of Australia*** World Heritage Area. They contain ancient rainforest communities, plants and animals with evolutionary links to Gondwana, and form part of the largest node of sub-tropical rainforest in Australia (DEE, 2019). Two islands in the Tweed estuary are included in the Directory of Important Wetlands in Australia. ***Stotts Island*** contains the only substantial remnant of lowland floodplain subtropical rainforest in NSW. ***Ukerebagh Island Nature Reserve*** is one of the largest estuarine wetlands in the Tweed and protects endangered communities of littoral rainforest, mangroves, saltmarsh and seagrasses (DPIE, 2019c).

While the coastline was extensively sand mined during the 20th century, the Tweed Shire's coastal reserves have significant value as a wildlife corridor along the coast, from Fingal Peninsula down to Byron Shire. Most beaches along the LGA coast are vegetated and are regularly used as nesting sites for turtles and wader birds (Umwelt, 2005). The dune vegetation is a significant part of the coastline's natural amenity.

The riparian zone, extending from the estuary foreshores to the upper catchment freshwater tributaries, provides a number of important ecological functions. It provides wildlife corridors that create connectivity in a largely cleared and fragmented landscape (Hydrosphere, 2013).

Some of the habitats important to the survival of local flora and fauna communities, and the health of the estuaries across the coastal zone include (as per AW and ABER, 2010):

- Shallow water vegetated habitats, notably saltmarsh and mangrove communities
- Freshwater wetlands
- Rainforests
- Riparian corridor
- In-stream habitat

There are over 200 significant plant species in the LGA, and the area supports Australia's highest concentration of threatened plant species (TSC, 2019a). Of these, the TSC Act lists one thought to be Extinct, and a further 25 are listed as endangered and 29 as vulnerable to extinction (TSC, 2019a). In addition, some 96 species are Rare or Threatened Australian Plants (ROTAP) listed.

FIGURE 3-3 THE BUSH STONE-CURLEW (SOURCE: TSC)

There are over 100 significant animal species identified by the TSC Act as within or proximate to the coastal zone. Seventeen of these are listed as Endangered – including the Bush Stone-curlew (see Figure 3-3), and a further 88 are considered vulnerable (TSC, 2019a). Over 50 species of migratory birds known to inhabit the LGA are protected under international agreements (JAMBA, CAMBA).

Shorebirds are an important component of estuarine systems, representing higher order consumers of intertidal invertebrates. The Tweed Estuary is one of the five most important sites in NSW for estuarine birds (AW & ABER, 2010). Shorebirds utilising the habitat of the Tweed's Estuaries are both local and internationally significant migratory species.

Hydrosphere (2019) has conducted an ecological assessment for the Tweed River Estuary and identified potential management actions, these actions should be considered during development of the CMP.

The region also encompasses the ***Cook Island Aquatic Reserve*** which is located approximately 500 m offshore from the Fingal Headland and includes approximately 80 hectares of the NSW marine estate (NSW DPI, 2019). The rocky reefs of the island provide significant habitat for temperate, subtropical and tropical species of fish, crustaceans and molluscs. Several threatened or protected species also occur in the reserve, including the giant Queensland groper, black rockcod, goldspotted rockcod (formerly known as estuary cod) and the grey nurse shark. Cook Island itself supports a large population of nesting seabirds (NSW DPI, 2019).

The various estuaries of the LGA also provide significant habitat for local flora and fauna. Statistics for key estuary habitat parameters, as adopted from Roper et al (2011), are provided below in Table 3-5.

TABLE 3-5 ESTUARY HABITAT PARAMETERS (ROPER ET AL, 2011)

Estuary Catchment	Area of Seagrass (km^2)	Area of Mangrove (km^2)	Area of Saltmarsh (km^2)
Tweed River	0.806	3.982	0.763
Cudgen Creek	0.009	0.139	0.052
Cudgera Creek	0.034	0.148	0.074
Mooball Creek	0.024	0.114	0.008
Total	***0.873***	***4.383***	***0.897***

3.1.4 Climate Change

Climate change will affect the natural, social and economic welfare of NSW (Adapt NSW, 2019). There are several impacts associated with climate change that are projected to affect the Tweed Coastal Zone and catchment. These include:

- ***Mean sea level rise***: Global sea levels are rising and increasing the risk to coastal communities from inundation and erosion. The current rate of mean sea level rise is estimated at around 3mm/year (White, 2014), with projected sea levels expected to increase by between 0.23m and 0.88m by 2090 (CoastAdapt, 2018a), depending on future emissions pathways. Further detail around sea level rise projections is given in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC, 2013).
- ***Ocean and Estuary Impacts***: In addition to sea level rise, climate change is expected to result in changes to the temperature, water quality and chemistry of coastal and estuarine systems. This includes ocean acidification and the impacts of warmer oceans on coral reefs and fisheries.
- ***Floods and Storms***: The frequency and intensity of floods and storms are likely to be affected by climate change (IPCC, 2013). Rainfall extremes are projected to increase throughout the 21st century, whilst the frequency and intensity of east coast lows is also expected to change, which in turn will affect water resources along the catchments of the northern NSW coastline.
- ***Water Resources***: Climate change is projected to impact the hydrological system through changes in rainfall regimes, groundwater recharge and surface runoff. This is projected to result in a number of flow on effects including impacts to salinity, erosion, water quality and aquatic biodiversity. Altered rainfall and drought regimes may place additional strain of water extraction - threatening water availability, access, and even quality. Tidal inundation into the Bray Park Weir pool is already a water quality issue, projected to become more frequent with rising sea levels and tidal anomalies
- ***Heat***: Heatwaves are a significant hazard, and have been responsible for more human deaths in Australia than any other natural hazard (Adapt NSW, 2019). Temperatures in NSW are projected to increase across the 21st century. Apart from human health impacts, changes in heat have the potential to affect a number of other important systems including emergency management, infrastructure, transport, primary industries and the environment (Adapt NSW, 2019).

- ***Bushfires***: Climate projections show that much of southern Australia may become warmer and drier, and as a result is likely to bring an increasing bushfire risk. The NSW Government estimates that, by 2050, extreme fire danger days in south-eastern Australia may occur 5 to 65 per cent more frequently than at present (Adapt NSW, 2019).
- ***Biodiversity***: Rising air and ocean temperatures, increased sea levels, potential changes in bushfire regimes, water quality and ocean chemistry will have wide-ranging impacts on biodiversity and pose a serious threat to native species and ecosystems (Adapt NSW, 2019). This may intensify existing threats such as habitat loss, weeds, pest animals and drought. Coastal wetlands, salt marshes, and mangroves are highly vulnerable to inundation as sea levels rise, unless they can migrate inland unimpeded. More frequent droughts in upland and coastal areas may also reduce the flow of freshwater into these brackish ecosystems, contributing to marsh dieback and shoreline retreat.

At its 19 September 2019 Council meeting, Tweed Shire Council declared a climate emergency that requires urgent action by all levels of government, including local councils. Tweed Shire Council aims to meet the challenges and embrace climate-friendly solutions in three ways (as per TSC, 2019b):

- ***Raising awareness*** - building a strong knowledge base in the local community about individual, community and local government roles in addressing climate change.
- ***Reducing emissions*** - reducing operational emissions through the delivery of energy and fuel efficiency measures, investing in renewable energy technologies and facilitating low carbon lifestyles in the local community
- ***Preparing for change*** - identifying and responding to the range of environmental, social and economic pressures that climate change and associated policy responses will pose to Tweed Shire Council and the community it serves.

3.2 Governance Context

Governance of the Tweed Shire coastal zone is multi-layered, with the waterways and foreshores of the coastal zone (and associated assets) owned and managed by a wide variety of stakeholders across multiple levels of government. There are over 10 government agencies that have a management and/or land ownership role. As a result, some jurisdictional ambiguity exists across the coastal zone of the LGA.

The strategic and statutory planning responsibilities for land across the Tweed Coastal Zone is shared by Council and DPIE, who are jointly responsible for administering the NSW Environmental Planning and Assessment Act 1979, which is the key legislation for land use planning and development assessment in NSW. The Tweed Local Environmental Plan (2014) has been developed under the NSW Environmental Planning and Assessment Act 1979 (Part 3) and guides planning through zoning and development controls.

Tweed Shire Council has a central role in managing the coastal zone across the LGA – and is responsible for the management of much of the 37 kilometres of coastline from Duranbah Beach at the Queensland/New South Wales border to Wooyung Beach in the south. With assistance from the NSW State Government, Council is responsible for preparation of CMPs that set out the long-term strategy for management of the coastal zone in its area.

Council is responsible for the management of assets that include coastal estuary infrastructure (such as seawalls and boat ramps), stormwater and drainage infrastructure, open space assets and public car parking. Council is also responsible for management of a range of issues across the coastal zone including events, cultural heritage, recreational use of the coastal zone, beach, estuary and floodplain management, and flora and fauna protection and conservation.

Council is also responsible for development planning and controls across the LGA. The objective of their development planning and controls are to achieve development that is consistent with the social, economic

and environmental values of the coastal zone to manage the cumulative impact of development across the coastal zone in a sustainable manner.

Council's ***Tweed Coast and Waterways Committee*** is an established advisory body comprised of community stakeholder groups and State Government Agency representatives. The purpose of the Committee is to provide advice and recommendations to Council regarding coastal and waterway issues.

The NSW Government, through the ***NSW Department of Planning, Industry and Environment*** (DPIE), is responsible for administering the CM Act, and providing oversight of the State's coastal management program. DPIE has an oversight role in the development of each Council's CMPs, and also to provide data and technical advice as needed. The department also administers the Coastal and Estuary Grants Program that provides funding for councils to prepare and implement their CMPs.

There are several NSW State Government agencies that have an ownership and/or management role across the LGA coastal zone, including the following agencies and entities within DPIE:

- Crown Lands and Water
- Transport for NSW (including Maritime Services and the Maritime Infrastructure Delivery Office)
- Local Land Services
- NSW National Parks and Wildlife Service
- Department of Primary Industries - Fisheries
- Department of Primary Industries - Biosecurity and Food Safety (including the NSW Food Authority)
- Department of Primary Industries - Agriculture
- Environmental Protection Agency

Some of these agencies have a land and asset management role, whilst others are issues based. The Department of Industry, Crown Lands and Water (***Crown Lands***) are responsible for ownership and maintenance of maritime assets including harbours (Tweed Heads Boat Harbour), breakwaters (such as the Cudgen Creek breakwaters at Kingscliff – see Figure 3-4), training walls and estuary navigation channels within the Tweed River. Note that Crown land includes submerged land: i.e. within the various coastal estuaries, foreshores and intertidal areas, and wetlands. Crown Land across the coast zone also includes the State's territorial waters, which extends 3 nautical miles out to sea. They are also responsible for implementation of the Crown Lands Management Act and Crown Lands Plans of Management.

NSW National Parks and Wildlife Service (NPWS) is responsible for management of a number of NPW Acts and management of nine different reserves and parks across the Tweed LGA coastal zone.

FIGURE 3-4 CUDGEN CREEK BREAKWATERS

The ***Department of Primary Industries - Fisheries*** is responsible for administering the *Fisheries Management Act 1994* and ensuring that decisions made about land management and development avoids and minimises impacts on fisheries resources. Their responsibilities also include the licensing of recreational fishers, enforcement of bag limits, and permits for commercial fishing activities. Fisheries also administer the *Marine Estate Management Act 2014* in coordination with the ***NSW Marine Estate Management Authority*** (MEMA) – which advises the NSW Government on the management of the NSW marine estate and coordinates programs for maintaining and

improving the marine environment. The Authority combines a number of the NSW Government agencies that have key marine estate responsibilities – including DPIE and Transport for NSW (MEMA, 2019).

The ***Department of Primary Industries – Agriculture*** is responsible for increasing the productivity and resilience of the agricultural sector in NSW. It does this through agricultural productivity research across livestock, plants and natural resource management areas, as well as providing education and training.

Local Land Services (LLS) was established under the *Local Land Services Act 2013* to provide quality, customer-focused services to landholders and the community across NSW. North Coast LLS provide agricultural production advice, biosecurity, natural resource management and emergency management functions cross the North Coast region (LLS, 2019).

The NSW ***Environment Protection Authority*** (EPA) is the primary environmental regulator for New South Wales, and Tweed Shire Council is the holder of several environment protection licences issued by the NSW EPA under the *Protection of the Environment Act 1997*. These licences generally relate to Wastewater Treatment Plants, Landfill Sites and Quarries, and Disused Landfill Site Under Remediation.

The ***NSW Food Authority*** (NSWFA) is responsible for food safety and consumer food protection across the state. It licences approximately 300 businesses in the shellfish sector across the state - made up of around 270 oyster farmers and 30 shellfish wild harvest businesses (NSWFA, 2019). It sits within DPIE under the DPI Biosecurity and Food Safety Branch

FIGURE 3-5 THE FINGAL HEAD LIGHTHOUSE

Transport for NSW (TfNSW), which in July 2019 absorbed NSW Roads and Maritime Services (RMS), is responsible for property administration, policy development, strategic planning and infrastructure management related to commercial and recreational boating. Within the Tweed LGA this includes operation of the Point Danger and Fingal Head Lighthouses (see Figure 3-5). ***Maritime Services*** (also referred to as NSW Maritime) role within TfNSW is to promote safe, responsible and sustainable use of waterways, including but not limited to the enforcement of safe on-water vessel practices, the administration of recreational vessel licenses and vessel registrations, and provision of guidance for safe navigation.

The ***Maritime Infrastructure Delivery Office*** (MIDO) is a joint initiative between the former agencies of Roads and Maritime Services (RMS) and the Department of Industry (DoI) to coordinate the delivery of coastal and boating infrastructure programs across NSW. They are responsible for delivering DPIE's Coastal Infrastructure Program and providing Councils with guidance and support on maritime infrastructure and dredging projects (RMS, 2019).

The ***NSW State Emergency Service*** major responsibilities are for provision of emergency and rescue services during time of natural hazard emergencies and disasters, including flooding, storms (including storm tide and severe erosion events), and tsunami events.

The neighbouring (coastal) council to the South is ***Byron Shire Council*** (BSC). BSC is responsible for the management of the coastal zone across the Byron LGA, which extends from Broken Head to Wooyung. They are responsible for the development and implementation of Byron LGA Coastal Management Programs(s).

To the north, the LGA is bounded by the ***City of the Gold Coast*** (CGC), which resides in the State of Queensland. CGC is responsible for the management of the Councils various beaches, estuaries and waterways. The administration of coastal management across the CGC is undertaken through the development and implementation of their Coastal Hazard Adaptation Strategy (CHAS). The CHAS is partly

funded by the Queensland State Government through the QCoast2100 program and aims to facilitate the development of high-quality information thereby enabling defensible (legally, socially and economically), timely and effective local adaptation decision-making across land use and development in the coastal zone.

The ***NSW Coastal Council*** provides independent expert advice to the Minister administering the CM Act 2016 on coastal planning and management issues. The Council was appointed under the CM Act 2016. The Minister can request the NSW Coastal Council to audit a local council's implementation of its coastal management program to determine if it is being effectively implemented (OEH, 2019b).

Tweed Byron Local Aboriginal Land Council (LALC) owns large tracts of coastal land and has a land manager role across the LGA – and in doing so interfaces with Council, as well as the various State and Federal Government bodies. Local Aboriginal Land Councils have a right to be informed in the planning, protection and preservation of cultural sites and areas under the *NSW Aboriginal Land Rights Act 1983* on land within their boundaries (BSC, 2019).

There are many other legislation, plans and policies relating to the management of the Tweed Shire LGA coastal zone, and a more detailed overview is provided in Section 6.4.

3.2.1 The Tweed River Entrance Sand Bypassing Project

The ***Tweed River Entrance Sand Bypassing Project*** (TSB) is a joint initiative of the New South Wales and Queensland State Governments (TSB, 2019). The project was formulated in response to the impact of the Tweed River entrance training walls on the local coastal process regime. Following the extension of the training walls during the early 1960's, the local patterns of shoreline erosion and accretion were altered in the region. The northerly longshore sediment transport regime generated shoreline accretion to the south of the southern training wall (resulting in a build-up of sand along Letitia Spit) and subsequent significant erosion along the southern Gold Coast beaches. Although extension of the training walls improved navigation for a period, the entrance bar reformed and again created navigation difficulties (TSB, 2019).

The TSB was formulated following extensive negotiations between the two state governments to overcome these problems. Agreement between the two states was reached by signing of a Heads of Agreement in 1994 to carry out a joint project in order to achieve the project objectives which were to maintain a safe navigable entrance to the Tweed River and to restore and maintain the amenity of the beaches on the southern Gold Coast of Queensland.

FIGURE 3-6 THE TSB JETTY (SOURCE: TSB, 2019)

The Project is a sand transport system that collects sand from the southern side of the Tweed River entrance at Letitia Spit, and pumps it under the river to outlets on the northern side – see Figure 3-7. From there, the sand is transported by local coastal processes to nourish the southern Gold Coast beaches. The project periodically dredges sand that accumulates at the Tweed River entrance which is also transported to southern Gold Coast beaches. The system is designed to transport the natural quantities of sand that move northwards along the coast (TSB, 2019).

TSB is responsible for sediment within the nearshore area and recreational amenity, but beach amenity, specifically Duranbah and Letitia Beaches, is the responsibility of Tweed Shire Council. However, TSB does monitor Letitia and Duranbah beaches and works closely with Tweed Shire Council to accommodate any erosion occurring after storm events.

The sand bypassing system was designed and built by McConnell Dowell (Australia) and the operation and maintenance of the system is being carried out by the ***Tweed River Entrance Sand Bypassing Company*** (TRESBCo), a subsidiary of the McConnell Dowell Corporation, under a long-term contract of about 24 years.

The *NSW Tweed River Entrance Sand Bypassing Act* and the *Qld Tweed River Entrance Sand Bypassing Project Agreement Act* were passed in 1995. The Acts detail the NSW/QLD agreement for the sand bypassing project. In accordance with the NSW Protection of the Environment Operations Act 1997 (POEO Act), the project operates under the requirements of the Environmental Protection Licence 10432. TRESBCo is the holder of the Licence issued by the NSW Environmental Protection Agency (EPA) and is responsible for compliance with the EPA Licence Conditions.

FIGURE 3-7 THE TWEED RIVER ENRTANCE SAND BYPASSING SYSTEM

3.3 Policy Context

The legislation and policy governing management of Tweed LGA Coastal Zone is complex and includes acts and policies from all levels of government.

3.3.1 Coastal Management Act 2016

As discussed in Section 1.2, the NSW Government has established a modern and integrated coastal management framework to better equip coastal communities to respond to existing and future coastal management challenges and opportunities. This includes the introduction of the *Coastal Management Act 2016* (CM Act) and the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) which was commenced on 3 March 2018. The CM Act replaces the *Coastal Protection Act 1979*.

The CM Act establishes the framework and sets forth the objectives for coastal management in New South Wales. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales (DPIE, 2019a).

The CM Act defines the coastal zone, comprising 4 coastal management areas:

- Coastal wetlands and littoral rainforests area
- Coastal vulnerability area
- Coastal environment area
- Coastal use area.

The CM Act establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

Section 14(1) of the CM Act provides guidance for councils in the preparation of CMPs, specifically:

> *14 Preparation of coastal management programs*
>
> *(1) A local council is to prepare a coastal management program in accordance with the coastal management manual.*

The Coastal Management Manual sets forth mandatory requirements and provides guidance to coastal councils in connection with the preparation, development and implementation of CMPs through a staged approach. As a mandatory first step, the manual notes that councils should prepare a Scoping Study.

3.3.2 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) updates and consolidates into one integrated policy SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan. These policies are now repealed.

The CM SEPP commenced on 3 April 2018 and gives effect to the objectives of the CM Act 2016 from a land use planning perspective by specifying how development proposals are to be assessed if they fall within the coastal zone (DPIE, 2019a).

The CM SEPP streamlines coastal development assessment requirements, identifies development controls for consent authorities to apply to each coastal management area to achieve the objectives of the CM Act, and establishes the approval pathway for coastal protection works.

State-wide mapping that accompanies the CM SEPP is available for the coastal wetlands and littoral rainforest area, the coastal environment area and the coastal use area. The mapping of coastal vulnerability areas may be undertaken as part of CMP development, based on either existing coastal hazard mapping, or mapping to be developed during Stage 2 of the CMP. Contemporary and fit-for-purpose coastal hazard data should be used when mapping the coastal vulnerability area.

3.3.3 Marine Estate Management Act 2014

The *Marine Estate Management Act 2014* (MEM Act) forms part of the NSW Marine Estate Management Framework. The framework comprises statutory instruments, strategies, assessment, plans and policy settings, and is administered under the auspices of the Marine Estate Management Authority (MEMA).

The objective of the MEM Act is to provide for strategic and integrated management of the NSW marine estate, including the marine waters, coasts and estuaries. The key legislative instruments under the act include:

- Marine Estate Management Regulation 2017;
- Marine Estate Management (Management Rules) Regulation 1999; and,
- Aquatic Reserves Notification 2015.

It should be noted that one of the objectives of the CM Act (and of the CMPs) is to support the objectives of the MEM Act 2014.

3.3.4 Additional Legislation and Policies

As of mid-2019, the NSW government has been working towards developing a new State Environmental Planning Policy (SEPP) for the protection and management of the natural environment. The ***Draft Environment SEPP*** consolidated SEPP is intended to simplify the planning rules for across catchments, waterways and urban bushland. The SEPP will consolidate and supersede the following seven (7) existing SEPPs:

- State Environmental Planning Policy No. 19 – Bushland in Urban Areas
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- State Environmental Planning Policy No. 50 – Canal Estate Development
- Greater Metropolitan Regional Environmental Plan No. 2 – Georges River Catchment
- Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No.2-1997)
- Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
- Willandra Lakes Regional Environmental Plan No. 1 – World Heritage Property.

Additionally, a new planning framework for primary production and rural development commenced on 28 February 2019. The ***SEPP (Primary Production and Rural Development) 2019*** supports NSW's agricultural sector, and simplifies the NSW planning system by consolidating, updating and repealing provisions in five former agriculture-themed SEPPs.

Table 3-6 provides an overview of the key legislation and policy relevant to the management of Tweed LGA coastal zone. Additional information regarding the administration and enforcement of these Acts is provided in Section 6.

TABLE 3-6 RELEVANT LEGISLATION

Legislation	Abbrev.	Administered By	Summary
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	EPB&C Act	Department of Environment and Energy	The Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
Native Title Act 1993	NT Act	Department of Attorney General Minister for Indigenous Affairs	The act establishes a framework for the protection and recognition of native title, and enables DPIE to enter into indigenous land-use agreements. The parts of the Native Title Act 1993 relating to native title representative bodies and prescribed bodies corporate are administered by the Minister for Indigenous Affairs.
State (NSW)			
Aboriginal Land Rights Act 1983	ALR Act	Minister for Aboriginal Affairs NSWALC DPIE (Crown Lands)	The purposes of this Act is to provide land rights for Aboriginal persons in NSW, and to provide for representative Aboriginal Land Councils. The Act makes provision for claimable Crown lands and other dealings by Local Aboriginal Land Councils (LALC). It also provides for agreements to permit hunting, fishing and gathering by Aboriginal groups or persons. It is administered by the Minister for Aboriginal Affairs, but allocates roles, responsibilities and powers to The NSW Aboriginal Land Council (NSWALC) and DPIE (Crown Lands).
Biodiversity Conservation Act 2016	BC Act	DPIE (Environment)	The Act stipulates how development activities on land are regulated and how the impacts of these activities on the natural environment are managed. It is intended to conserve biological diversity and promote ecologically sustainable development.
Biosecurity Act	BIO Act	DPIE (GS LLS)	The Biosecurity Act 2015 came into effect on 1 July 2017. It aims to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants.
Coastal Management Act	CM Act	DPIE	The CM Act establishes the framework and sets forth the objectives for coastal management in New South Wales. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales (DPIE, 2019a).
Crown Land Management Act 2016	CLM Act	DPIE (Crown Lands)	The Act requires that environmental, social, cultural heritage and economic considerations to be taken into account in decision-making about Crown land.

Legislation	Abbrev.	Administered By	Summary
Environmental Planning & Assessment Act 1979	EP&A Act	DPIE Council	The act requires relevant planning authorities to take into consideration the impacts to the environment (both natural and built) and the community of proposed development or land-use change.
Fisheries Management Act 1994	Fisheries Act	DPIE (Fisheries)	The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.
Heritage Act 1977	Heritage Act	DPIE (Environment)	The Act provides for the conservation of environmental heritage items in NSW. It is intended to promote understanding and conservation of the state's heritage and provide for identifying and registering items of state heritage significance. The Act is complemented by the Heritage Regulation 2012.
Local Government Act 1993	LG Act	DPIE (Planning)	The Act provides the legal framework for the system of local government for New South Wales, and sets out the responsibilities and powers of councils, councillors and other persons and bodies that constitute the system of local government. DPIE administers Part 2A of Chapter 6 of the Act, which allows councils to make environmental upgrade agreements with development proponents. The Act is complemented by Local Government (General) Regulation 2005.
Local Land Service Act 2013	LLS Act	DPIE (Local Land Services)	The objective of the Act is to guide the management and delivery of local land services in the social, economic and environmental interests of the State. The Local Land Service Act 2013 requires the development of regional strategies to set the vision, priorities and strategy for the delivery of local land services in each region. The act is also the main piece of legislation for managing and protecting native vegetation.
Marine Estate Management Act 2014	MEM Act	MEMA	The Marine Estate Management Act 2014 (MEM Act) forms part of the NSW Marine Estate Management Framework. The framework comprises statutory instruments, strategies, assessment, plans and policy settings, and is administered under the auspices of MEMA. The objective of the MEM Act is to provides for strategic and integrated management of the NSW marine estate, including the marine waters, coasts and estuaries.
National Parks and Wildlife Act 1974	NPW Act	DPIE	The Act provides for the management of National Parks reserve land, including the conservation of nature, including habitat, ecosystems and heritage. It is the main piece of legislation for managing and protecting Aboriginal cultural heritage in NSW. The NPW Act is complemented by the National Parks and Wildlife Regulation 2009.

Legislation	Abbrev.	Administered By	Summary
Natural Resources Commission Act 2003	NRC Act	DPIE (Planning)	The Act established The Natural Resources Commission - an independent body with broad investigating and reporting functions for the purposes of establishing a sound evidence basis for the properly informed management of natural resources in the social, economic and environmental interests of the State.
Protection of the Environment Operations Act 1997	POEO Act	DPIE (EPA)	The key piece of environment protection legislation administered by the EPA. The object of the Act is to achieve the protection, restoration and enhancement of the quality of the NSW environment.
Rural Fires Act 1997	RF Act	NSW RFS Local Councils	The purpose of the is to facilitate the co-ordination of bush fire fighting and bush fire prevention throughout the State. It is intended to enhance the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires.
State Emergency Service Act 1989	SES Act	Department of Community Services and Justice	The Act defines the functions on the NSW State Emergency Service.
Tweed River Entrance Sand Bypassing Act 1995	TSB Act	DPIE (Crown Lands) Queensland Department of Environment and Science (DES)	The purpose of this Act is to detail the agreement for the carrying out of agreements between the States of New South Wales and Queensland with regard to the operation of the TRESP – including the interstate cost sharing arrangements.
Water Management Act 2000	WM Act	DPIE (Industry) Water NSW	The object of the Act is the sustainable and integrated management of the state's water for the benefit of both present and future generations. The act is supported by the Water Management (General) Regulation 2018.
Water NSW Act 2014	Water Act	DPIE (Industry) Water NSW	The object of the Act to ensure that declared catchment areas and water management works in such areas are managed and protected so as to promote water quality, the protection of public health and public safety, and the protection of the environment. The act is supported by the Water NSW Regulation 2013

Legislation	Abbrev.	Administered By	Summary
State (QLD)			
Tweed River Entrance Sand Bypassing Project Agreement Act 1998	TSB ACT	Queensland DES DPIE (Crown Lands)	The purpose of this Act is to detail the agreement for the carrying out of agreements between the States of New South Wales and Queensland with regard to the operation of the TRESP – including the interstate cost sharing arrangements.

3.4 Management and Planning Context

There are several coastal and estuary management plans that guide the management of the Tweed Shire LGA coastal zone. Furthermore, there exist several wider plans and strategies that are relevant to the governance and planning of Tweed Shire LGA coastal zone. These include:

- State Level Plans;
- Regional Level Plans; and
- Local Level Plans.

A brief overview of these plans is provided herein. A full list of relevant studies and plans is provided in Appendix B.

3.4.1 Coastal Management Plans

Over the years, several coastal management studies and plans have been developed for the coastline and estuaries of the Tweed. These have been prepared in various forms, including Coastal Zone Management Plans (CZMPs), Coastline Management Plans and Estuary Management Plans. These documents have been developed over 20 years and cover a range of study areas within and across the LGA. The most relevant studies and management plans are listed below:

- *Tweed River Estuary: Coastal Management Program 2020-2030* (Hydrosphere, 2019 - Draft)
- *Tweed Estuary Tidal Inundation Assessment and Mapping* (BMT WBM, 2019)
- *Kingscliff Coastal Risk Management Study* (BMT WBM, 2015)
- *Kingscliff – Dreamtime Beach Coastal Zone Management Plan* (BMT WBM, 2017)
- *Tweed River Bank Erosion Management Plan 2014*, Tweed Shire Council, update on recommendations of *Tweed River Estuary Bank Management Plan 1998* (Patterson Britton and Partners, 1998).
- *Tweed Shire: Coastal Hazard Assessment* (BMT WBM, 2013)
- *Coastal Zone Management Plan for Tweed Coast Estuaries* (Hydrosphere, 2013)
- *Coastal Zone Management Plan for Cobaki Broadwater and Terranora Broadwater*, (Australian Wetlands & ABER, 2010)
- *Tweed Coastline Management Plan,* (Umwelt, 2005)

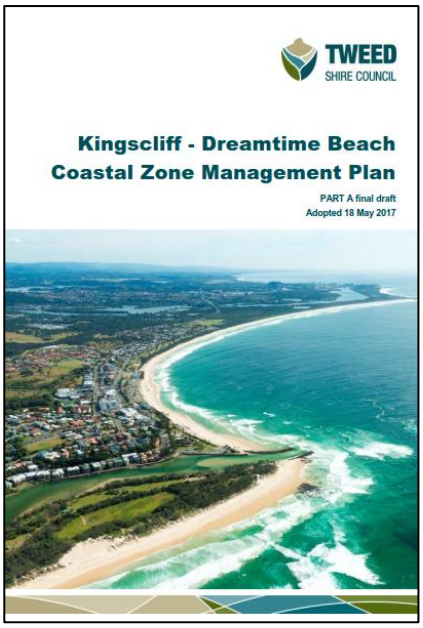

FIGURE 3-8 KINGSCLIFF - DREAMTIME BEACH CZMP, 2017

Details of the actions identified in various historical coastal management related plans (and an audit of implementation) are provided in Section 6.

3.4.2 State Level Plans

The ***NSW Marine Estate Management Strategy 2018-2028*** (MEMA, 2018) provides for an overarching, strategic approach to the coordination and management of the marine estate through to 2028. It sets the overarching framework for the NSW Government to coordinate the management of the marine estate over the next decade in accordance with the objects of the Marine Estate Management Act 2014 and the NSW Government's vision for the marine estate (MEMA, 2018). The Strategy responds to the priority threats to water

quality, habitats and biodiversity of the State's coastal waters and estuaries that were identified in the ***NSW Marine Estate Threat and Risk Assessment (TARA)*** (BMT WBM, 2017). The management of priority threats is grouped into nine (9) management initiatives that summarise the objectives, benefits, threats, stressors and proposed management actions. An implementation plan (developed by the Authority's member agencies in consultation with key stakeholders) articulates the management actions in more detail.

Recently, DPIE has developed the ***Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions***. This framework presents a structured approach that decision-makers, such as councils and environmental regulators, can use to help manage the impact of land-use activities on the health of waterways in New South Wales. The framework brings together existing principles and guidelines recommended in the National Water Quality Management Strategy and allows decision-makers to determine management responses that meet waterway health outcomes - and reflect the community's environmental values and uses of waterways (OEH, 2017).

In November 2016, the NSW Government released the ***NSW Climate Change Policy Framework***. It outlines the Government's role in reducing emissions, and helping NSW adapt and become more resilient to the impacts of climate change. The policy framework provides the strategic framework for NSW Government action on climate change and sets two objectives: to achieve net-zero emissions by 2050, and to make NSW more resilient to a changing climate.

The ***NSW Maritime Infrastructure Plan 2019-2024*** sets out a strategic and coordinated approach to prioritising and delivering maritime infrastructure in NSW. The purpose of the plan is to effectively manage and maintain important maritime infrastructure assets owned and managed by the state, and to adopt a strategic approach to investment in maritime infrastructure across NSW. Relevant assets and facilities include harbour and river entrance breakwaters, boat harbours, river entrance sand by-passes, dredged navigation channels and public boat ramps, wharves and jetties. The plan supports maritime infrastructure investment and delivery throughout NSW, however it focuses primarily on key regional coastal ports and waterways. The plan identifies Tweed Heads and Tweed River as a priority location for future investment and highlights the importance of maintaining an accessible navigation channel at the Tweed River Entrance.

The ***NSW Regional Ports Strategy*** is being developed by DPIE (Crown Lands) in order to guide the investment and operations of regional ports and infrastructure managed by DPIE (including Tweed Boat harbour and the Tweed Heads training walls). The strategy will guide investment and operations of regional ports and associated infrastructure under its management, in the short and long term. In addition to this, ***NSW Boating Now*** is a five-year boating infrastructure funding program that aims to support the delivery of new and improved boating facilities through effective partnerships with local government and other organisations.

In 2017, the state government released the ***NSW Coastal Dredging Strategy***. The purpose of the program is to adopt a strategic and proactive approach to dredging that delivers recreational boating benefits for local waterways in regional NSW. The strategy identifies the funding arrangements to support delivery of dredging projects to improve the accessibility and safety of regional coastal waterways and is expected to be delivered in three stages over the period 2017-2027 (Department of Industry, 2017). As dredging is not a legislative responsibility, the Coastal Dredging Strategy has been developed and is coordinated by the DPIE (Crown Lands). The Tweed River estuary is listed as a priority regional waterway in the Coastal Dredging Strategy with State-owned assets located at the Southern Boat Harbour and significant sand bypassing infrastructure located in the vicinity of the entrance (Hydrosphere, 2019).

The ***NSW Oyster Industry Sustainable Aquaculture Strategy 2016*** (DPI, 2016) applies to the NSW edible oyster aquaculture industry and identifies areas within NSW estuaries where oyster aquaculture is a suitable and priority outcome. The Strategy promotes environmental, social and economic best practice for NSW oyster farming, and ensures that the principles of ecological sustainable development, community expectations and the needs of other user groups are integrated into the management and operation of the NSW oyster industry (DPI, 2016).

3.4.3 Regional Level Plans

The ***North Coast Regional Plan 2036*** was developed in 2017 and sets regional planning priorities and provides guidance and direction for regional and local planning decisions over a 20 year period to 2036. It provides an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions. The NSW Government has established the North Coast Delivery, Coordination and Monitoring Committee to deliver, coordinate and be accountable for achieving the vision and goals of the Plan (DPE, 2017).

The ***Local Land Services North Coast Local Strategic Plan 2016-2021*** sets the vision, priorities and overarching strategy for LLS on the north coast, with a focus on appropriate economic, social and environmental outcomes. The plan focuses on community engagement, setting and delivering local priorities, and determining how the priorities for Local Land Services are best achieved at local level (LLS, 2016).

Byron and Tweed Shire Councils Climate Change Adaptation Action Plan was undertaken in 2008, with the objective of undertaking risk assessment and adaptation planning to examine the potential impacts of climate change on the Byron and Tweed Shire Councils, and to seek adaptation strategies to reduce or mitigate this risk and the potential impacts should an event occur.

The ***Northern Rivers Catchment Action Plan 2013-2023*** (CAP2) is an all-of government and all-of-community plan to guide the sustainable management of natural resources in the Northern Rivers Region. CAP2 is intended to maintain and improve the resilience of the catchments natural systems which in turn support three broad NRM values: landscapes (which include seascapes), livelihoods, and lifestyle and culture. It establishes priorities to maintain and improve the health, resilience and productivity of the Region's natural resources. It outlines 21 strategic directions that sum up the Region's strategic NRM priorities, which are in turn delivered by 85 priority actions.

The ***North Coast Integrated Regional Vulnerability Assessment*** (IRVA) was undertaken by the state government to engage regional stakeholders, gain a holistic view and plan collaborative responses to the emerging risks from a changing climate along the North Coast (OEH, 2016). It includes a qualitative assessment of the influence of climate impacts on services and infrastructure for the region, and fosters relationships between government sectors and agencies from which regional managers and decision-makers can adapt government services.

The ***Tweed - Clarence Valley Regional Boating Plan 2015*** identifies boating safety, access and infrastructure actions for the north coast region to be implemented over the period 2015-2020.

3.4.4 Local Level Plans

The ***Tweed Shire Council Community Strategic Plan 2017–2027*** is the overarching, visionary document that translates the community's key priorities and aspirations into long-term strategic goals that guide the future direction of Tweed Shire. The Plan represents the highest level of strategic planning undertaken by a local council. All other plans developed by Council (such as CMPs) as part of the IP&R framework must reflect and support the implementation of the Community Strategic Plan. In fact, under the CM Act, the objectives and management actions developed as part of CMPs are required to be strategically aligned with the objectives and strategies outlined in the Community Strategic Plan. The Plan is also required to be consistent with the North Coast Regional Plan 2036 are per the NSW State Planning Hierarchy (see Figure 3-9).

The ***Tweed Local Environmental Plan 2014*** (LEP) is the primary planning tool for the majority of the Tweed Shire and outlines the local environmental planning provisions for land in the Tweed LGA. It outlines the aims for the use and development of land within the LGA, in accordance with the relevant standard environmental planning instrument under section 33A of the Environment Protection and Assessment Act 1979. Tweed Shire has three Local Environmental Plans: the Tweed City Centre LEP 2012, applying to the Tweed Heads CBD area; the Tweed Local Environmental Plan 2014; and the Tweed LEP 2000, which will continue to apply to the

remainder of the Shire which has been deferred form the LEP 2014. The ***Tweed Development Control Plan 2008*** (DCP) provides detailed planning and design guidelines to support planning controls in each LEP. Council has recently developed a ***Biodiversity DCP*** to ensure the planning and design of new developments maintains or improves ecological values in the LGA.

The Tweed Shire Council operates under an ***Integrated Planning and Reporting Framework*** (IP&R Framework). The IP&R Framework is the main mechanism by which councils plan for, and report on, their asset management and service delivery responsibilities. The Framework supports a suite of strategic documents including:

- The Community Engagement Strategy
- Community Strategic Plan;
- Delivery Program and Operational Plan; and
- Resourcing Strategy.

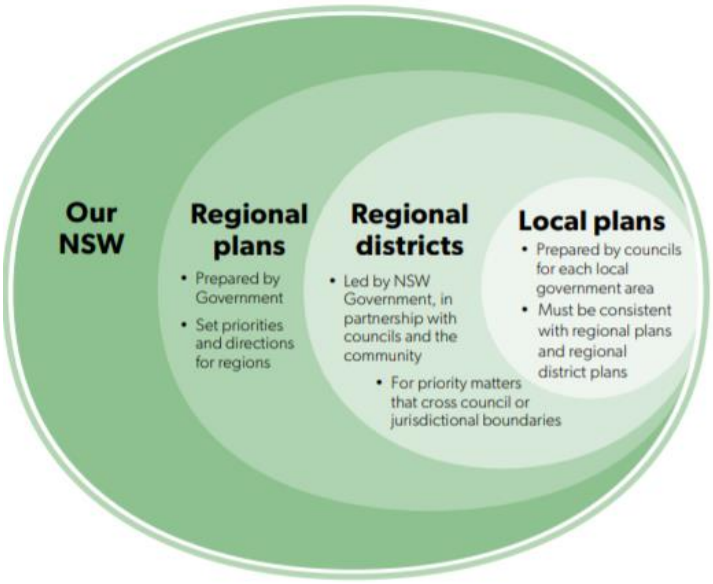

FIGURE 3-9 THE NSW STATE PLANNING HIERARCHY

Councils ***Delivery Program 2017–2021*** and annual ***Operational Plan*** translate the manifestation of objectives, strategies and actions outlined in the various local and regional plans into functional actions. The delivery program and annual operational plans follow the themes identified in the Community Strategic Plan 2017–2027 and detail Council's role in the delivery of projects and services during the four-year term of the elected council, in order to realise the long-term strategic goals. This Delivery Program details the delivery of planned projects and services for each year, aligning each action to a budget and outlining any other resourcing issues and how works will feed into the IP&R framework – see Figure 3-10. The CM Act requires that CMPs are given effect through Councils IP&R framework. This includes performance auditing, to ensure that programs are appropriately implemented.

The ***Community Engagement and Participation Plan 2019-2024*** sets out a whole-of-council commitment to community engagement across the Shire (TSC, 2019d). It describes the principles of Councils approach to community engagement and participation, and outlines why Councils engages with the community, who Council engages with, what Council engages with the community about, and how it is undertaken. The Community Participation Plan is intended to meet the requirements of the EP&A Act 1979, and applies to all planning functions, including: Development Applications, LEPs, DCPs, Locality Plans, Strategic Plans, Contributions Plans, and notably CMPs.

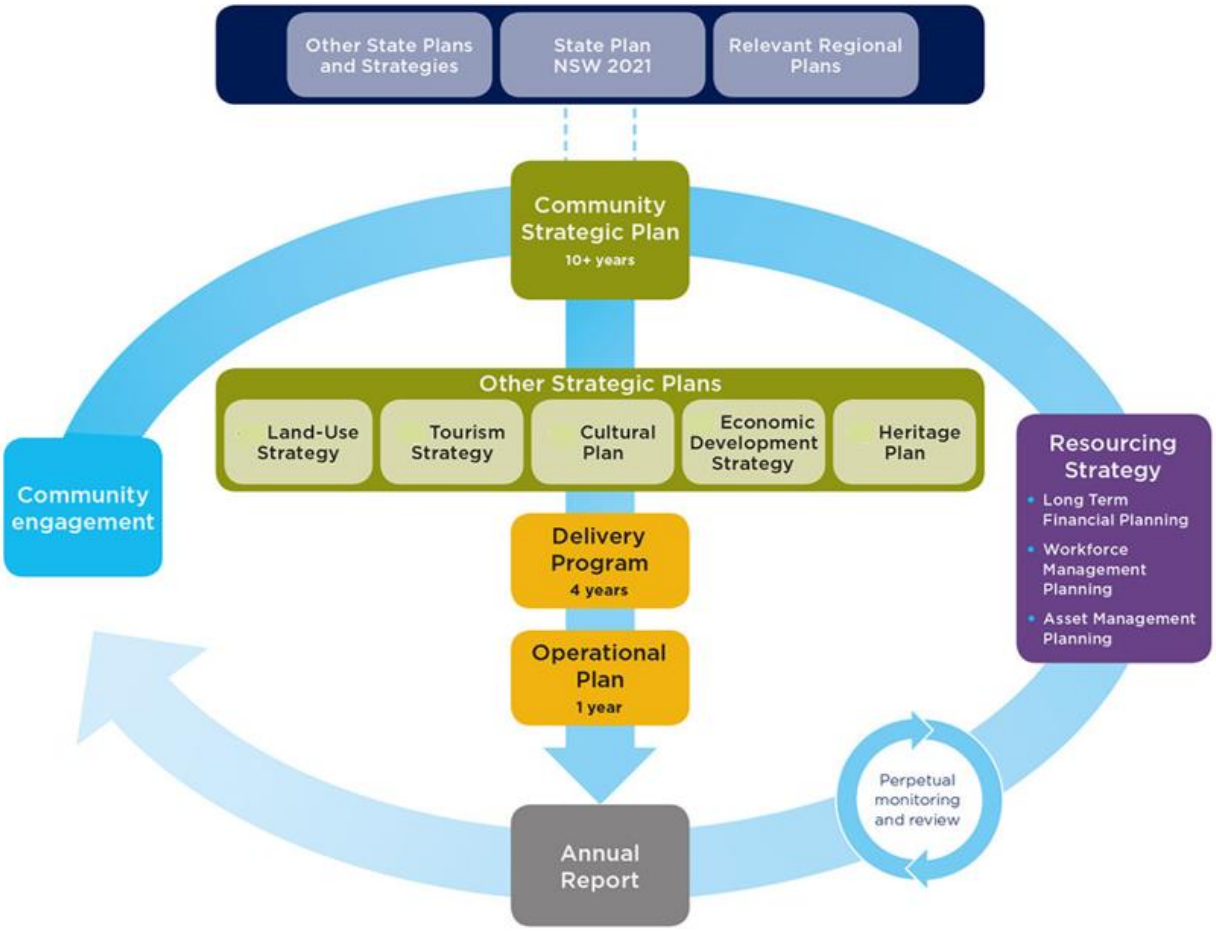

FIGURE 3-10 INTEGRATED PLANNING AND REPORTING FRAMEWORK (SOURCE: NSW GOVERNMENT)

There are several additional local strategies and plans relevant to CMP development, including:

- Tweed Valley Floodplain Risk Management Study and Plan 2014
- Coastal Creeks Floodplain Risk Management Study and Plan 2010
- Tweed Shire Council Aboriginal Cultural Heritage Management Plan 2018
- Tweed Sustainable Agriculture Strategy 2016.
- Tweed Urban Stormwater Quality Management Plan 2016
- Tweed River Domestic Structures Strategy September 2008
- The Tweed Vegetation Management Strategy 2004
- Vegetation Vandalism on Public Land Policy 2016
- The Tweed Vertebrate Pest Animal Management Strategy

3.5 Economic Context

Tweed Shire's Gross Regional Product (GRP) was $3.35 billion in the year ending June 2018, which represents 0.6% of the NSW Gross State Product (GSP) (Tweed Economy id, 2019) – and the Tweed Shire contributes 0.8% of New South Wales's employment.

The Tweed has a diverse industry base including agriculture, health care, and tourism related industries such as accommodation, cafés/restaurants and retail. The structure of the Tweed economy has been identified through the Tweed Shire Council's Economy id demographic resources tool (Tweed Economy id, 2019). The value added to the GRP by various industries directly and indirectly connected to the coastal zone is presented in Table 3-7. That table also shows the change in relative contribution of the various industries since 2007/08.

TABLE 3-7 TWEED ECONOMY BREAKDOWN (SOURCE: TWEED COMMUNITY ID, 2019)

Industry Sector	Value added to GRP 2017/18 ($)	Value added to GRP 2017/18 (%)	Full-time equivalent employment	Change in value added since 2007/08
Health Care and Social Assistance	$343m	14%	3,900	+14%
Construction	$265m	11%	2,900	-33%
Retail Trade	$236m	10%	3,100	+3%
Tourism**	$257m	10%	2,300	-10%
Education	$190m	8%	2,200	+10%
Property and Real Estate Services	$163m	7%	600	+33%
Accommodation and Food Services	$161m	7%	2,100	-1%
Professional, Scientific and Technical Services	$128m	5%	1,300	+24%
Manufacturing	$121m	5%	1,300	-18%
Agriculture, Forestry and Fishing	$73m	3%	740	-26%

** *It should be noted that the value assigned to tourism is a partial combination of many different traditional industries that make up the "tourism" sector, including transport, accommodation, education, retail, cultural and recreational services, administrative services etc*.

Tourism is a significant component of the Tweed's economy, contributing an estimated $250 million to GRP annually. The coastline occupies a unique location on the Australian east coast. It is located in a world-renowned tourist area that stretches from Byron Bay in the south, to the Sunshine Coast of Queensland in the north. Due to the largely undeveloped and relatively natural coastline, the Tweed coastline offers a vastly different and more relaxed experience compared to the south eastern Queensland coast.

According to the North Coast Regional Plan, the North Coast of NSW has over 12 million tourist visits per year, and is the 3rd most popular Australian tourist region by overnight stays (TSC, 2017). Regional airport passengers in the north coast region increased by 250% over the period 2006-2016, highlighting the role of Gold Coast Airport as a conduit for local tourism (TSC, 2017). The Tweed's tourism industry underpins the

health and vitality of more than 320 accommodation and food service businesses in the LGA and provides important employment opportunities of around 2,300 full time equivalent jobs (number as of FY2017/18).

For 2018/19, there were 284,000 international visitors' nights in Tweed Shire (Tweed Community id, 2019). Table 3-8 shows the number of visitor nights and domestic day trips to the LGA for the years 2018/19 (recorded July to June) and 2010/11. It shows a substantial increase in international visitor nights and domestic day trips over this period. This is likely linked to the growing recreational use base from southeast QLD.

TABLE 3-8 TWEED TOURISM DATA (SOURCE: TWEED COMMUNITY ID, 2019)

Visit Type	2018/19	2010/11	Change
International Visitor Nights	284k	220k	+27%
Domestic Visitor Nights	1.7m	1.9m	-14%
Domestic Daytrips	1.3m	760k	+72%

The seasonality of tourism demand in the Tweed is presented in Figure 3-11 in terms of accommodation occupancy rates in the LGA for the FY ending June 2016 (Destination NSW, 2016) - by financial quarter. It shows that peak season for tourism is generally around the summer months, peaking in December during the NSW School Holidays.

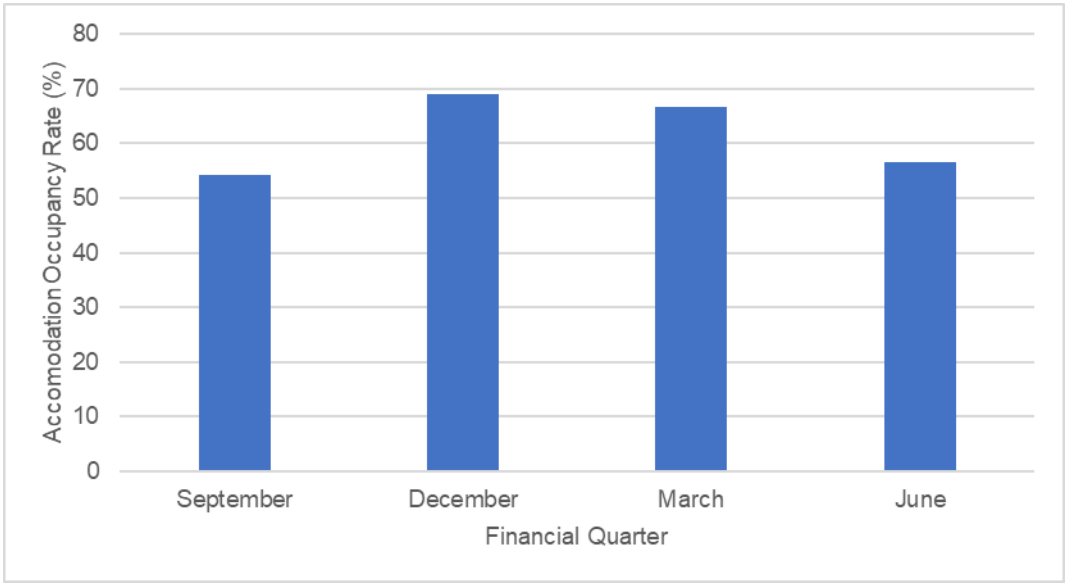

FIGURE 3-11 SEASONALITY OF TOURISM DEMAND

Tourism in the area is highly focussed upon the coastal zone, and Tweed has long leveraged off the environmental, recreational and aesthetic aspects of the coastal zone as a tourist draw card – notably using a "*from the coast to the valley*" approach (Visit the Tweed, 2019). Environmental assets such as pristine beaches, world-class surf and reef breaks, accessible and clean waterways are key to the economic performance of the tourism sector. Popular tourist activities include camping, surfing, hiking, recreational fishing and boating, swimming, ecotourism (such as whale watching), and nature appreciation. Towns such as Tumbulgum and Murwillumbah also showcase old historic river ports and quaint villages.

For a long time, the regional economy of the Tweed relied on the tourist industry during holiday seasons as the main driver of growth and employment. While growth of the tourist industry will continue, the permanent residency is now rising rapidly (Umwelt, 2005).

Tweed's favourable subtropical climate, coastal location and range of soil types support a diversity of ***agriculture***, dominated by sugarcane, beef and dairy, sweet potato and other horticulture, all of which are dependent upon water resources from the coastal zone to some degree (either saline water downstream of the Bray Park Weir, or fresh water extracted from upstream). Some industries have declined in scale over recent decades, including bananas and dairy as a result of production issues, increased competition and deregulation. The FTE employment provided by the Agriculture, Forestry and Fishing sector has nearly halved since 2007/08.

Commercial fishing in the Tweed has experienced a decline over recent decades. Table 3-9 shows data depicting the economic contribution of commercial fishing and aquaculture in the Tweed over the last 10 years (Tweed Economy id, 2019). It shows a significant decline in economic value and employment derived from these sectors, which can be (at least partly) attributed to restrictions introduced by NSW Fisheries in 2002 on the operations of commercial fishers in the Tweed River, leading to the development of designated recreational fishing havens. This decline is representative of wider state-wide trends in the commercial fishing industry which have resulted from NSW Government resource access restrictions aimed at achieving biodiversity conservation and economic sustainability.

In terms of ***aquaculture***, there are currently between ten to twelve commercial oyster leases in the Terranora Broadwater, all of which are located within the areas designated as priority commercial aquaculture areas. There are currently four active oyster farms, all operating in Bingham Bay in Terranora Broadwater. There have been short term closures of the oyster industry in Terranora Broadwater due to concerns about sewage discharge in the past (AW & ABER, 2010).

TABLE 3-9 TWEED COMMERICAL FISHING AND AQUACULTURE SECTOR (SOURCE: TWEED ECONOMY ID, 2019)

Commercial Fishing	Value added to GRP 2017/18 ($)	Full-time equivalent employment 2017/18	Value added to GRP 2007/08 ($)	Full-time equivalent employment 2007/08
Commercial Fishing	$3.5m	24	$5.7m	80
Aquaculture	$0.5m	12	$0.7m	10
Agricultural Support Services	$7m	60	$20m	230

As part of this Scoping Study, a preliminary economic valuation has been undertaken of the ***ecosystem services*** across the Tweed Coastal Zone. This assessment has been undertaken using the method of Costanza et al (2014) which provides approximate unit values for ecosystem services and land usages. It should be noted that the true value of the ecosystem services in the coastal zone is difficult to capture – and this analysis is not intended to be an in depth economic assessment, but rather is intended as a coarse, *preliminary estimation* in order to gain a broad understanding of the economic value of the Tweed Coastal Zone ecosystems, and to provide high-level guidance for the Business Case (see Section 9). Unit pricings are based on overall estimates of economic value and contribution. For example, tidal marsh and mangroves provide value in the form of storm protection, erosion control, carbon storage and waste treatment. Results of the relative economic contribution are provided in the table below. The table shows that the Tweed Coastal Zone ecosystem services are valued at around ***$250 million per year***.

TABLE 3-10 APPROXIMATE ECONOMIC VALUATION OF TWEED COASTAL ZONE ECOSYSTEM SERVICES

Biome	Approx. Area (ha)	Unit Value (USD/ha/yr)	Unit Value (AUD/ha/yr)	Approx. Total Ecosystem Services Value (AUD/yr)
Mangrove	440	$190k	$270k	$118m
Saltmarsh	90	$190k	$270k	$24m
Seagrass	90	$29k	$40k	$4m
Estuary	2,500	$29k	$40k	$103m
			Total	**~$250m**

It is also important to appreciate the significant economic contribution of the coastal zone to the ***wider Tweed economy***. The significant social, recreational, and environmental assets of the coastal zone are a major factor in drawing permanent residents to the area and maintaining and increasing the local rate payer base. Furthermore, the lifestyle afforded to residents from proximity to the coastal zone is a major contributor to the social and economic wellbeing of the community.

Therefore, the overall economic value of having a functioning and healthy coastal zone across the Tweed is difficult to quantify. Nonetheless it is reasonable to state that the economic wellbeing of the LGA is heavily linked to the condition and health of the coastal environment in the Tweed.

FIGURE 3-12 THE COASTAL LIFESTYLE OF THE TWEED

3.6 Social and Cultural Context

3.6.1 Indigenous Heritage

The Tweed has a long Aboriginal cultural history extending over 40,000 years, based on current evidence and knowledge. This long history of settlement has naturally resulted in both tangible and intangible Aboriginal cultural heritage across the coastal zone and the wider LGA (TSC, 2019).

The ***Bundjalung people*** of the Tweed Valley have a long and deep association with the land in which their ancestors have lived for many generations (TSC, 2018) – and remnant physical evidence of their activities is preserved. Many of the Shire's towns and villages derive their names from the languages of the local Aboriginal people (Umwelt, 2005). There were two tribal groups, the Nganduwal/Ngarakwal and Minyanbal. The Nganduwal tribal boundary is bounded by McPherson, Tweed and Burringbar Ranges and the Minyanbal tribal boundary is south of Burringbar Range and Cudgera Creek (Tweed Heads Taskforce, 2004).

The region has a rich and continuing Aboriginal heritage. Historic records demonstrate a history of regular large gatherings of traditional Aboriginal people along the Tugun sand plain, Lower Tweed Estuary, and adjacent broadwater shorelines (AW & ABER, 2010). Prior to European settlement, the estuarine landscapes of the Tweed were rich resource areas with an abundance of shellfish species that were readily harvested at low tide. Headlands hold additional cultural significance as story places with ceremonial significance, for example Fingal, and as tool making sites with observational opportunities – such as Hastings Point and Norries (TSC, 2018). Near Fingal Head, there is an official aboriginal burial site which is in close proximity to the ocean,

and concerns have been raised that the site may be exposed to inundation and erosion in the near future. Cook Island, just off Fingal, is also known as a ceremonial ground.

There are numerous registered Aboriginal sites, middens, shelters, deposits, engravings and burials within the Tweed coastal zone and wider LGA catchment area. Some estuary foreshore locations contain built structures, such as fish traps, which relied on cycles of tidal inundation to pen selected food resource species. Regular harvesting of estuarine resources has resulted in vast accumulations of shellfish remains (middens) and evidence of numerous campsites which contain fire hearths and artefacts (tools). The coastal dunes along the study area contain extensive cultural resources and are associated with numerous archaeological sites, including open campsites, middens, burials, ceremonial locations and traditional story places (TSC, 2018).

The protection of Aboriginal cultural heritage is currently managed through the National Parks and Wildlife Act, 1974. With the aims of acknowledging and respecting Aboriginal cultural heritage (ACH) and improving the understanding of ACH, Tweed Shire Council adopted the Aboriginal Cultural Heritage Management Plan 2018 on 5 July 2018. ***Tweed Byron LALC*** have a cultural responsibility to protect culture and heritage within it's boundary. The *NSW Aboriginal Land Rights Act 1983*, is the legislative framework that supports Tweed Byron LALC in carrying these cultural obligations.

As of the 2016 National census, the local Aboriginal and Torres Strait Islander population comprised around 4.0% of the total LGA population, which is above the overall NSW figure of 2.9%. The Aboriginal community and the Tweed Byron LALC will be an important stakeholder in the development of the later stages of the CMPs.

Tweed Shire Council acknowledges the Nganduwal and Minyungbal people of the Bundjalung nation, in particular the Goodjinburra, Tul-gi-gin and Moorung-moobah clans as being the Traditional Owners and Custodians of the land and water within the Tweed Shire boundaries.

3.6.2 Population and Demographics

The Tweed LGA is home to a diverse array of people and cultures, with more than 50 different languages spoken across the region, and up to 15% of the population was born outside of Australia. In Tweed Shire, 4.2% of people spoke a language other than English at home in 2016 (Tweed Community id, 2019).

The population of the LGA has grown significantly in the past 15 years, increasing from around 71,000 in 2001 to around 91,000 in 2016 (Tweed Community id, 2019) – see Table 3-11. This represents an average annual population change of 1.6% per year over that period.

The age structure of Tweed Shire provides key insights into the level of demand for age-based services and facilities. Analysis of the service age groups of Tweed Shire in 2016 compared to Australia shows that there was a lower proportion of people in the younger age groups (0 to 17 years) and a higher proportion of people in the older age groups (60+ years) – see Figure 3-13. Notably, 32.6% of the population are aged 60 years and over, compared with the national average of 21.3%. This has become a growing trend for the Tweed over the last few decades, and the largest changes in the age structure in this area between 2001 and 2016 were in the age groups 50+. The median age in the Tweed is 47, compared to the national median of 38. This data demonstrates the popularity of the Tweed Shire as a ***retirement destination***.

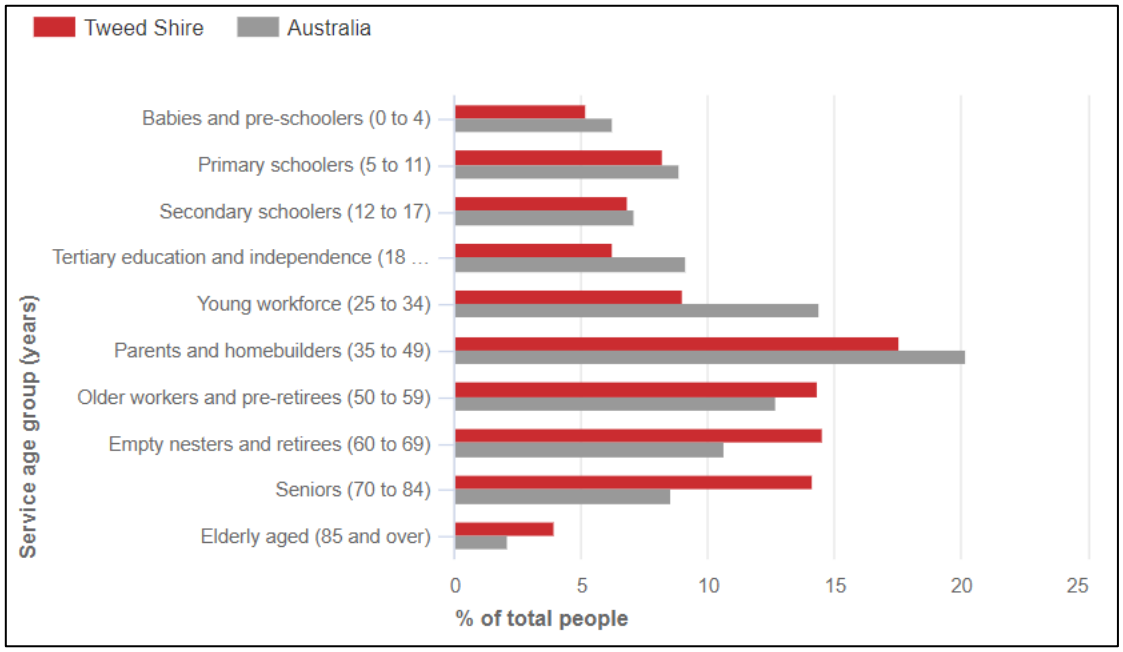

FIGURE 3-13 TWEED LGA DEMOGRAPHIC BREAKDOWN (SOURCE: TWEED PROFILE ID, 2019)

The Tweed's population is forecast to grow to over 127,000 by 2036 (Tweed Forecast id, 2019) – see Table 3-11. The forecast to 2036 suggests that the ageing demographics of the Tweed since 2001 is likely to plateau – likely due to the growth of telecommuting (working remotely) in professional industries, and the growth of the Gold Coast opening commercial and employment opportunities in adjacent regions. The forecast annual change of population between 2016 and 2036 for the LGA is 1.1%, which is slightly lower than the national forecast of 1.3%. This growth will require significant changes to the built environment that will place additional pressure on the Tweed coastal zone.

TABLE 3-11 TWEED POPULATION GROWTH AND PROJECTIONS (SOURCE: TWEED FORECAST ID, 2019)

Year	Population	Percentage <18 years	Percentage between 18 and 60 years	Percentage >60 years
2001	71,609	24.0	48.7	27.3
2016	91,377	20.3	47.1	32.6
2036	127,400	22.1	46.5	31.3

Given the proximity of the Tweed LGA to the ***City of Gold Coast***, and the high recreational usage of the Tweed Coastal Zone by Gold Coast residents, it is also prudent to consider projected population growth in that area. QLD Government forecasting of the population growth for the City of Gold Coast LGA is from 580,000 in 2016 to 870,000 in 2036– an increase of around 50%. This is likely to place significant additional strain on recreational use pressures on the Tweed Shire LGA coastal zone.

Seasonal population changes are presented in Table 3-12 and Figure 3-11. Based on the raw visitor numbers provided in Table 3-8 and the seasonal variability presented in Figure 3-11, an estimate of local population increases has been provided in Table 3-12 below. It shows that during the peak summer tourist season, the Tweed LGA population can increase by around 10,000 people, an increase of 11%.

TABLE 3-12 TWEED SEASONAL POPULATION VARIANCE (TOTAL PERSONS)

Visitor Type	September Quarter	December Quarter	March Quarter	June Quarter
International Overnight Visitors	670	860	830	700
Domestic Overnight Visitors	4,300	5,500	5,300	4,500
Domestic Daytrip Visitors	2,900	3,700	3,600	3,000
Total Visitors (on a given day)	**7,870**	**10,060**	**9,730**	**8,200**

3.6.3 Community Values

The Tweed coastline offers a relatively natural and relaxed environment, particularly when compared to the neighbouring south-eastern Queensland coast (Umwelt, 2005). This coastline is highly valued for these features by the local community, and by a regional population that extends beyond the boundaries of the shire. The local community (and tourists alike) are attracted by this aesthetic value, which has been preserved by the fact most existing development is not visible from the scenic beaches and headlands.

The community highly values the foreshore areas, estuaries and tidal inlets. The Tweed River is one of the busiest waterways in NSW due to its proximity to the large population base in south-east Queensland, its warm climate and its popularity as a holiday destination. Coastal harbour facilities at Tweed Heads are located in Boyds Bay which is about 4km upstream via Terranora Inlet from the river entrance. The area provides mooring facilities for both commercial fishing vessels and recreational boats (TfNSW, 2015).

Recreational boating is popular in the region, with users undertaking a wide variety of boating activities. The region also supports various commercial vessel operations such as commercial fishing vessels, hire and drive vessels (TfNSW, 2015). The Tweed River is particularly popular for recreational activities, including the following identified in the Tweed Regional Boating Plan (TfNSW, 2015):

- Recreational fishing - both from vessels and the shoreline. Popular areas include downstream from Boyd's Bay Bridge, Wommin Lake and Crystal Waters;
- Water skiing and wake boarding vessels are concentrated in a few areas of the river. These include the area adjacent to the Fingal Head Boat Harbour, between Chinderah and The Piggery, and Tumbulgum to the Commercial Road Boat Ramp upstream from the Murwillumbah Bridge;
- Personal Watercraft (PWCs) are popular throughout most of the estuary. The "wave-zone" area adjacent to the Jack Evans Boat Harbour is a popular PWC area due to the surf-like conditions at the entrance bar;
- Rowing occurs from two rowing clubs located near Boyds Bay Bridge and the Condong to Murwillumbah reach of the river; and
- Non-powered boating activities such as canoeing, sailing and kayaking.

In addition to the recreational activities, the Tweed River accommodates ***commercial activities*** such as fishing, aquaculture, charter and hire and drive operations.

As of 2015, there were approximately 25,000 boat licence holders in the Tweed – Clarence Valley Region. This represents approximately 4.6% of all boat licence holders in NSW (TfNSW, 2015). There are also many boaters from Queensland that visit the area. Interstate registrations accounted for nearly 5% of all licence holders (approximately 25,000) in NSW. Based on anecdotal reports, it is likely that a significant portion of these are Queensland boaters using the Tweed River. There are currently approximately 14,000 registered recreational vessels in the Tweed-Clarence Valley region. This represents approximately 6% of all registered vessels in NSW. Transport for NSW forecasts a continuing growth trend in vessel ownership of 2.9% annually across NSW (TfNSW, 2015).

The Tweed coastline features some of the most pristine and stunning ***beaches*** in NSW, and these beaches represent a significant social resource for the local community and visitors alike. These beaches (such as Duranbah Beach shown in Figure 3-14) are well known by surfers for their surf break and large swell, and are recognised both nationally and internationally as having a ***high recreational value for the surfing*** community. The Tweed coast has four Surf Life Saving Clubs at Salt, Fingal Head, Cabarita Beach and Kingscliff. Popular beach activities also include water sports, swimming, walking, dog walking and nature appreciation.

FIGURE 3-14 SURF AT DURANBAH BEACH (SOURCE: COASTALWATCH, 2019)

The local beaches are also used for several other purposes, including:

- Recreational business usage (such as surf schools);
- Hosting weddings and events including Surf Lifesaving events and triathlons; and
- Filming for television, film and advertisements.

Horses may be ridden on beaches and coastal creek areas where there is no signage stating that this activity is prohibited. However, Councils current policy is that horses are not permitted in areas that are patrolled by surf lifesaving associations, or in nominated areas of high pedestrian traffic (TSC, 2019c).

Throughout the coastal zone, scenic amenity is valued highly by the local community and tourists. Specific characteristics identified include clean foreshore areas, presence of native flora and fauna (including threatened species), good water quality and appreciation of landscape and estuarine features (Hydrosphere, 2013).

Key social and community values associated with the Tweed Shire coastal zone, based on review of documents outlined in Section 3.4 - including the Tweed River Estuary CMP Community Values Study (Hydrosphere, 2019) - are identified to be:

- Maintaining safe and equitable access to the coastal zone estuaries, waterways and surrounding foreshores;
- Maintaining safe and equitable access to local beaches, and balancing recreational and commercial use pressures;
- Maintenance and improvement of estuarine water quality;
- Sustainable use and management of the beaches and estuaries;
- Ensuring stable riverbanks to protect estuary foreshores and adjacent assets;
- Maintaining and enhancing the social and recreational values (such as scenic amenity and recreational fishing);
- Maintenance of economic prosperity and agricultural productivity;
- Preservation of biodiversity and coastal reserve;
- Protection of coastally adjacent infrastructure; and
- Preservation and appreciation of cultural heritage.

3.7 Land Use and Development Context

A breakdown of the land use across the various sub-catchments of the Tweed Coastal Zone is provided in the table below, based on Roper et al (2011). The table shows that much of the catchment (and coastal zone for that matter) is undeveloped forest and reserve. The predominant land uses across the catchment include agriculture (grazing, crops, pasture) and urban development – which tends to be concentrated across the various townships within the LGA (particularly around Tweed Heads).

TABLE 3-13 LAND USE ACROSS THE ESTUARY CATCHMENTS (ROPER ET AL, 2011)

Estuary Catchment	Undistur-bed Forest (ha)	Cleared (ha)	Urban (ha)	Crops (ha)	Grazing (ha)	Pasture (ha)	Total % Disturbed
Tweed River	45,678	206	12,287	7,179	36,141	2,756	55%
Cudgen Creek	2,052	58	879	227	2,641	933	68%
Cudgera Creek	2,473	26	721	604	1,860	341	58%
Mooball Creek	3,433	9	1,181	1294	3,831	779	64%

As part of this scoping study, a high-level overview of projected use of coastal land for infrastructure, housing, commercial, recreational and conservation purposes have been undertaken – particularly in relation to planned major urban subdivisions.

An assessment of proposed new dwellings over the period 2016-2036 has been undertaken using the Tweed Community Id portal (Tweed Community id, 2019). Some areas will be experiencing significant growth in new dwellings, either through greenfield development or densification and renewal – see Figure 3-15. Two regions within the LGA in particular are forecast for the greatest increase in development of new dwellings in Tweed Shire. These regions are projected to have an increase of over 3,000 dwellings between 2016 and 2036, owing largely to two separate, large-scale master planning estate developments. They include:

- *Cobaki - Piggabeen area:* This includes the planned ***Cobaki Estate Development*** which will comprise a new mixed, residential, commercial, community use redevelopment, covering over 600 hectares of net developable land. The estate will contain seventeen residential precincts comprising approximately 5,500 dwellings (a new population of between 10,000 and 12,000 people).
- *Mid Coast – Casuarina Area*: This includes the planned ***Kings Forest Development*** which will comprise a new mixed, residential, commercial, community use redevelopment. It is a master-planned community that will contain fourteen residential precincts with a mix of housing totalling over 4,500 dwellings (a new population of over 11,000 residents) covering approximately 437 hectares of net developable land. It also includes active open space areas and passive open space areas (approximately 17 hectares), and environmental protection areas covering 300 hectares of land.

These two developments have both been identified within the State Government's Far North Coast Regional Plan as some of the largest contributors for the provision of new housing and employment within the Tweed Shire over the next 25-year time period. Both sites are owned by LEDA Manorstead Pty Ltd, who is also the development proponent.

Several other major urban subdivisions are also planned for the LGA, including Bilambil Heights subdivision - which will be a residential area catering for around 8,000 people.

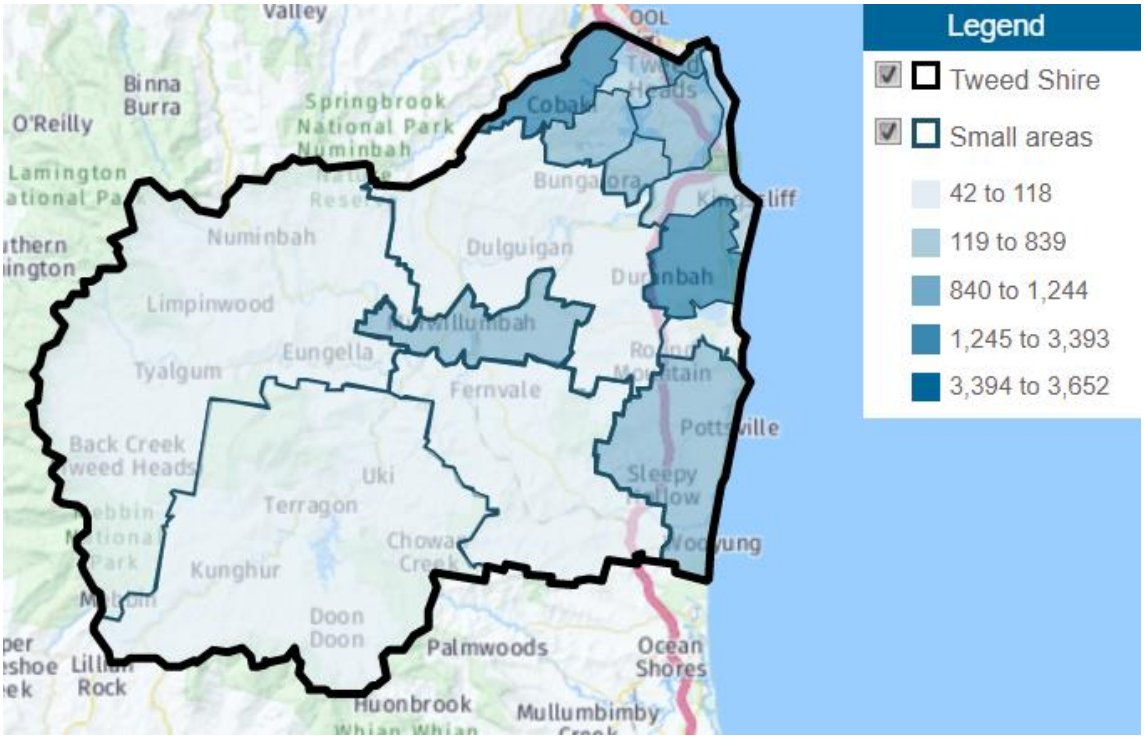

FIGURE 3-15 FORECAST CHANGE IN NUMBER OF DWELLINGS 2016-2036 (TWEED FORECAST ID, 2019)

4 STAKEHOLDER ENGAGEMENT

4.1 Stakeholder Engagement

A Stakeholder Engagement Workshop was held on the afternoon of Wednesday 24 July 2019 at Councils Murwillumbah Administration Office. The Workshop included an initial presentation by Water Technology Project Manager Chris Beadle to provide background and context of the CMP process and was then followed by a series of open forum, round-table discussion sessions.

Overall 25 attendees were invited, and of these a total of 12 attended on the day from six different agencies. Organisations in attendance included Tweed Shire Council, Department of Industry – Lands, NSW National Parks and Wildlife Service, DPI Fisheries and Byron Shire Council (see Table 4-1). Notably, a series of scheduling conflicts prevented attendance from some representatives from the Department of Planning, Industry and Environment. Representatives from several other organisations were invited to attend but were not able to, including the Transport for NSW (NSW Maritime), Tweed Byron Local Aboriginal Land Council, Gold Coast City Council and the Tweed Sand Bypass Project.

TABLE 4-1 STAKEHOLDER ENGAGEMENT WORKSHOP ATTENDEES

Name	Title	Organisation
Jane Lofthouse	Coordinator Sustainability and Environment	Tweed Shire Council
Scott Hetherington	Senior Program Leader – Biodiversity	
Jodie Hewett	Recreation Planner	
Mark Tickle	Economic Development Officer	
Stewart Brawley	Manager Parks and Active Communities	
Robyn Eisermann	Acting Unit Coordinator – Strategic Planning and Urban Design	
Andrew Illingworth	Coordinator Tweed Holiday Parks	
Danny Rose	Manager Roads and Stormwater	
Anthony Burnham	Manager Water and Wastewater	
Megan Gallagher	Coastal Management Specialist	Department of Industry – Lands
Josh Chivers	Senior Project Officer (Coastal Landscapes)	NSW NPWS
Jonathan Yantsch	Fisheries Manager – Coastal Systems	DPI Fisheries
Chloe Dowsett	Coastal and Estuary Officer	Byron Shire Council
Chris Beadle	Senior Coastal Engineer	Water Technology

The purpose of the workshop was to:

- Communicate the strategic context and drivers of the CMP to participants;
- Confirm management roles and responsibilities across coastal zone;
- Identify key coastal management issues, including historical, present day and emerging/future; and
- Identify any tacit knowledge or non-documented issues and/or risks.

The structure of the workshop is given in Table 4-2. The round table discussion sessions gave attendees the opportunity to fill in activity sheets (proforma's) for the purposes of harnessing information.

TABLE 4-2 STAKEHOLDER ENGAGEMENT WORKSHOP RUN LIST

Time	Component
13:00 – 13:10	**Introduction** ■ Welcome and introductions ■ Outline of the day
13:10 – 13:20	**Background and Strategic Context into the Coastal Management Programs (CMP)** ■ Snapshot of the NSW Coastal Reforms ■ The Tweed Shire Coastal Management Program ■ Purpose, Vision and Objectives for the CMPs
13:20 – 14:20	**Round-Table Discussion #1: Current Coastal Management Arrangements, Roles and Responsibilities** ■ Identification of roles and responsibilities across the coastal zone ■ Round-table discussion amongst stakeholders of current coastal management arrangements, what has worked? What hasn't? What could be improved? ■ Key data repositories and databases
14:20 – 14:30	**Afternoon Tea Break**
14:30 – 15:45	**Round-Table Discussion #2: Identification of Key Management Issues** ■ Outline of previous studies and coastal / estuary management plans ■ Round-table discussion amongst stakeholders of key coastal and estuary management issues across the LGA, including historical, present and future issues ■ Identification of important values and high priority threats
15:45 – 16:00	**Wrap Up and Discussion of Forward Program** ■ Summary and conclusion ■ How to follow up with the project group regarding additional data and information ■ The way forward for the project

For those not able to attend on the day, activity sheets were provided after the event for review and supplementation. An extended engagement period of three weeks was provided to allow organisations and agencies to provide information and feedback.

Outcomes of the workshop are described in the workshop summary provided in Appendix D.

A smaller workshop session was held with the Tweed Coast and Waterways Committee of Council on 14 August 2019. This session further explored the responsibilities and management issues of a broader range of community and industry stakeholders such as boating, recreational fishers, Dunecare and the habitat restoration industry.

FIGURE 4-1 WORKSHOP ROUND-TABLE SESSION

4.2 Community Consultation

As part of the Stage 1 Scoping Study, direct consultation with the community to confirm community values and key issues was not undertaken. Rather, a review of the outcomes of historical community and stakeholder engagement activities was conducted. This approach was adopted as a way of providing a "stocktake" of community values and issues that have been established during previous direct community engagements – noting that this will be built on during latter stages of the CMPs.

This approach is supported by the NSW Coastal Management Manual, which states that for a Stage 1 scoping study, relevant information about the community and its interests and aspirations for the coast may be drawn from results of previous community engagement or surveys, with the aim to collect and analyse more detailed information about the community and stakeholders to be included in Stage 2.

There have been several studies and management plans over recent years (since 2005) that have included engagement with the community, and much can be gleaned by reviewing the outcomes of such projects. These include activities conducted as part of coastal and estuary management plans, community strategic plans, and other relevant studies and investigations, including:

- Tweed River Estuary CMP Community Values Study (Hydrosphere, 2019);
- Tweed Coastal Estuaries CZMP 2013 (Hydrosphere, 2013);
- Cobaki and Terranora Broadwater CZMP (AW & ABER,2010);
- Tweed Shire Coastline Management Study Stage 1 - Values Assessment Report (Umwelt, 2005);
- The NSW Water Quality and River Flow Objectives (DPIE, 2019d);
- The Marine Estate Management Strategy (MEMA, 2018);
- The North Coast Regional Plan 2036;
- The Northern Rivers Catchment Action Plan 2013-2023; and

- Tweed Shire Council Community Strategic Plan 2017–2027.

A summary of the community values ascertained from this review is provided in Section 7. That Section also provides an overview of keys threats and risks which were also informed (in part) by previous community consultation activities.

4.3 Stakeholder Engagement Strategy

As part of this study, a community and stakeholder engagement strategy has been developed for Stages 2 to 5 of the CMP process. The Strategy is provided in Appendix A, and has been prepared in accordance with the guidance provided in the NSW Coastal Management Manual (OEH, 2018c).

5 CMP SCOPE AND KEY ISSUES

5.1 Spatial Extent

As discussed in Section 3.3, the CM Act defines the area of land to be covered by a CMP – which may include any of the following four (4) coastal management areas. Each area has different characteristics and may overlap. These are discussed in Section 5.2 and include:

- Coastal environment area;
- Coastal use area;
- Coastal wetlands and littoral rainforests area; and
- Coastal vulnerability area.

The CM SEPP includes adopted maps for three (3) of these zones. The CM SEPP mapping of coastal environment, coastal use, and coastal wetlands and littoral rainforests areas are provided in Figure 5-1 and Figure 5-2. Mapping for the coastal vulnerability area has not been provided from the SEPP, and no such coastal vulnerability area map yet exists for the Tweed LGA. The Tweed Development Control Plan Section B25 – Coastal Hazards contains mapping of the adopted coastal erosion hazard lines.

The mapping of these coastal management areas may be refined during Stage 2 of the CMPs. A key outcome of Stage 2 will be to provide detailed information necessary for a planning proposal to amend the mapping of coastal management areas for planning purposes in Council's Local Environmental Plan (LEP)

Two points are noted with regards to the CM SEPP mapping:

- ***The intent of Tweed Shire Council is to propose, by way of a planning proposal, the adoption of a map indicating a Coastal Vulnerability Area (CVA) for coastal erosion and tidal inundation hazards.***
- ***The existing CM SEPP mapping for coastal environment area, coastal use area, and coastal wetlands and littoral rainforests area may be amended or replaced based on the outcomes of the CMP – also through the process of making a planning proposal.***

All four coastal management areas identified above are applicable to the development of the CMPs for the Tweed Shire Open Coast and Estuaries, and the Cobaki and Terranora Broadwaters.

Under the CM Act, CMPs are required to take a "systems" approach to coastal management. This means that the study area for the CMPs needs to recognise that important ecological and hydrological systems extend across the catchment, coastline, estuaries and foreshore of the Tweed LGA. There are several issues that exist on a system wide scale, including water quality, ecological processes, estuarine ecology and biodiversity, coastal and catchment flooding, development pressures and local and regional planning. In order to identify the values, pressures and risks related to these systems and to develop a coordinated approach to their management, the spatial extent of the CMPs should include the upper catchment areas that extend outside of the coastal zone as defined by the CM SEPP mapping.

It should be noted that although the CMP study area lies wholly within the Tweed Shire LGA, it also lies within the wider 'Point Danger–Cape Byron' coastal sediment compartment, which extends from Point Danger in the North to Cape Byron in the South (Thom et al, 2018; CM Act, 2016). In accordance with CM Act, consultation with other local Councils within this sediment compartment (that is, Byron Shire Council) is required as part of the CMP development. As such, Byron Shire Council has been consulted as part of the Stakeholder Engagement activities for the scoping study (see Section 4).

5.2 Coastal Management Areas

5.2.1 Coastal Environment Area

The CM Act defines the coastal environment area as land containing ***coastal features such as the coastal waters of the States, estuaries, coastal lakes, coastal lagoons***, and land adjoining those features including headlands and rock platforms. ***Beaches dunes and foreshores*** are included in this area. Within estuaries, the coastal environment area extends upstream to the extent of tidal influence.

The area of land adjacent to the open coast, estuary or coastal lake/lagoon is also included in the coastal environment area. This is to ensure nearby development considers potential impacts on the coastal environment. The CM SEPP mapping for the coastal environment area therefore includes the following buffers around these coastal features:

- *For estuaries and coastal lakes:* a 500 m landwards buffer
- *For beaches, dunes, headlands, rock platforms and foreshore:* a 250 m landwards buffer.

The coastal environment area mapping provided in the CM SEPP is depicted in Figure 5-1.

The management objectives for the Coastal Environment Area provided in the CM Act are:

- To protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity;
- To reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change;
- To maintain and improve water quality and estuary health;
- To support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons;
- To maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place; and
- To maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.

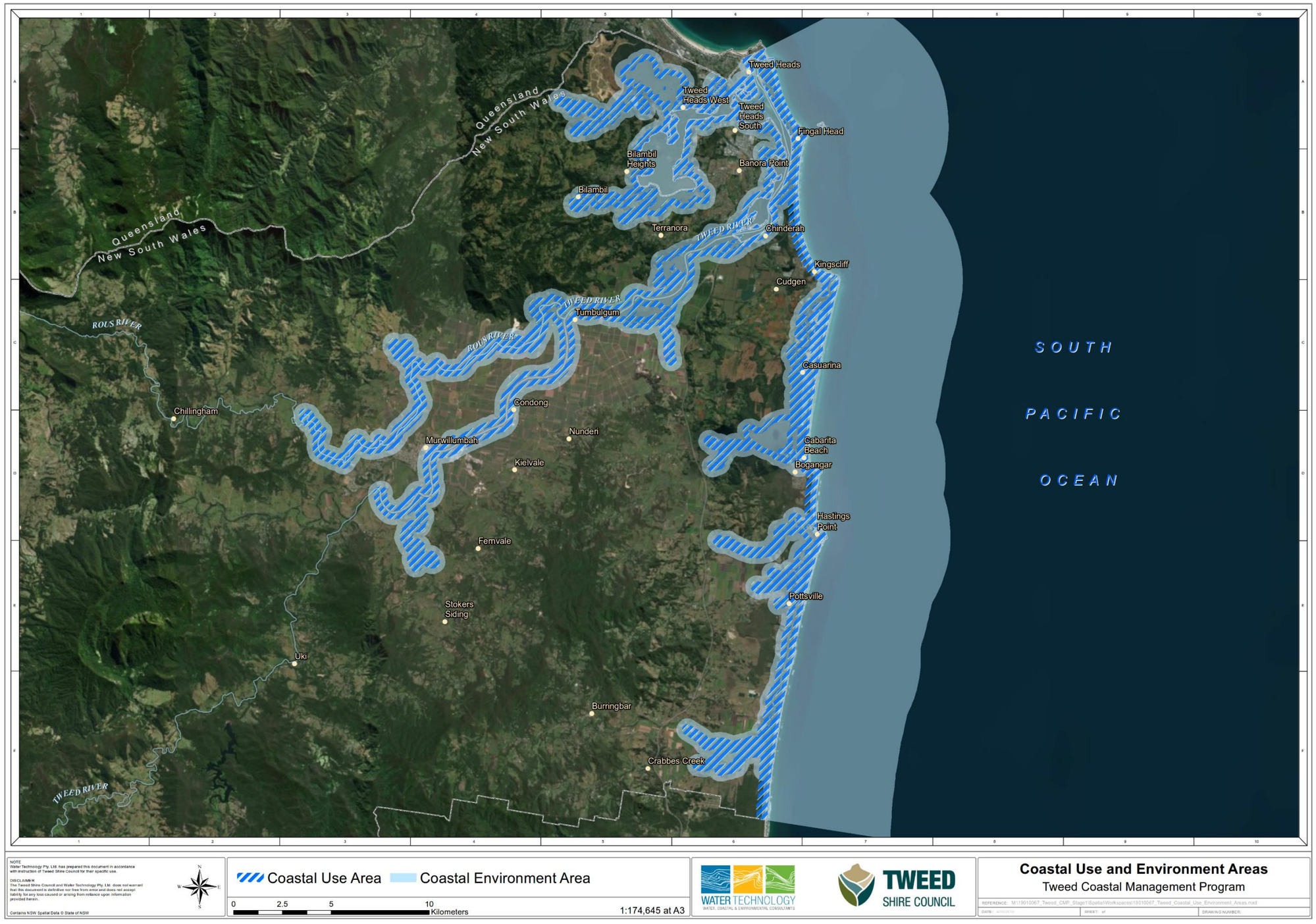

FIGURE 5-1 COASTAL ENVIRONMENT AREA AND COASTAL USE AREA

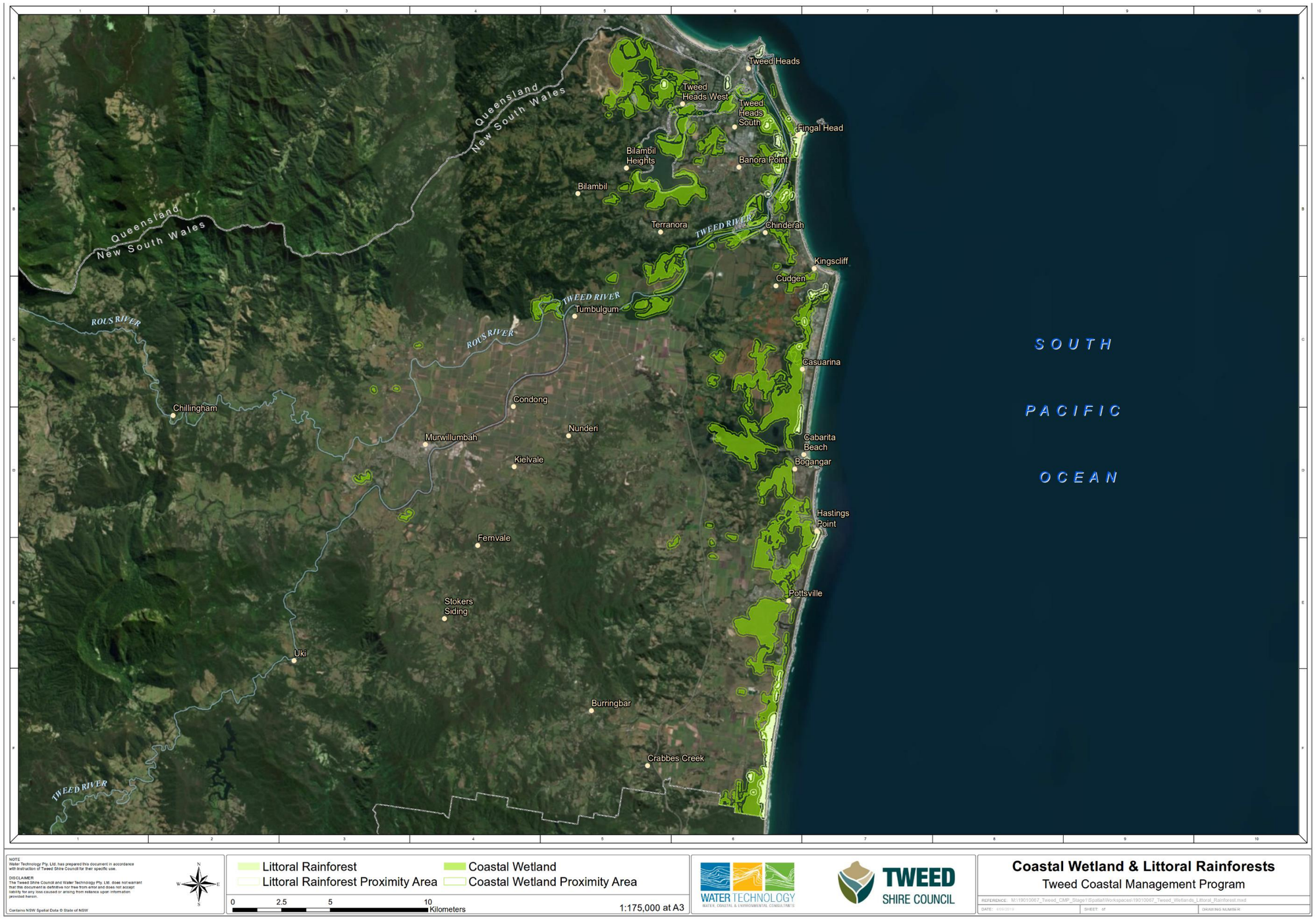

FIGURE 5-2 COASTAL WETLANDS AND LITTORAL RAINFORESTS

5.2.2 Coastal Use Area

The CM Act defines the coastal use are as being ***land adjacent to coastal waters, estuaries, coastal lakes and lagoons*** where development is or may be carried out (at present or in the future), and impacts of development on the scenic and cultural values and use and enjoyment of the beaches, foreshores, dunes, headlands, rock platforms, estuaries, lakes and the ocean need to be considered. In regional NSW, the coastal use area is defined as the 500 m landward extent from the open ocean boundary of LGA's, and a 250 m landward extent from the boundaries of estuaries.

The coastal use area mapping provided in the CM SEPP is depicted in Figure 5-1.

The management objectives for this area within the CM Act are to accommodate both urbanised and natural stretches of coastline and to protect and enhance the scenic, social and cultural values of the coast by ensuring that:

- The type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast;
- Adverse impacts on cultural and built environment heritage are avoided or mitigated;
- Urban design, including water sensitive urban design, is supported and incorporated into development activities;
- Adequate public open space is provided, including for recreational activities and associated infrastructure; and
- Use of the surf zone is considered.

5.2.3 Coastal Wetlands and Littoral Rainforests Area

The CM Act defines the coastal wetlands and littoral rainforests area as the land which displays the hydrological and floristic characteristics of coastal wetlands or littoral rainforests, as well as a surrounding proximity area to manage impacts of adjacent development.

Coastal wetlands mapped in NSW for the development of the CM SEPP include those that are dominated by the following vegetation types: mangroves, saltmarshes, melaleuca forests, casuarina forests, sedgelands, brackish and freshwater swamps, and wet meadows.

Littoral Rainforests are defined by their dominant vegetation which include riberry broad leaved lilly pilly, tuckeroo, brush box, yellow tulip, baurela, red olive plum, plum pine, cabbage palm and various figs.

The maps include a 100-metre proximity area, applying to all land zones around coastal wetlands and littoral rainforests.

The coastal wetlands and littoral rainforests area mapping provided in the CM SEPP is depicted in Figure 5-2.

FIGURE 5-3 TWEED RIVER MANGROVES (SOURCE: NPWS, 2019)

The CM Act specifies that the management objectives for this area are:

- To protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity;
- To promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests;

- To improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration;
- To support the social and cultural values of coastal wetlands and littoral rainforest; and
- To promote the objectives of State policies and programs for wetlands or littoral rainforest management.

5.2.4 Coastal Vulnerability Area

The coastal vulnerability area (CVA) is defined in the Act as land which is subject to coastal hazards. The area focusses on identifying land subject to current and future coastal hazards, and to ensure land use management and development undertaken in these areas recognise coastal risk and is subsequently appropriate. The Act provides for the management of seven coastal hazards:

- Beach erosion;
- Shoreline recession;
- Coastal lake or watercourse entrance instability;
- Coastal inundation;
- Tidal inundation (often referred to as “sunny-day flooding”);
- Coastal cliff or slope instability; and
- Erosion and inundation of foreshores caused by tidal water and waves, including the interaction of those waters with catchment floodwaters.

The CM Act specifies that the management objectives for this area are to:

- Ensure public safety and prevent risk to human life;
- Mitigate current and future risks from coastal hazards, taking into account the effects of coastal processes and climate change;
- Maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place;
- Maintain public access, amenity and use of beaches and foreshores;
- Encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions;
- Adopt coastal management strategies that reduce exposure to coastal hazards, in the first instance by restoring and enhancing natural defences such as coastal dunes, vegetation and wetlands; and, if that is not sufficient, by taking other action to:
  - Avoid significant degradation of biological diversity and ecosystem integrity;
  - Avoid significant degradation or disruption of ecological, biophysical, geological and geomorphological coastal processes;
  - Avoid significant degradation of or disruption to beach and foreshore amenity and social and cultural values;
  - Avoid adverse impacts on adjoining land, resources or assets; and
  - Provide for the restoration of the beach or adjacent land if any increased erosion is caused by actions to reduce exposure to coastal hazards.
- Prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency; and

- Improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.

At the time of preparing this Scoping Study, there was no map published under the CM SEPP to identify the CVA in the Tweed Shire LGA. ***Therefore, a planning proposal will be required to prepare an LEP which declares a map (based on the outcomes of the CMPs) to be the CVA for the purposes of the CM SEPP in Tweed Shire LGA***.

It should be noted that DPIE are currently in the process of finalising formal guidance on CVA mapping inputs and processes.

Existing Coastal Hazard Mapping

Coastal hazards have been assessed and mapped across the various coastlines and estuaries of the LGA through several coastal hazard studies and modelling investigations.

The ***Tweed Shire Coastline Hazard Definition Study*** (WBM Oceanics, 2001) addressed a range of issues for the study area coastal zone, including erosion, long term shoreline recession, tidal inundation, storm tide inundation and wave run-up and estuary entrance instability. The study generated mapping of coastal erosion and inundation along the LGA coastline and estuaries, for the present day (immediate), 2050, and 2100 planning timeframes. These hazard lines were updated in 2010 to incorporate the (then) NSW Governments sea level rise planning benchmarks.

In 2013, Council commissioned the ***Tweed Shire Coastal Hazards Assessment*** (BMT WBM, 2013). The purpose of the assessment was to update the 2001 Hazard Definition Study (WBM Oceanics, 2001) in relation to changes to the Coastal Protection Act 1979 and the (then) updated guidelines for Preparing Coastal Zone Management Plans made by the NSW Government in 2010, which advocates a risk based approach to coastal hazards management. The update did not apply to the entire Tweed LGA Coastal Zone, only the select developed coastal areas from Pottsville to Kingscliff. The zones that were not updated comprised the coastline regions defined by undeveloped coastal reserves, and in these regions the 2010 hazard lines are still in place. The assessment also included analysis of coastal inundation incorporating assessment of:

- Elevated ocean levels;
- Design wave conditions;
- Wave run-up and overtopping; and
- Creek estuary inundation levels.

The ***Tweed-Byron Coastal Creeks Flood Study*** (BMT WBM, 2009a) has modelled flood behaviour across the catchments of the Tweed Coast estuaries and resulted in the preparation of flood maps which predict inundation depth and flow velocity for events ranging from 5-year ARI (20% AEP) to probable maximum flood (PMF). Similarly, the ***Tweed Valley Flood Study 2009 Update*** (BMT WBM, 2009b) assesses combined coastal and catchment flooding through the Tweed River Estuary.

The ***Tweed Development Control Plan Section B25 - Coastal Hazards*** includes mapping of these coastal hazards across the open coastline of the Tweed LGA.

The ***Coastal Zone Management Plan for Tweed Coast Estuaries*** (Hydrosphere, 2013) addressed coastal hazards affecting the estuaries not addressed by Tweed Shire Coastal Hazards Assessment - namely bank erosion. The ***Tweed Coast Estuaries Bank Erosion Study*** is an appendix to that document and provides spatial mapping of bank erosion risk across Cudgen, Cudgera and Mooball Creeks.

Tweed River Estuary: Coastal Management Program 2020-2030 maps the relevant coastal hazards for the Tweed River estuary – including entrance instability, tidal inundation, bank erosion, and combined coastal and catchment flooding. The tidal inundation mapping for the CMP was undertaken as part of the parallel study:

Tweed Estuary Tidal Inundation Assessment and Mapping (BMT WBM, 2019) which provided mapping for tidal inundation within the Tweed Estuary and its surrounding townships (including the Cobaki and Terranora Broadwaters), considering both present and future tides arising from sea level rise, incorporating storm surge events. Scenarios modelled included a range of design events including the 20% Annual Exceedance Probability (AEP), 5% AEP and 1% AEP events, the 1 EY (1 exceedance expected per year), Mean High Water Spring Tide (MHWS) and Mean Higher High Water Solstice Springs (MHHWSS i.e. King Tide). These design events were modelled for lower, median, and upper range SLR projections for current day 2030, 2050, 2080 and 2120.

The various studies that generate coastal hazard mapping across the LGA, and their applicability to the CM SEPP Coastal Vulnerability Area components, are provided in Table 5-1 using the following key:

- A: Tweed Shire: Coastal Hazard Assessment (BMT WBM, 2013)
- B: Tweed Shire Coastline Hazard Definition Study (WBM Oceanics, 2001 and 2010 Update)
- C: Coastal Zone Management Plan for Tweed Coast Estuaries (Hydrosphere, 2013)
- D: Tweed River Estuary: Coastal Management Program 2020-2030 (Hydrosphere, 2019 - Draft)
- E: Tweed Estuary Tidal Inundation Assessment and Mapping (BMT WBM, 2019)
- F: Tweed-Byron Coastal Creeks Flood Study (WBM, 2009a)
- G: Tweed Valley Flood Study 2009 Update (BMT WBM, 2009b)
- H: Cobaki and Terranora Broadwaters CZMP (AW and ABER, 2010)

TABLE 5-1 SUMMARY OF EXISTING COASTAL VULNERABILITY ASSESSMENTS FOR THE TWEED LGA

Hazard Type	Tweed Open Coastline	Tweed River	Coastal Estuaries (Cudgen, Cudgera and Mooball Ck)	Cobaki and Terranora Broadwaters
Beach erosion	**A and B**	N/A	N/A	N/A
Shoreline recession	**A and B**	N/A	N/A	N/A
Estuary entrance instability	N/A	**D and E**	**A and B**	**D and E**
Tidal inundation (including SLR)	N/A	**D and E**	**Does Not Exist**	**D and E**
Coastal inundation (storm tide and wave run-up)	**A and B**	**D and E**	**A and B**	**D and E**
Cliff/slope instability	**Does Not Exist**	N/A	N/A	N/A
Estuary foreshore (bank) erosion	N/A	**D and E**	**C**	**H**
Estuary foreshore inundation from combined coastal and catchment flooding	N/A	**G**	**F**	**G**

The ***NSW Estuary Tidal Inundation Exposure Assessment*** was undertaken by DPIE (then NSW OEH) in 2018 (OEH, 2018d), along with associated mapping of tidal inundation extents. This undertaking represents a state-wide assessment of the impact of inundation in estuaries associated with projected SLR on the NSW coast. The aim of the study was to refine estimates of the extent of current exposure of properties and infrastructure to potential SLR to help assess the need for, and prioritisation of, adaptation planning and action. As part of the study, mapping was undertaken of Higher High Water Solstice Springs (HHWSS) for three SLR

scenarios: 0.5 m, 1 m and 1.5 m. These were selected to be representative of a range of scenarios relevant to structure design as well as land-use planning (OEH, 2018d). The exposure assessment is limited to broadscale quantification inundation to property and infrastructure – and DPIE notes that it does not replace the need to undertake flood or inundation studies for individual estuaries and results should not be used to assess risk to individual properties and assets. Nonetheless, the study provides a high-level indication of exposure to tidal inundation.

Beach Erosion and Shoreline Recession Hazards

The vast majority of the LGA coastline comprises undeveloped coastal reserve, and most of the coastal development is situated behind a vegetated dune system that provides a significant buffer for short term storm erosion and long-term shoreline recession. However, there are several areas along the coast where development is more coastally adjacent and therefore may experience a higher level of exposure to coastal erosion. Furthermore, the exposure of such areas is likely to increase over the future planning horizon due to sea level rise and corresponding long-term shoreline recession.

FIGURE 5-4 COASTAL EROSION AT KINGSCLIFF

These locations include:

- Fingal Head east of Letitia Road, including the Fingal Head Holiday Park, SLSC and aboriginal cemetery.
- Kingscliff east of Marine Parade, including the Kingscliff Holiday Park, Kingscliff North Holiday Park and SLSC (see Figure 5-4).
- Casuarina, along the most seawards row of development - east of North Point Ave and Cylinders Drive.
- Cabarita Beach east of Tweed Coast Road, including the Cabarita Beach SLSC.
- Hastings Point, east of Tweed Coast Road.

FIGURE 5-5 BANK EROSION AT MOOBALL CREEK (SOURCE: HYDROSPHERE, 2012)

There are several locations along the various estuary foreshores that experience bank erosion. Bank erosion is occurring in all three estuaries, with varying levels of severity. The Coastal Zone Management Plan for Tweed Coast Estuaries (Hydrosphere, 2013) identified that in some areas bank erosion poses a high risk to both built and natural assets.

Out of the total 45 kms of foreshore surveyed across the three estuaries, 63% (29 kms) of banks were assessed as stable and 7% (3 kms) had been adequately controlled with no on-going erosion issues observed. Of the remaining banks, 2% (0.7kms) had some erosion control works in place but there were continuing issues requiring attention. Of the remaining banks with no protection measures, 21% (9.3kms) of the banks were classified as having minor erosion, 4% (1.8kms) had moderate erosion, and 4% (1.6kms) showed severe erosion.

Coastal and Tidal Inundation Hazards

Many of the open coast locations are relatively protected from coastal inundation as the LGA beaches are typically back by vegetated dune systems that provide a coastal protection buffer. However, BMT WBM (2013b) showed that some locations at Kingscliff (such as the Holiday Park and Lions Park near the Cudgen Creek Entrance) are at risk of storm tide inundation and wave run-up.

The areas within the LGA with the highest exposure to tidal inundation and coastal inundation are the low-lying fringes of the coastal estuaries. Most of the estuary foreshores and a significant amount of surrounding development is at risk of inundation under the existing 100-year ARI inundation extent (combined catchment and coastal), as depicted in the flood mapping provided in Appendix E. Most of these areas will have an increased exposure to such hazards due to projected sea level rise. These areas include:

- Cobaki and Terranora Broadwaters:
  - Tweed Heads West – in the vicinity of Davey's Island; and
  - Tweed Heads South – in particular the area of land bounded by Minjungbal Drive and Dry Dock Road.
- The Tweed River, including:
  - Chinderah (west of the Pacific Motorway) and Dodds Island;
  - Tumbulgum;
  - Condong;
  - Murwillumbah and South Murwillumbah; and
  - Bray Park.
- Cudgen Creek:
  - East Kingscliff (near the Cudgen Creek entrance);
  - The Bogangar Canal Estate
- Cudgera Creek:
  - Hastings Point (west of Tweed Coast Road)
  - Lower Cudgera (west of Tweed Coast Road)
  - Mooball Creek:
- Pottsville (in the vicinity of the Tweed Coast Road bridge)

Many of the locations listed above will also become increasingly exposed to tidal inundation (i.e. sunny day flooding) into the future as sea level rise begins to take effect. The NSW Estuary Tidal Inundation Exposure Assessment (OEH, 2018d), indicates that tidal inundation is likely to affect a significant portion of estuary adjacent land under a 1.0 m sea level rise scenario.

At Cudgen Creek this includes residential development around South Kingscliff and the Bogangar Canal Estate, and agricultural land such as over 70 ha of agricultural land in between Cudgen and Kinds Forest and another 130 ha around Reserve Creek at Tanglewood.

Tidal inundation mapping (OEH, 2018d) at Cudgera for the 1.0 m sea level rise scenario shows inundation impacts to residential properties at Hastings Point, as well as 250 ha of affected agricultural land northeast of Pottsville. Similarly, for Mooball creek this mapping indicates impacts to agricultural land around Sleepy Hollow and Wooyung.

Overall, for many areas adjacent to these estuaries, the OEH (2018a) mapping indicates that there will be limited room for the upslope migration of macrophytes where the estuary foreshore abuts areas of residential development.

The overall scale of potential tidal inundation impacts identified by the OEH (2018a) mapping indicates that more detailed (property scale) analysis is required regarding tidal inundation impacts around the coastal estuaries.

5.3 Key Issues

A key component of the Stage 1 Scoping Study is to determine the scope of key coastal management issues for the Tweed Shire LGA. Identifying these issues will inform the future direction of the CMPs. Several key management issues for the region exist given the complexity of the catchment in terms of environmental value, increasing development and population pressures, recreational and industrial/agricultural pressures. Key issues for the LGA Coastal Zone have been identified across various historical studies and plans, including the documents listed in Section 3.4.1. Key issues have also been identified in the Marine Estate Management Authority (MEMA) Threat and Risk Assessment (TARA). Key issues were also identified through the Stakeholder Engagement Workshop (see Section 4).

Key issues identified in the literature review and Stakeholder Engagement Workshop conform to one of five high level categories, comprising:

- *Land use intensification and environmental impacts:* Potential threats include water pollution and sediment contamination resulted from urban stormwater discharge, agricultural runoff, point source pollution and sewage overflows and discharges. Key issues also include habitat clearance/disturbance and pollution impacts on local ecosystems and biodiversity, and management of pest species.
- *Resource use and conflict*: This relates to conflicting resource use of foreshore/waterway areas and facilities. Key issues include overcrowding/congestion of waterways, limited foreshore and waterway access, and balancing commercial and recreational use of local beaches.
- *Natural hazards*: Resulting in threats such as coastal erosion, estuarine bank erosion, coastal inundation, estuarine and catchment flooding and cliff instability. These hazards occur under existing day conditions and may be exacerbated over future timeframes due to climate change impacts.
- *Public safety:* Key issues include water pollution/contamination affecting human health and safety, public safety risk from coastal and estuary processes (rip currents, hazardous surf conditions), natural hazards such as inundation and erosion and ongoing hazards associated with bushfires affecting residential development adjacent to fire-prone areas of parkland.
- *Planning and Governance:* These issues include ambiguity or lack of understanding/agreement on governance (e.g. coastal protection structures ownership and maintenance), lack of compliance with regulations (by users) and lack of regulation effort (by agencies) and lack of funding for investigation and action implementation. Issues also include data gaps that may represent a risk to effectively managing the coastal zone.

Values, threats and risks to the Tweed LGA Coastal Zone are described in more detail in Section 7. Based on the nature and the scope of these issues, the Coastal Management areas discussed in Section 5 (and mapped in Figure 5-1 and Figure 5-2) are considered suitable to address the various threats and stressors to the environmental, social and economic values of the study area.

6 ROLES AND RESPONSIBILITIES

6.1 Existing Studies and Management Plans

Over the years, a number of coastal management studies and plans have been developed for the coastline and estuaries of the Tweed, as outlined in Section 3.4.1. These have been prepared in various forms, including Coastal Zone Management Plans, Coastline Management Plans and Estuary Management Plans. These documents have been developed over 20 years and cover a range of study areas within and across the LGA. Details of the previous coastal management related plans are provided below. The most relevant studies and management plans are outlined below:

6.1.1 Tweed Coastline Management Plan (2005)

Council commenced development of a coastline management plan in 1999, in accordance with the then NSW Government Coastline Management Manual (1990). Tweed Coastline Management Plan (Umwelt, 2005) was the culmination of several supporting studies including:

- ***The Tweed Coastline Hazard Definition Study*** (WBM, 2001), which identified coastline hazards affecting the entire Tweed coast, such as short and long term erosion, shoreline recession, oceanic inundation and coastal entrance instability. The study delineates the landward extent of the hazard zones for the Immediate, 50-year and 100-year planning timeframes. Of the natural processes investigated, the significant issue identified and mapped for the Tweed Coastline Management Plan project was the potential for beach erosion and shoreline recession. These hazard lines and zones were updated in 2010 to incorporate the (then) NSW Governments sea level rise planning benchmarks.
- ***The Tweed Shire Coastline Management Study Stage 1 and Stage 2*** (Umwelt, 2005a) were undertaken, to identify the issues and values along various elements of the Tweed coast, and to assist in determining objectives for management, and suitable options to address the risks to the coast.

Following adoption of the 2001 Hazard Study, Council commissioned the Tweed Shire Coastline Management Study and Tweed Shire Coastline Management Plan. The Management Plan was adopted by Tweed Shire Council in June 2005. The Coastline Management Plan was developed to provide strategic and practical guidance for future management of the Tweed LGA coastline.

The plan captured preferred actions to treat risks from coastal hazards, and to improve recreational amenity, landscape character and ecological values along the coast.

6.1.2 Coastal Zone Management Plan for Cobaki Broadwater and Terranora Broadwater (2010)

The CZMP for the Cobaki and Terranora Broadwaters was undertaken by Australian Wetlands and ABER in 2010. The objective of the CZMP was to develop a management plan that addressed the unique characteristics and interrelationships of ecosystems and human activities for Cobaki and Terranora Broadwaters, considering the degree of existing modification and future impacts. The CZMP provides a scheduled sequence of recommended management actions to achieve the various objectives for estuary management across the two Broadwaters.

An integrated approach to management of the two Broadwaters and their catchments was proposed in recognition of the fact that there is hydrological connectivity between the two systems, that they share similar physical characteristics and are affected by the same physical, ecological and anthropogenic processes.

6.1.3 Tweed Coast Estuaries Coastal Zone Management Plan (2013)

The study area for the CZMP comprises the Tweed Coast Estuaries, namely the Cudgen Creek and Cudgen Lake, Cudgera Creek and Mooball Creek systems. The aim of the plan was to document Tweed Shire Council's strategy for management of the Tweed Coast Estuaries and their catchments consistent with NSW state policy.

The CZMP addresses identified pressures on estuary health through the implementation of integrated, balanced, responsible strategies to restore and maintain the ecological sustainability of the estuaries and catchments as well as the associated recreational and commercial activities.

The Plan includes associated studies and documents, including the Baseline Ecosystem Health Assessment, Bank Erosion Study and Catchment Modelling Report. These data collection exercises were undertaken during the development of the plan and provide information regarding the health of these systems and the key factors within the creeks and their catchments that are affecting the ecological health and recreational values of the systems.

The Plan supersedes the preceding Tweed Coast Estuaries Management Plan 2004-2008.

6.1.4 Tweed River Bank Erosion Management Plan (2014)

This plan was developed by Tweed Shire Council in 2014. The purpose of the plan is to provide an updated classification of bank erosion severity within the Tweed Estuary, and corresponding schedule of works to stabilise river bank erosion on public land (to be undertaken by Council), as well as updated design advice for works required on private land. The plan provides preferred design options for river bank stabilisation works in the Tweed River, with a focus on revegetation and bio-engineered design that maximise ecological and amenity values.

The report is to provide an update of the recommendations of the Tweed River Estuary Bank Management Plan (Patterson Britton and Partners, 1998). The plan is informed by the findings of Patterson Britton and Partners (1998), as well as an investigation into river bank erosion prepared in 2012 by SMEC, the Impact of Wake on Tweed River Bank Erosion Study, (SMEC, 2012). The study area for the plan is constrained to the estuarine part of the main Tweed River, from Bray Park Weir to Fingal Head. The upper catchment, Rous River and Terranora Creek were not included, as erosion in those systems is significantly different in character and scale to that of the main estuary.

6.1.5 Kingscliff Coastal Risk Management Study (2015)

The approach to the short and long-term management of Kingscliff Beach between the Cudgen Headland SLSC and Kingscliff Beach Bowls Club was assessed in the Kingscliff CRMS (BMT WBM, 2015). The study included a summary of the key coastal processes affecting the coastal zone of Kingscliff, and identification of a series of hazard management options. The study describes the key aspects of each management option and provides a shortlist of potential management options, which were then assessed via a multi-criteria assessment. The study determined a suite of short to medium term management solutions for Kingscliff over a future 30-year planning horizon.

6.1.6 Kingscliff – Dreamtime Beach Coastal Zone Management Plan (2017)

The Kingscliff - Dreamtime Beach CZMP was adopted by Council in 2017. The purpose of the plan was to set a plan of management for the coastal zone encompassed by Kingscliff Beach and Dreamtime Beach. The two beaches form a 6 km long embayment with continuous sandy shoreline, from Fingal Head in the north to Cudgen Headland and the Cudgen Creek training walls in the south.

The plan incorporates actions from the previous Tweed Coastline Management Plan that covered the whole Tweed Coast (Umwelt, 2005), actions for Kingscliff Beach arising from the Kingscliff Coastal Risk Management Study (BMT WBM, 2015) (which focused on the section of shoreline between the Cudgen Headland SLSC and Kingscliff Beach Bowls Club); and new actions for the remainder of the beach developed through the course of that CZMP.

For the plan, the embayment was separated into management "precincts" – which were defined in terms of the different risks and values within them that in turn support a different level of community usage and development, ecological habitats and function, and therefore require different management intent and actions.

6.1.7 Tweed River Estuary Coastal Management Program (2019)

The CMP for the Tweed River estuary was developed by Hydrosphere in 2019 and provides the updated plan to direct ongoing management of the estuary. The CMP addresses the NSW Coastal Management Reforms, particularly the requirements of the CM Act and the CM SEPP. It has been developed in accordance with Stages 1 to 4 of the five-stage process for developing and implementing a CMP, as detailed in the Coastal Management Manual (OEH, 2018a). The study area comprises the reaches of the estuary from the entrance to the extent of the tidal limits including the tidal waterways, foreshore and adjacent land.

6.2 Audit of Implementation

As part of this scoping study, an audit was undertaken of the recommended actions and strategies put forth in the various management plans listed above. This audit was undertaken in consultation with information provided by Tweed Shire Council, and was undertaken on over 260 discrete actions recommended in the following documents:

- Kingscliff – Dreamtime Beach CZMP (2017) – 22 Actions;
- Tweed Coastline Management Plan (2005) – 142 actions across 6 sections of the coastal zone;
- Coastal Estuaries CZMP – 27 actions/strategies across Mooball, Cudgen and Cudgera Creeks; and
- Cobaki and Terranora Broadwaters CZMP – 71 actions.

The results of the audit are provided in Appendix C. For each action item within each plan, information has been provided regarding the current status of that action. The status of the respective actions generally fit one of five categories:

- ***Completed:*** Where discrete (one-off) actions items have been completed and no further actions is required
- ***Implemented and Ongoing:*** Where actions have an ongoing component and are currently being enacted. This includes actions that are in progress
- ***Not Undertaken / Outstanding:*** Where outstanding actions have not yet commenced - but have been marked for future implementation.
- ***No Longer Applicable:*** Where actions are no longer applicable or outside the remit of Council.
- ***Other:*** Actions that do not necessarily fit into the above categories.

Where advantageous, information has been provided regarding linkages to where action items overlap with Council Plans that relate to the coastal zone, such as *the Commercial Recreation Activities on Public Open Space Policy* and Vegetation *Management Strategy*. Linkages of action items to external agencies organisations have also been highlighted where applicable. These linkages generally relate to implementing actions that relate to coastal zone space that is managed by Crown Lands, the NPWS or Tweed Byron LALC.

A summary of the audit is provided in Table 6-1, which provides a breakdown of action implementation across the various management plans. Council uses an internal reporting system called *Cascade* to monitor progress of management plan actions, and report on progress and outcomes.

TABLE 6-1 SUMMARY OF AUDIT

Plan	Total Actions	Completed or Implemented and Ongoing	Outstanding	Not Applicable	Other
Kingscliff – Dreamtime Beach CZMP 2017	22	18	2	0	2
Coastal Estuaries CZMP 2013	27	15	9	0	3
Cobaki and Terranora Broadwaters 2010	71	38	30	1	1
Tweed Coastline Management Plan 2005	142	84	15	41	2
Total	**262**	**155 (59%)**	**56 (21%)**	**42 (16%)**	**8 (3%)**

Results in this table and Appendix C show that most actions recommended in the plans have been undertaken or are currently ongoing. A number of these have generated positive environmental and socio-economic outcomes when compared to their intended monitoring indicators. Examples are numerous, but some notable ones include:

- Funding and implementation of a Coastal Compliance Ranger, who assists in monitoring a number of issues across the coastal zone including off-leash dog access (particularly during shorebird and turtle nesting seasons), beach vehicle use, damage to dune vegetation due to illegal camping and vegetation vandalism, and other recreational or access issues that may affect coastal biodiversity values.
- The 2017 upgrade of the Kingscliff Beach seawall (along the Holiday Park shoreline), which was undertaken as part of the Kingscliff Beach Holiday Park Renewal and Rowan Robinson Park developments.
- The 2014 construction of a floating shorebird roost near in the Terranora Broadwater (east of Tommy's Island).
- Development and implementation of a vertebrate pest animal management strategy – to help protect coastal zone biodiversity including nesting turtles, migratory and shore birds.
- The development and implementation of the Tweed Vegetation Vandalism on Public Land Policy 2016.
- Tweed Development Control Plan B25 – Coastal Hazards.

Council has given effect to many of these actions through their integrated Planning and Reporting (IP&R) framework and are manifest in the Delivery Program 2017–2021 and annual operational plans.

Of those actions currently listed as *not yet started*, several barriers to implementation were identified by both literature review and the Stakeholder Engagement workshop. The most common barriers to implementation relate to the availability of funding and resources, given the relatively small rate payer base relative to the size and area of the Tweed Coastal Zone. The scale of visitation from South East Qld also presents challenges to implementation for some actions.

Some actions, particularly those relating to older documents such as the Tweed Coastline Management Plan 2005 were found to no longer be applicable due to changing circumstances and study/plan updates. For example, there a significant number of actions in the Tweed Coastline Management Plan (2005) relating to the Kingscliff Beach area that have superseded by newer actions in the Kingscliff – Dreamtime Beach CZMP (2017).

6.3 Monitoring Programs

As part of the NSW Natural Resources Monitoring Evaluation and Reporting (MER) Estuary Ecosystem Health Program (OEH, 2016), core estuary condition indicators are monitored by Council throughout the study area. Council undertakes regular water quality monitoring in the freshwater and estuarine reaches of the Tweed River and the Tweed Coastal Creeks. As part of this monitoring program, data is collected and analysed by the Tweed Laboratory, and is regularly reviewed with the result published in the form of an ***Annual Water Quality Report Card*** for the Tweed's waterways, including estuaries, catchments and coastal creeks. The report card rates the quality of waterways across the Shire and describes the projects that Council and the community implement to manage it.

6.4 Current Coastal Management Arrangements

One of the objectives of the CMPs is to facilitate the integration of management responsibilities across Tweed Shire Council, adjoining councils, land managers and public authorities. In order to develop a robust suite of CMPs that achieve Councils objectives now and into the future, it will be necessary to have an in-depth understanding of historical coastal management arrangements for the Tweed, including the roles and responsibilities of the various agencies managing the different areas of the coastal zone. Therefore, as part of the Scoping Study, an assessment was undertaken in order to identify the strengths and weaknesses of past and present management actions, any previous barriers to implementation, and what could be adapted going forward for better implementation.

The information is compiled and summarised in Appendix D, and was garnered from a variety of sources including a review of historical coastal and estuary management plans and the Stakeholder Engagement Workshop. The review pertains to the various roles and responsibilities across the CMP study area, both of Tweed Shire Council and other organisations and agencies. These include State Government agencies and entities discussed in Section 3.2.

For each organisation, a high-level review of the various roles and responsibilities are provided, and for each role/responsibility the following information has been provided in Appendix D:

- A description of the role/responsibility;
- Where linkages and liaison with other organisations/agencies are required;
- The desired outcomes;
- The challenges to delivery; and
- Learning and opportunities for improvement.

A high-level overview of the various roles and responsibilities across the Tweed LGA Coastal Zone is provided in Table 6-2. It is not intended to be exhaustive, but rather provides an overarching outline of the current coastal management arrangements.

TABLE 6-2 OVERVIEW OF ROLES AND RESPONSIBILITIES ACROSS THE TWEED COASTAL ZONE

Organisation	Overview of Roles / Responsibilities
Tweed Shire Council	
Tweed Shire Council (Asset Management)	▪ Coastal and estuary public access infrastructure ▪ Coastal and estuary hazard protection infrastructure ▪ Stormwater and drainage infrastructure ▪ Road, traffic and parking infrastructure ▪ Open space and community assets ▪ Involvement in the TSB

Organisation	Overview of Roles / Responsibilities
Tweed Shire Council (Issue Management)	▪ Coastal, estuary and waterway management ▪ Floodplain management ▪ Vegetation protection and management ▪ Fauna protection and conservation ▪ Pollution and illegal dumping prevention and compliance ▪ Events ▪ Cultural Heritage ▪ Recreational use of the coastal zone and waterways
Tweed Shire Council (Land Management and Planning)	▪ Development Planning and Control ▪ Management of beaches and beach access ▪ Management of foreshore parks and recreation ▪ Management of bushland reserve ▪ Commercial use of the public space in the coastal zone ▪ Surf Life Saving Clubs ▪ Council managed Holiday Parks
NSW Department of Planning, Industry and Environment	
DPIE (Environment)	▪ Implementing the state governments coastal management arrangements and administration of the CM Act 2016 ▪ Administration of CM SEPP, LUP for coastal zone ▪ Administration of the Coastal and Estuary Grants Program ▪ Flood Risk Management ▪ MEMS – risk-based framework implementation and monitoring
Crown Lands and Water	▪ Coastal, estuary and waterway management of Crown Land ▪ Management of waterways access, including navigation dredging ▪ Ownership and maintenance of maritime assets including harbours ▪ Administration of the Crown Lands Management Act and Crown Lands Plans of Management ▪ Management and protection of Aboriginal cultural heritage and European heritage ▪ Involvement in the TSB
Marine Infrastructure Delivery Office	▪ Coordination and delivery of coastal and boating infrastructure programs ▪ Delivering DPIE's Coastal Infrastructure Program ▪ Councils support for on maritime infrastructure and dredging projects
National Parks and Wildlife Service	▪ Coastal foreshore and dune management ▪ Administration of the NPW Act and management of reserves, including the Cudgen, Road Mountain, Billinudgel and Wooyung Nature Reserves) ▪ Management and conservation of native flora and fauna across the NPWS coastal zone ▪ Management and protection of Aboriginal cultural heritage and European heritage
DPI - Fisheries	▪ Administration of the Fisheries Management Act ▪ Administration of the Marine Estate Management Act ▪ Responsible for ensuring that fish stocks are conserved and that there is "no net loss" of key fish habitats upon which they depend
LLS North Coast	▪ Agricultural production advice ▪ Biosecurity management ▪ Natural resource management (NRM) ▪ Emergency management

Organisation	Overview of Roles / Responsibilities
NSW EPA	▪ Administration of environment protection licenses ▪ Enforcement of operating conditions and pollution reduction programs ▪ Monitoring and compliance of licence conditions and investigating pollution reports
Other Agencies and Organisations	
Transport for NSW (including RMS)	▪ Property administration and infrastructure management related to commercial and recreational boating ▪ Promotion of safe, responsible and sustainable use of waterways ▪ Licensing of recreational and commercial vessel operators, and the registration of vessels ▪ Safety regulator for the operation of vessels and safe navigation within the LGA waterways
Byron Shire Council	▪ Management of the Coastal Zone across the Byron LGA, from Broken Head to Wooyung ▪ Development and implementation of Byron LGA Coastal Management Programs(s) ▪ Land Manager of Council Land, and some Crown Land ▪ Management of estuaries including ICOLLS
City of Gold Coast Council	▪ Involvement in the TSB ▪ Land manager of lands immediately adjacent to Tweed Shire LGA
Tweed Byron LALC	▪ Land manager for Tweed Byron LALC owned lands ▪ Management of Aboriginal cultural heritage and foreshore
The Tweed River Entrance Sand Bypassing Company	▪ The operation and maintenance of the Tweed River Entrance Sand Bypassing Project (TSB)
Commercial Boating and Tourism Operators	▪ Provision of tourism services
Commercial Fishers	▪ Provision of food supply, economic and social benefits
Dune Care and Land Care Groups	▪ Restoration and maintenance of bushland and natural areas
Resident and Advocacy Groups	▪ Community voice and advocacy
Bushland Restoration Industry	▪ Habitat and bushland restoration

A schedule of land management responsibilities is provided in the ***Tweed Coast Regional Crown Reserve Plan of Management*** (NSW Land and Property Management Authority, 2006) on a unique lot/DP basis. The NSW Government gazetted the Tweed Coast Regional Crown Reserve on the 25 August 2006 for the purpose of providing public access and rural services, tourism, environment and heritage conservation and other public requirements.

The entire shoreline of the Tweed coastline is in public ownership. About 31 of the 37 kilometres of coastline in the Tweed Shire is currently ***Crown Land***, most of which is under the control of Council, with 5.5 kilometres of the remainder under the control of the NPWS, in Cudgen, Wooyung and Billinudgel Nature Reserves (Umwelt, 2005). The majority of coastal Crown Land is part of the Tweed Coast Reserve, which generally extends from the mean low water mark (MLWM) of the Pacific Ocean to the eastern boundary of the Tweed Coast Road, as well as a number of areas west of the Coast Road south of Hastings Point and Pottsville.

The public lands currently occupied by the ***Tweed Holiday Parks*** have been excluded from the reserve and separately reserved for the public purpose of Holiday Park (Umwelt, 2005). They are managed by Tweed Shire

Council under separate business plans, and include Fingal Head, Tweed Heads, North Kingscliff, Kingscliff Beach, Hastings Point, Pottsville North and Pottsville South Holiday Parks.

In the early 2000's, a large section of the Fingal Peninsula was granted to the ***Tweed Byron Local Aboriginal Land Council***, with areas to the north and south of Fingal Head village being granted. There are also areas of privately-owned residential land that abut the public lands, thus restricting public access at these locations. This occurs in the developed towns on the coastline at Fingal Head and to a lesser extent at Cabarita Beach, Hastings Point and Pottsville (Umwelt, 2005).

6.5 Challenges and Opportunities

The major barriers to the implementation of existing management plans and the execution of management actions across the coastal zone have been identified through both literature review and the Stakeholder Engagement workshop. These barriers and challenges are outlined herein.

For Tweed Shire Council, a ***lack of funding*** was consistently identified as a barrier to implementation. Tweed Shire Council has a relatively low density of rate payers across its LGA relative to the size of its coastal and estuary foreshore/assets, and as a result there are often insufficient funds available to undertake necessary studies, develop management plans and implement the actions identified therein – particularly those relating to capital and maintenance works. This lack of funding often results in the delay of requisite studies, and an ad hoc development and implementation of management plans. To this end, the Tweed LGA CMPs represent an opportunity to access funds to tackle larger, whole-of-system, issues that could not be addressed by smaller, individual, studies and plans. Furthermore, the CMPs can be used to identify priorities for investment.

Significant ***jurisdictional ambiguity*** also exists across the various coastal and estuarine management organisations. In particular, this ambiguity relates to the ownership and management responsibilities pertaining to coastal zone assets and infrastructure. For instance, there is considerable ambiguity regarding the ownership and management of breakwaters/trainings walls between Council and Crown Lands. However, the stakeholder engagement workshop also revealed that there is a lack of understanding of the objectives of the various land managers across the coastal zone (Council, Crown Lands, NPWS in particular), and at times competing objectives that represent a barrier to the coordinated and effective management of the coastal zone. The ambiguity and inefficiencies of the approvals process and legislature across multiple agencies and levels of government was also identified as a challenge for coastal management (i.e. the Local Government Act and the Crown Lands Management Act). Therefore, the CMP process should be undertaken with a vision of establishing pathways and processes for improved coordination across the various bodies managing the coastal zone - both amongst internal council units and across state agencies.

Coastal Hazards were also identified as a significant barrier to effective coastal zone and catchment management and represent a risk to asset management and maintenance. A recent example of this is the series of storm erosion episodes between 2009 and 2012 which severely impacted the Kingscliff Beach Holiday Park and other public assets. Other natural hazards include coastal inundation, catchment flooding and inundation, bushfires and (potentially) tsunami. These natural hazards can represent irregular and episodic challenges that often require emergency management and funding. Furthermore, it is expected that increased pressure from such disasters is likely to be incurred in the future, owing to ***climate change impacts***. The frequency and intensity of natural disasters such as Tropical Cyclones and East Coast Lows – and associated coastal and catchment flooding impacts are likely to create additional pressure to the implementation of effective coastal zone management over future planning horizons. As such, the development of the CMPs can be used to identify high priorities for climate change adaptation measures associated with coastal and catchment risk management.

Population pressures have also been identified as a significant challenge to the management of the coastal zone. These pressures manifest in several forms, including management of recreational use and user conflicts – particularly during peak periods. In particular, the increase in recreational use intensity owing to the increased

patronage from adjacent Council areas such as the Gold Coast – which has experienced a population boom in recent decades. Population and recreational use demographics are outlined in Section 3.6.2. However, population pressure also represents a challenge to coastal management in the form of increased development and associated environmental pressures across the coastal zone. ***Development pressure and urbanisation*** is also noted as a major challenge for the coastal zone. Section 3.7 discusses a series of planned major urban subdivisions which are likely to be developed over the CMP planning horizon. These developments will add to the increasing population pressures and may also have impacts with regards to urban runoff into the various estuaries of the coastal zone.

Some of the challenges discussed herein have also been identified as coastal zone threats – and are discussed further in Section 7.

6.6 Roles and Responsibilities for CMP Development

The NSW Coastal Management Framework provides for some flexibility around the structure and governance arrangements of a CMP. As discussed in Section 1.3, a CMP is intended to help local councils and their communities to identify and manage risks to the environmental, social and economic values of the coast. With this in mind, the lead applicant for CMP development should be ***Tweed Shire Council***. It is recommended that Council will retain ownership of the process and be responsible for day-to-day management of their CMPs.

The development and implementation of the Tweed Open Coasts and Estuaries and the Cobaki and Terranora Broadwaters CMPs will require engagement and coordination across a range of relevant agencies and organisations. Therefore, it is imperative that the CMP governance structure foster and facilitate collaboration across these agencies.

To this end, a recommended governance structure for the CMPs is provided in Figure 6-1. It is recommended that the governance structure for each CMP includes a ***Project Advisory Group*** (PAG). The PAG will be comprised of a range of stakeholders from the Tweed Coast and Waterways Committee. These stakeholders are listed in Figure 6-1.

The purpose of the PAG will be to:

- Provide input into the technical aspects of the project;
- Exchange information and data where relevant and available; and
- Inform and support decision making regarding technical and managerial matters.

It should be noted that for coastal and estuary systems as vast and complex as those in the study area, flexibility will be needed across all stages of the CMPs to ensure successful delivery. Therefore, the make-up of the PAG should be considered flexible, with the potential inclusion of additional organisations as the CMP progresses, and as future governmental department changes may dictate.

In addition to the PAG, a group of Key Referral Agencies will also be utilised – comprising representatives from a series of state government agencies, whose various roles and responsibilities across the study area are discussed in Sections 3.2 and 6.4. The referral agencies will provide technical advice and information, as well as the provision of decision-making support for technical aspects of the project. As Stages 2 and 3 evolve, additional agencies may be consulted if required.

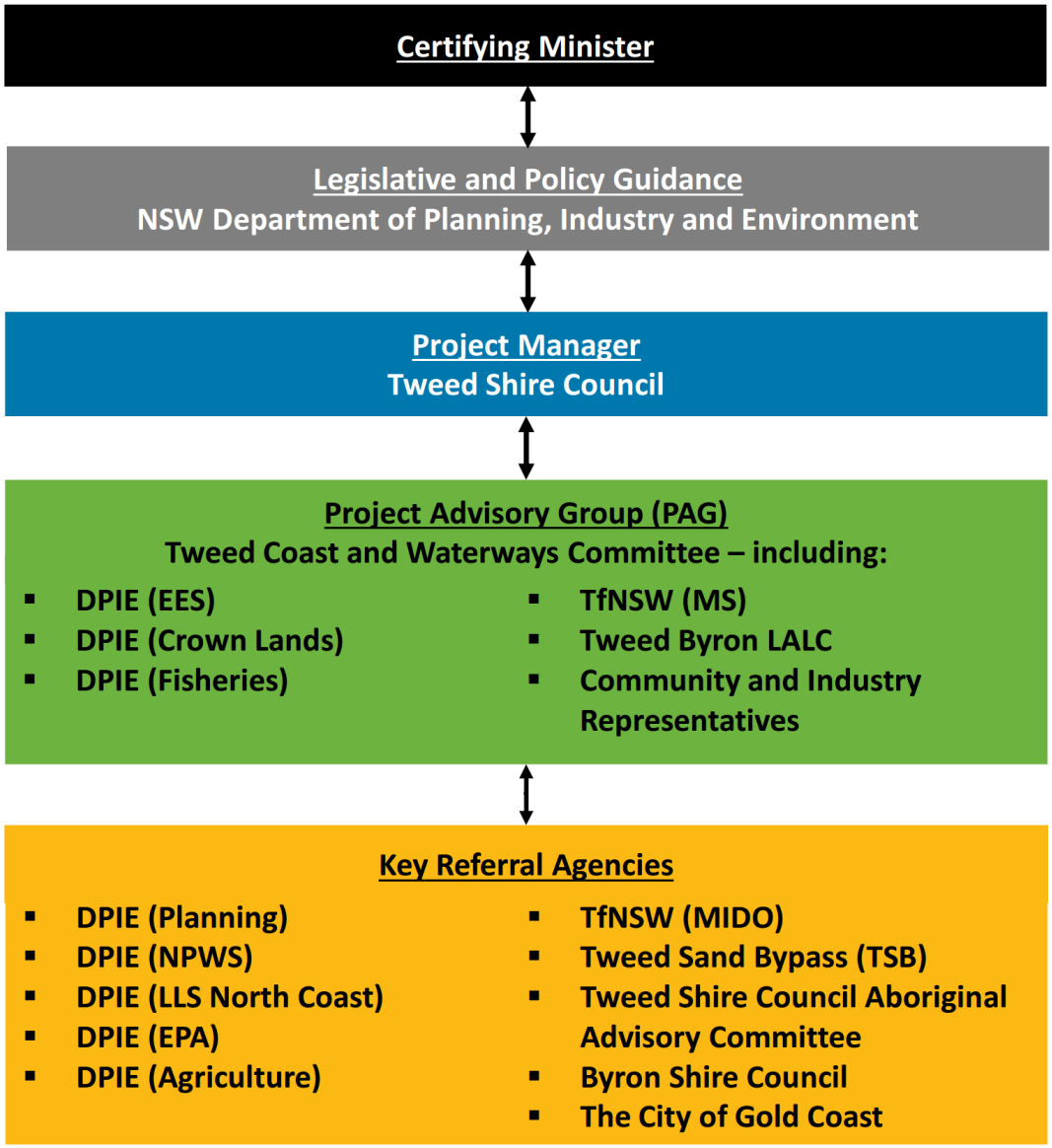

FIGURE 6-1 PROPOSED CMP GOVERNANCE STRUCTURE

7 FIRST PASS RISK ASSESSMENT

This chapter outlines the preliminary review undertaken into the values of the Tweed coastal zone and catchment, the various threats and pressures which affect these values. Based on this, a first pass risk assessment (FPRA) was undertaken, to help to inform CMP development by prioritising risk areas which need to be addressed.

7.1 Values

As part of this scoping study, a review was undertaken of the community uses and values of the Tweed LGA coastal zone. As discussed in Section 4.2, this task was informed by a review of the outcomes of historical community and stakeholder engagement activities, rather than via direct community consultation. A brief overview of relevant community values ascertained from that review is provided below.

The ***Tweed River Estuary CMP Community Values Study*** documents the key findings of the community consultation phase of the Tweed River Estuary CMP (Hydrosphere, 2019), including community values of the estuary. Consultation activities included the Tweed River Survey - a community phone survey and parallel online/paper-based survey as well as targeted stakeholder consultation with key stakeholder groups and government agencies.

The ***Tweed Coastal Estuaries CZMP*** (Hydrosphere, 2013) and ***Cobaki and Terranora Broadwater CZMP*** (AW and ABER, 2010) each identified community values through literature review and a series of community engagement activities. Community feedback and written submissions received during the public exhibition stages of those documents was incorporated in their respective values assessments.

The ***Tweed Shire Coastline Management Study Stage 1 - Values Assessment Report*** (Umwelt, 2005) identified the values that make the Tweed coastline important in a local, regional and national sense, and explored the issues that needed to be addressed to maintain those values. The values identified in that study were identified from a series of community workshops, the consideration of Council and regional policies, and discussions with relevant Council and State agency staff.

In NSW, environmental values and uses for all major waterways were identified through community consultation by the Department of Environment, Climate Change and Water (now DPIE). These values and uses were adopted by the NSW Government in 1999 and are known as the ***NSW Water Quality and River Flow Objectives*** (DPIE, 2019d). These values were adopted based on wide-spread community and stakeholder engagement, and the Tweed Region objectives encompasses the Tweed, Cobaki and Terranora Broadwaters, Cudgen Creek, Cudgen Lake, and the Cudgera Creek and Mooball Creek estuaries.

As part of the ***Marine Estate Management Strategy*** (MEMS), around 1,700 NSW residents were surveyed regarding their values and attitudes in relation to the marine estate. The survey revealed that the NSW community considers the health of the marine estate as a core value. Diversity and abundance of marine life and natural beauty of the marine estate are key economic values for nature-based and regional tourism. Overall, the MEMS survey found that the marine estate is integral to the social and cultural wellbeing of the community.

FIGURE 7-1 THE SCENIC AMENITY OF THE TWEED COAST

Based on this review, a suite of common values was identified, as presented in Table 7-1 below. It is anticipated that community consultation and stakeholder engagement activities undertaken during subsequent stages of the CMPs may expand and refine this list of values.

TABLE 7-1 VALUES OF THE TWEED COASTAL ZONE

Values		Overview
Environmental Values	Biodiversity & Natural Habitats	The Tweed coastal zone is highly valued for the healthy and diverse coastal, estuarine and terrestrial ecosystems it provides. The coastal zone supports some significant natural assets such as Nature Reserves and State protected wetlands and rainforest – and provides a diversity of habitats for a range of terrestrial and aquatic species, including those protected under state and Commonwealth legislation.
	Water Quality	Good water quality is highly valued and considered a general indicator of estuary and catchment health by the community. The value of water quality extends to maintaining or improving the ecological condition of waterbodies, visual amenity, primary & secondary contact recreation, the production of aquatic foods for human consumption and aquaculture activities, as well as livestock and irrigation water supply.
Social and Cultural Values	Social & Recreational Amenity	The Tweed Coast Estuaries, foreshore areas and freshwater creeks are greatly valued by the community and visitors for recreational activities. Recreational activities such as surfing and boating culture are integral components of the Tweed social culture, and are recognised as iconic activities important to a broad range of community and visitors.
	Scenic Amenity	Scenic amenity is an important and value, and specific characteristics identified include clean beaches and foreshores, the presence of native flora and fauna, good water quality and appreciation of landscape and physical features. Due to the largely undeveloped and relatively natural coastline, the Tweed coastline offers a vastly different and more relaxed experience compared to the south eastern Queensland coast.
	Cultural Heritage	The coastal zone central part of The Tweed's heritage and culture. The region has a rich and continuing Aboriginal heritage, and the coastal zone has high cultural and spiritual significance to significant to its Traditional Owners, both in terms of its ongoing importance to communities, and also because of the links to the original owners of the area.
Economic Values	Economic Prosperity	The coastal zone is a significant economic resource that supports a wide range of industries. The coastal zone provides direct economic value through coastally dependant industries such tourism, commercial fishing and agriculture. It also has a high level of indirect economic value, associated with the knowledge that there is a healthy and sustainable environment and ecosystems. It is a major contributor to the local and regional economy.
	Agricultural Productivity	The Tweed Coastal zone is highly values for its agricultural uses, and agriculture is one of the main land uses in the Shire. The agricultural sector provides significant contributor to the local economy and economic employment and career opportunities, economic stimulus and stewardship of the natural environment.

7.2 Threats

Threats to community benefits arise from a range of stressors, and can have impacts on the environmental, social and economic values of the coastal zone. The threats associated with the Tweed Shire Coastal Zone have been identified through stakeholder engagement (see Section 4.1) and a review of previous coastal and estuary studies and management plans (see Section 6.1) and the Marine Estate Management Strategy Threat and Risk Assessment (BMT WBM, 2017).

Based on this preliminary review, a total of 64 threats have been initially provided. The threats have been grouped into a series of *Issue* and *Threat* Categories as per Table 7-2 below.

TABLE 7-2 THREAT CATEGORIES

Issue Categories	Threat Categories
Resource Use and Conflict	Commercial Fishing and Boating Recreation and Tourism Access and Availability
Land Use Intensification and Environmental Impacts	Water Pollution and Sediment Contamination Habitat Clearing / Disturbance Hydrologic Modifications
Natural Hazards	Long Term Hazards Event Based Hazards Climate Change Impacts
Public Health and Safety	Public Health and Safety
Planning and Governance	Governance and Funding Information Gaps

A summary of the various threats is provided in Table 7-3 below. The summary table provides an outline of the potential environmental and social impacts of these threats, as well as Tweed Coastal Zone specificity identified through the stakeholder engagement workshop and the literature review.

TABLE 7-3 SUMMARY OF THREATS

Issue Category	Threat Category	Threats (and Threat ID)	Environmental Impacts	Social and Economic Impacts	Tweed LGA High Level Overview
Resource Use and Conflict	**Commercial Fishing and Boating**	1.1 Commercial Fishing in Coastal / Marine Waters - Ocean Haul 1.2 Commercial Fishing in Estuaries 1.3 Aquaculture – Oysters 1.4 Commercial Boating - Small commercial vessels and charters activities etc	▪ Water quality – toxic contaminants through antifouling paint and oil spills, sediment resuspension, and effluent disposal. ▪ Reductions in abundances of species and trophic levels. ▪ Boat wash induced bank erosion (including resultant loss of foreshore biodiversity). ▪ Bycatch (including incidental catch of species of conservation significance) ▪ Physical disturbance through anchor damage ▪ Wildlife disturbance (shorebirds, turtles, wales) ▪ Marine debris	▪ Environmental impacts may reduce recreational and social amenity and enjoyment of environmental values. ▪ Overfishing, or the localised depletion of fish stocks, may contribute to measurable and ongoing negative economic impacts for the commercial/recreational fishing industry. ▪ Bank erosion is a threat to the built foreshore assets, access and amenity value on private and public land.	▪ The Tweed River Estuary CMP showed that commercial fishing is ranked as having relatively low acceptability amongst the local community (Hydrosphere, 2019), and this is likely due to perceived conflict with highly popular recreational fishing and widely held concern about declining fish stocks due to overfishing. ▪ The NSW commercial fisheries are carefully managed. DPI Fisheries has a role in enforcing laws regarding recreational and commercial fishing. ▪ North Coast Local Land Services has supported the Tweed River oyster farmers to develop and launch an industry led Environmental Management System (EMS) ▪ Boat wash bank erosion has been addressed in numerous historical studies (Section 6.1).
	Recreation and Tourism	2.1 Recreational Fishing (boat and shore based) 2.2 Recreational Boating and Boating Infrastructure 2.3 Passive Recreational Use 2.4 Coastal infrastructure, marina expansion, modifications, upgrades and associated dredging. 2.5 Anti-social behaviour and unsafe practices	▪ Water pollution – contaminants released into the waterway through antifouling paint and oil spills, and effluent disposal ▪ Reductions in abundances of species and trophic levels. ▪ Boat wash generating bank erosion (including resultant loss of foreshore biodiversity). ▪ Physical disturbance resulting from propeller wash, anchoring, moorings, and shoreline infrastructure. ▪ Shading from boats/jetties resulting in light reduction to the seabed – and associated impacts on benthic communities. ▪ Disturbance of fauna through noise and vessel strike. ▪ Litter and wildlife entanglement ▪ Dredging can generate elevated turbidity that can affect benthic communities.	▪ Environmental impacts may reduce recreational and social amenity and enjoyment of environmental values. ▪ Recreational pressures on the coastal zone may impact amenity and therefore people's enjoyment and relationship with the estuary environmental values. ▪ Continued and ongoing incidents of anti-social behaviour are likely to deter community use of the marine estate.	▪ Issue needs to be addressed in conjunction with MIDO, particularly in relation to the Southern Boat Harbour. Coastal estuaries – consideration of appropriate levels of boating access and infrastructure. ▪ Coastal infrastructure such as breakwaters and training walls require delineation of ownership and management responsibilities. ▪ Dangerous behaviour by watercraft users along the Tweed River and other estuaries, particularly PWC use. Coordinated messaging with RMS is needed. ▪ Erosion of beach access paths due to high pedestrian traffic represents a risk to users at Fingal Head beach access and Fingal Headland walkway.
	Access and Availability	3.1 Overcrowding / congestion of waterways and user group conflict 3.2 Overcrowding / congestion of foreshores and user group conflict 3.3 Limited or lack of foreshore and waterway access 3.4 Limited or lack of supporting infrastructure (for boating etc)	▪ Overcrowding of beaches and estuary foreshores can affect disturbance of riparian and adjacent habitat ▪ Wildlife disturbance through noise disturbance, vessel strike	▪ Overcrowding / congestion reduces the recreational and social amenity of the coastal zone, resulting in "loss of appeal". ▪ Tangible and intangible Aboriginal cultural heritage is impacted by conflict over resource access and use.	▪ Some of the boat ramps around the LGA experience excessive congestion during peak season, including Kingscliff (Cudgen Creek) and Riverside Dr (Tumbulgum). ▪ During peak season waterways congestion occurs across both downstream areas around Tweed Heads and areas farther upstream at Tumbulgum. Boating restrictions in QLD have resulted in an increase in the number of QLD registered vessels operating along the Tweed Estuaries, contributing to congestion during peak periods. ▪ Increasing commercial use of beaches creating user conflict with public and affecting social and environmental values of the beach. ▪ Very high demand for local carparking across the LGA coastal zone during peak summer season. ▪ Natural mangrove progradation along the estuary is affecting access points, such as at boat ramps ▪ The estuaries presently have a lack of access to water and foreshore for non-boat recreation, particularly lack of sandy beaches
Land Use Intensification and	**Water Pollution and Sediment Contamination**	4.1 Urban Stormwater Discharge 4.2 Agricultural Runoff	▪ Water pollution – through nutrients and organic matter, toxic contaminants; sediments,	▪ Water pollution due to stormwater discharge, agricultural runoff and industrial discharges can impact health, safety and wellbeing.	▪ These threats are largely identified as part of the Marine Estate Management Strategy state-wide

Issue Category	Threat Category	Threats (and Threat ID)	Environmental Impacts	Social and Economic Impacts	Tweed LGA High Level Overview
Environmental Impacts		4.3 Industrial Discharges 4.4 Sewage Effluent and Septic Runoff 4.5 Sediment contamination / pollution 4.6 Disturbance of contaminated sediment on seabed (e.g. dredging)	pathogens and marine debris (including microplastics) ▪ Contribution to proliferation of algae blooms / aquatic weeds ▪ Impacts on aquatic ecology ▪ Bank erosion along creeks and rivers due to increased water velocity.	▪ Loss of amenity associated with pollution likely to significantly impact people's relationship with the coast and their ability to appreciate marine biodiversity. ▪ Impacts on seafood quality (especially aquaculture) on health, safety and wellbeing. ▪ Local Businesses that are dependent on the coastal zone for their viability, such as commercial fishers and tourist operators, may experience major impacts on viability due to events such as closures and fish kills. ▪ Water pollution can impact on tangible Aboriginal cultural heritage including damage to places of significance. ▪ Sediment contamination and pollution may restrict viability of waterway dependant businesses including aquaculture.	threat and risk assessment (MEMS TARA), and the Coastal Management SEPP (CM SEPP) ▪ Hotspots for water pollution issues from agricultural runoff include Cudgera Creek, Christies Creek and the mid-upper Tweed River estuary ▪ Acid Sulfate Soil runoff from disturbed ASS in the small catchments such as Cudgera Creek and Christie Creek ▪ Historical evidence of impacts to participation (food safety) and enjoyment through consumptive use concerns related to seafood in Cobaki Broadwater. ▪ Contaminated sediment disturbance associated with dredging of Tweed Heads boat harbour (but is well understood and managed).
	Habitat Clearing / Disturbance	5.1 Foreshore / urban development 5.2 Stock grazing of riparian and marine vegetation (in estuaries) 5.3 Clearing / disturbance of riparian and adjacent habitat including wetland drainage 5.4 Clearing / disturbance of littoral rainforest habitat 5.5 Clearing / disturbance of terrestrial habitat 5.6 Introduction of invasive fauna pest species (e.g. carp) and diseases 5.7 Introduction of invasive flora pest species (e.g. aquatic weeds) and diseases	▪ Physical disturbance resulting from shoreline infrastructure, sediment re-suspension and shading resulting in light limitation, sediment deposition ▪ Wildlife disturbance through pollution and habitat loss ▪ Introduction of pest species can have negative impact on habitats and protected species. ▪ Changes to estuary flow velocity and patterns. ▪ Threats to species of conservation significance and overall biodiversity of the coast zone. ▪ Clearing terrestrial vegetation results in increased runoff of sediment into the upper estuary. ▪	▪ Environmental impacts may reduce recreational amenity and social enjoyment of environmental values. ▪ Impacts on people's relationship with the coast (e.g. loss of appeal due to decline in wildlife and depreciation of visual character) will also impact social connections. ▪ Habitat (physical disturbance) from human activity can impact on Aboriginal cultural heritage.	▪ The clearing of riparian and adjacent habitat is addressed in MEMS (partially), and the Tweed Biodiversity DCP. Marine vegetation is protected under the Fisheries Management Act. Hot spots include Cobaki Lakes. ▪ Clearing of littoral rainforest occurring incrementally via beach access incursions. Hotspots include Fingal Head and Kingscliff. ▪ Recent strategies for habitat restoration and creation include installation of bird islands, and osprey nests. Requires consideration of migratory bird agreements such as JAMBA, CAMBA, and ROKAMBA ▪ Key issues include Foxes, Cats, Indian Myna, Cane Toads and Bitou Bush. Tilapia are an emerging pest species across the Tweed River and coastal estuary catchments. ▪ Key wildlife disturbance issues relate to off-leash dogs, 4WD's (permitted and unauthorised), filming; events (med – large community), commercial horse / camel rides; horse riding; littering; illegal camping; vegetation vandalism; fishing comps; boating and other watercraft.
	Hydrologic Modifications	6.1 Increasing use of groundwater 6.2 Modified freshwater flows (in estuaries) 6.3 Sedimentation and infilling channels and changing flows 6.4 Navigation and entrance management and modification (such as dredging)	▪ Changes to hydrological regime can result affect habitat and biodiversity in the upper estuary. ▪ Dredging can result in physical disturbance and habitat loss resulting from sediment re-suspension etc. ▪ Water pollution & contamination through disturbance of acid sulfate soils. ▪ Sedimentation impacts on seagrass. ▪ Dredging can modify tidal flow and tidal prism within estuaries.	▪ Sedimentation can affect navigation channels, negatively affecting recreational and commercial use of the waterways. ▪ Turbidity associated with dredging can negatively affect recreational amenity. ▪ Modified freshwater flows can impacts commercial and recreational fishing, and Aboriginal cultural heritage, by negatively affecting fish stocks.	▪ Increasing groundwater use is placing a strain on the local water table. Need to consider future groundwater use compared to other options such as raising the Bray Park Weir. ▪ Navigational access needs to be addressed in conjunction with MIDO. ▪ Need to manage blackwater events related to ICOLL openings.
Natural Hazards	**Long Term Hazards**	7.1 Tidal inundation of estuaries 7.2 Long term coastal shoreline recession 7.3 Estuary foreshore erosion and bank instability 7.4 Entrance instability 7.5 Cliff and slope instability	▪ Shoreline and bank erosion can affect foreshore biodiversity and generate "habitat squeeze" ▪ Bank erosion can cause increased sedimentation of the waterway and affect benthic habitat.	▪ Inundation of low-lying foreshores during king tide events can affect social and recreational amenity. ▪ Ingress of tidal inundation to low lying communities via storm water systems can affect access and public safety and threaten assets and infrastructure.	▪ Tidal inundation is an ongoing and future issue for Bray Park Weir and local stormwater and sewerage infrastructure. ▪ Historically cleared areas along estuary foreshores experience an increased rate of erosion and this generates a desire for hard protection solutions. Hot spots include significant stretches of the Tweed River Estuary (along Tweed Valley Way).

Issue Category	Threat Category	Threats (and Threat ID)	Environmental Impacts	Social and Economic Impacts	Tweed LGA High Level Overview
				▪ Long term shoreline recession and estuary bank erosion can affect recreational and social amenity through reduction of open space. ▪ Long term shoreline recession and estuary bank erosion can threaten and undermine foreshore assets and recreational access. ▪ Cliff instability can threaten foreshore assets and public safety.	▪ Tidal inundation to ecological communities, land and development.
	Event Based Hazards	8.1 Coastal Storm Impacts - Inundation 8.2 Coastal Storm Impacts - Erosion 8.3 Catchment Flooding and Overland Flooding 8.4 Bushfire 8.5 Drought 8.6 Tsunami	▪ Catchment flooding can transport pollutants into the estuary systems. ▪ Bushfire may result in loss of habitat and biodiversity, as well as transport of ash and other pollutants into the estuary systems. ▪ Coastal erosion may result in loss of dune habitat, and seabed deposition can affect seagrass and benthic habitat and biodiversity in the short term. ▪ Droughts can affect salinity in the upper catchment and riparian vegetation that requires freshwater.	▪ Coastal erosion and inundation during storm events are a threat to built foreshore assets on private and public land, foreshore access, and social and recreational amenity values. ▪ Catchment flooding affects low lying infrastructure and environmental assets, and represents a significant risk to public safety. ▪ Bushfires represent a huge public safety risk and can affect recreational amenity values. ▪ . ▪ Tsunami, whilst rare, can significantly affect maritime assets and infrastructure and low-lying land, and represent a serious risk to public safety.	▪ Storm erosion impacts requires consideration of impacts on private vs public assets (Council or Crown). Particular hotspots at Fingal Head, Kingscliff, and Lower Tweed Estuary
	Climate Change Impacts	9.1 Altered ocean currents and nutrient inputs 9.2 Ocean Temperature Increase 9.3 Ocean Acidification 9.4 Altered Storm Frequency and Severity 9.5 Sea Level Rise 9.6 Long Term Shoreline Recession due to SLR 9.7 SLR Altered salinity levels / profile 9.8 SLR Habitat Migration and Squeeze	▪ Increased ocean temperatures and ocean acidification are expected to have a negative impact on ecological health and biodiversity of the local estuaries.. ▪ Sea level rise and rainfall impacts will affect coastal and estuarine processes and dynamics. ▪ The effects of increased flood incidence include poor water quality with impacts on terrestrial, aquatic and marine coastal ecosystems. ▪ Landward migration of coastal wetlands will occur in response to sea level rise. However, coastal development will form a barrier to wetland migration in some areas, resulting in habitat squeeze.	▪ Sea level rise is likely to significantly affect low lying coastal communities in terms of their susceptibility to tidal inundation, coastal inundation and catchment flooding. ▪ Increases in heavy rainfall events are expected to increase the likelihood of flooding along the upper catchment, with impacts on private property, loss of crops and livestock etc. ▪ Increased frequency and severity of storm and erosion events will result in economic costs as well as implications for socialisation and sense of community. ▪ Climate change impacts on marine and estuarine ecology will affect specific businesses and industries (such as commercial fishing and agriculture) and recreational use of the coastal zone. ▪ Climate change stressors such as sea level rise and increased sea temperatures can negatively impact cultural heritage.	▪ Need to assess impacts of sea level rise on storm water outfalls and efficacy. ▪ Need to investigate and better understand potential impacts regarding habitat squeeze along open coast and estuaries due to rising sea levels and altered salinity profile.
Public Health and Safety	**Public Health and Safety**	10.1 Wildlife interactions (sharks etc) 10.2 Water pollution/contamination affecting human health and safety 10.3 Seafood contamination 10.4 Coastal hazards (coastal erosion, cliff instability and inundation/wave overtopping) 10.5 Public safety risk from aging and/or degraded coastal/estuary infrastructure 10.6 Radioactivity along those areas historically used for sand mining (storage and stockpiling).	-	▪ Shark attacks can threaten life and safety. Media coverage can have a negative impact on recreational use of the coastal zone. ▪ Seafood contamination can have major impacts on consumptive use including the viability of fishing and aquaculture industries. ▪ Wave overtopping of coastal structures can represent a safety hazard. ▪ Energetic coastal processes represent a significant safety risk to local users, particularly in the form of rip currents	▪ Lack of clarity around the ownership and maintenance responsibilities of breakwaters along the LGA coastal estuaries. ▪ Water pollution of drinking supply at Bray Park Weir has been affected by blue-green algae ▪ Potential health impacts in poorly flushed estuaries and from ASS runoff in small catchments (e.g. Christies / Cudgera Creek) ▪ Dreamtime Beach (south of Fingal Head), which is an unpatrolled beach, has had a number of safety incidents from 2015-2019 including 5 deaths of swimmers and rock fishers. ▪ Wave overtopping at breakwater heads, and headland rock formations can affect recreational fishers. Perhaps a need for better signage to alert community to the risks.
Planning and Governance	**Governance**	11.1 Ambiguity or lack of agreement on governance and jurisdiction between agencies	▪ Illegal dumping prohibited use of vehicles on beaches, vegetation clearing to improve sight lines, and creation of unauthorised private boat	▪ Lack of regulation and compliance has the potential to create long-term negative impacts on businesses and employment. Commercial fishers	▪ There is a present lack of understanding regarding the ownership and management responsibilities of Council and other organisations regarding:

Issue Category	Threat Category	Threats (and Threat ID)	Environmental Impacts	Social and Economic Impacts	Tweed LGA High Level Overview
		11.2 Inadequate, inefficient regulation, or over-regulation (agencies) 11.3 Lack of compliance with regulations (by users) or lack of regulation effort (by agencies) 11.4 Lack of funding for investigation and action implementation 11.5 Lack of or ineffective community engagement or participation in governance	ramps and jetties can all affect foreshore habitat and biodiversity. ▪ Inadequate regulations and enforcement for protection can affect threatened and significant species. ▪	may also be significantly impacted where their livelihoods are under threat from overfishing and habitat destruction related to illegal activities. ▪ The roles and responsibilities of the various agencies across the coastal zone create inefficiencies with regards to management and approvals processes. ▪ Environmental impacts may reduce recreational and social amenity and enjoyment of environmental values.	– Breakwaters (Crown Lands) – Training walls (Crown Lands / Council) – Protection Zones (Fisheries) ▪ Fisheries-related zoning applies to recreational fishing havens and the Cook Island Aquatic Reserve. Certain activities within these zones are regulated by DPI Fisheries. ▪ A clear understanding needs to be obtained so that management can be more effectively coordinated. ▪ Issues across the LGA include illegal dumping, prohibited use of vehicles on beaches, vegetation clearing to improve sight lines, and creation of unauthorised private boat ramps and jetties. ▪ Funding from the state government typically does not sufficiently cover preliminary work such as licencing, DA's, and design. ▪ Too much funding emphasis is placed on "Shovel Ready Projects" and preliminary investigations / permits and approvals need to be included in scheme funding.
	Information Gaps	12.1 Incomplete coastal process information (including climate change impacts) 12.2 Incomplete ecological information (including climate change impacts) 12.3 Inadequate and/or incomplete European and Indigenous Heritage information 12.4 Inadequate social and economic information	▪ Lack of adequate information hampers the implementation of effective management strategies and plans.	▪ The cumulative impacts of socio-economic threats is an area that has received limited research attention to date and this is recognised as a current data gap in the TARA process. ▪ There is a knowledge gap around the views and aspirations of Aboriginal people in regard to the NSW marine estate, and this may affect the cultural and heritage amenity of the area.	▪ There remains a lack of understanding of the extent of Queensland based (that is, cross border) recreational use of the local waterways and coastline, and how this contributes to peak season congestion. ▪ A better understanding of the valuation (economic and social) of ecosystem services is required to enable full inclusion of natural resources in CBAs ▪ There remains an incomplete understanding of climate change impacts on biodiversity. ▪ Impact of Climate Change on agricultural viability. Specifically relates to cane farming and other floodplain agricultural uses (as per Tweed Sustainable Agriculture Strategy).

7.3 First Pass Risk Assessment

As part of this scoping study, a high-level, first pass risk assessment has been undertaken in accordance with the requirements in the NSW Coastal Management Manual. This first-pass risk assessment is essentially a tool for the prioritisation of risks to identify those that need to be further assessed in subsequent stages of the CMPs. It should be noted that in Stage 2, this preliminary assessment may be refined through a more detailed process.

The risk assessment has been undertaken for the list of threats affecting the environmental, social and economic values of the coastal zones outlined in Section 7.2. The assessment has been undertaken in a systemic fashion, in accordance with the following national risk standards and guidelines:

- ISO 31000:2018, Risk management – Principles and guidelines, provides principles, framework and a process for managing risk and
- AS 5334:2013 Climate change adaptation for settlements and infrastructure – a risk-based approach.

The assessment process was systematic and involved application of qualitative scales of likelihood and consequence. The scales of likelihood and consequence adopted for this assessment have been modified from the MEMA TARA (BMT WBM, 2017), to provide consistency with that wider assessment.

TABLE 7-4 CONSEQUENCE DEFINITIONS, ADAPTED FROM MEMA TARA (BMT WBM, 2017)

Consequence	Definition
Negligible	No or barely discernible negative impacts on the environmental, social or economic values
Minor	Discernible and/or temporary negative impacts on the environmental, social or economic values
Moderate	Measurable and on-going negative impacts on the environmental, social or economic values
Major	Substantial measurable and ongoing negative impacts on the environmental, social or economic values
Catastrophic	Significant on-going and/or permanent negative impacts are or are, and where these values are endangered either permanently or irreversibly

TABLE 7-5 LIKELIHOOD DEFINITIONS, ADAPTED FROM MEMA TARA (BMT WBM, 2017)

Likelihood	Definition
Rare	Never reported for this situation, but still plausible within the timeframe (< 10%)
Unlikely	Uncommon, but has been known to occur elsewhere. Expected to occur here only in specific circumstances within the timeframe (10-30%)
Possible	Some clear evidence exists to suggest this is possible in this situation within the timeframe (30-70%)
Likely	Expected to occur in this situation within the timeframe (70-90%)
Almost Certain	A very large certainty that this will occur in this situation within the timeframe (>90%)

Based on the delineation of likelihood and consequence, a risk rating has been provided based on the risk matrix in Table 7-6, which is again consistent with the MEMA TARA (BMT WBM, 2017).

TABLE 7-6 RISK ASSESSMENT MATRIX, ADAPTED FROM MEMA TARA (BMT WBM, 2017)

Consequence → / Likelihood ↓	Negligible	Minor	Moderate	Major	Catastrophic
Almost Certain	Minimal	Low	Moderate	High	High
Likely	Minimal	Low	Moderate	High	High
Possible	Minimal	Minimal	Low	Moderate	High
Unlikely	Minimal	Minimal	Minimal	Low	Moderate
Rare	Minimal	Minimal	Minimal	Minimal	Low

The risk ratings for each threat are provided in Table 7-7. For each of the assessed threats, the risk assessment has considered the following factors:

- What are the existing arrangements to address the threat? Specially, attention has been paid to where these threats have been addressed by the previous coastal and estuary management plans.
- Are the existing arrangements working? If so, what is the residual risk? A residual risk rating has been provided.
- How will the risk level change over future planning horizons of 20, 50 and 100 years? Particular consideration was given to the degree of future risk with the impacts of future development, population pressures and climate change.
- What is the existing level of knowledge available to manage the threat? And what is the risk associated with any data gaps? For this task, a designation for the criticality of the knowledge gap has been provided based on the following:
  - **Low:** Information is mostly sufficient, some small data gaps that are of relatively low consequence.
  - **Moderate:** There are some technical or geographical data gaps, or information is outdated - and addressing this would improve the effectiveness of management.
  - **High:** There are significant technical or geographical data gaps, and management action cannot proceed effectively without this knowledge.
  - Unknown: Unknown criticality of knowledge for management decisions / actions / planning.

It should be noted that in Table 7-7, the following key is used to identify existing management plans:

** The Marine Estate Management Strategy

Tweed River Estuary CMP 2019

^ Tweed Coastal Estuaries CZMP 2013

Cobaki and Terranora Broadwaters CZMP 2010

^^ Tweed Coastline Management Plan 2005; and/or the Kingscliff-Dreamtime Beach CZMP

TABLE 7-7 FIRST PASS RISK ASSESSMENT

Threat Category	ID	Threat	Available Knowledge, Management Plans & Strategies in Place to Address Risk						Present Day Risk			Future Risk			Other Management Plans & Strategies	Knowledge Gap Criticality
			MEMS 2018-2028**	TRE CMP 2019#	TCE CZMP 2013^	C&TB CZMP 2010##	TCMP 2005^^ KDB CZMP	Other →	Likeli-hood	Conse-quence	Risk	20 yr Risk	50 yr Risk	100 yr Risk		
Commercial Fishing & Boating	1.1	Commercial fishing in coastal waters	✓	✓				✓	Likely	Moderate	Moderate	Moderate	Moderate	Moderate	NSW Commercial Fisheries Business Adjustment Program FM Act and Regulation	Moderate
	1.2	Commercial fishing in estuaries	✓	✓		✓		✓	Likely	Moderate	Moderate	Moderate	Moderate	Moderate	NSW Commercial Fisheries Business Adjustment Program FM Act and Regulation Tweed River Bank Erosion Management Plan 2014	Moderate
	1.3	Aquaculture – Oysters	✓	✓		✓		✓	Likely	Moderate	Moderate	Moderate	Moderate	Moderate	NSW Oyster Industry Sustainable Aquaculture Strategy 2016 SEPP (Primary Production and Rural Development) 2019 Terranora Lakes Oyster Farmers EMS 2016	Low
	1.4	Commercial boating - small commercial vessels & charters activities	✓	✓				✓	Possible	Moderate	Low	Low	Moderate	Moderate	Tweed River Bank Erosion Management Plan 2014	Low
Recreation & Tourism	2.1	Recreational fishing (boat and shore based)	✓	✓	✓				Likely	Moderate	Moderate	Moderate	High	High	FM Act and Regulation	Moderate
	2.2	Recreational boating	✓	✓	✓				Likely	Moderate	Moderate	Moderate	High	High	Tweed River Bank Erosion Management Plan 2014	Moderate
	2.3	Passive recreational use	✓	✓	✓	✓	✓	✓	Possible	Minor	Minimal	Minimal	Moderate	Moderate	Tweed Open Space Strategy 2018 – 2028	Low
	2.4	Coastal infrastructure, marina expansion, modifications, upgrades and associated dredging.	✓	✓	✓	✓	✓	✓	Likely	Moderate	Moderate	Moderate	Moderate	Moderate	NSW Maritime Infrastructure Plan 2019-2024 Tweed River Domestic Structures Strategy 2008	Low
	2.5	Anti-social behaviour and unsafe practices	✓	✓	✓		✓	✓	Almost Certain	Moderate	Moderate	Moderate	Moderate	Moderate	RMS Maritime Safety Plan 2017–2021	Low
Access & Availability	3.1	Overcrowding / congestion of waterways and user group conflict	✓	✓	✓		✓	✓	Possible	Major	Moderate	High	High	High	RMS Maritime Safety Plan 2017–2021	Low
	3.2	Overcrowding / congestion of beaches/surf and user group conflict	✓				✓	✓	Almost Certain	Moderate	Moderate	High	High	High	Tweed Open Space Strategy 2018 – 2028 Tweed Commercial Recreation Activities on Public Open Space Policy	Moderate
	3.3	Limited or lack of foreshore and waterway access	✓	✓	✓	✓			Almost Certain	Moderate	Moderate	High	High	High		Moderate
	3.4	Limited or lack of supporting infrastructure (for boating etc)	✓	✓	✓	✓			Almost Certain	Moderate	Moderate	High	High	High		Moderate
Water Pollution and Sediment contamination	4.1	Urban Stormwater Discharge	✓	✓	✓	✓		✓	Almost Certain	Major	High	High	High	High	Tweed Urban Stormwater Quality Management Plan 2016 The Tweed River Estuary Health Monitoring and Reporting Program	Low
	4.2	Agricultural Runoff	✓	✓	✓	✓		✓	Almost Certain	Major	High	High	High	High	Tweed Sustainable Agriculture Strategy The Tweed River Estuary Health Monitoring and Reporting Program	Low
	4.3	Industrial Discharges	✓	✓	✓	✓		✓	Likely	Major	High	High	High	High	The Tweed River Estuary Health Monitoring and Reporting Program	Low
	4.4	Sewage Effluent & Septic Runoff	✓	✓	✓	✓		✓	Almost Certain	Major	High	High	High	High	The Tweed River Estuary Health Monitoring and Reporting Program	Low
	4.5	Sediment contamination / pollution (including ASS)	✓	✓	✓	✓		✓	Possible	Moderate	Moderate	Moderate	Moderate	Moderate	NSW Coastal Dredging Strategy 2017-2026	Low
	4.6	Disturbance of contaminated sediment on seabed (e.g. dredging)	✓	✓	✓		✓		Possible	Moderate	Low	Low	Low	Low	The Tweed River Estuary Health Monitoring and Reporting Program	Low

Threat Category	ID	Threat	Available Knowledge, Management Plans & Strategies in Place to Address Risk						Present Day Risk			Future Risk			Other Management Plans & Strategies	Knowledge Gap Criticality
			MEMS 2018-2028**	TRE CMP 2019#	TCE CZMP 2013^	C&TB CZMP 2010##	TCMP 2005^^ KDB CZMP	Other →	Likeli-hood	Conse-quence	Risk	20 yr Risk	50 yr Risk	100 yr Risk		
Habitat Clearing / Disturbance	5.1	Foreshore / urban development	✓	✓	✓	✓	✓	✓	Possible	Major	Moderate	Moderate	High	High	Tweed DCP & Tweed LEP Tweed River Domestic Structures Strategy 2008	Low
	5.2	Stock related damage of riparian and marine vegetation (in estuaries)	✓	✓	✓	✓		✓	Likely	Major	High	High	High	High	Tweed Sustainable Agriculture Strategy 2016 Tweed Sustainable Grazing Education Program Fisheries Management Act (protection of marine vegetation) MEMS Marine Vegetation Strategy	Low
	5.3	Clearing / disturbance of riparian and adjacent habitat including wetland drainage	✓	✓	✓	✓		✓	Likely	Major	High	High	High	High	Tweed Sustainable Agriculture Strategy 2016 Tweed Vegetation Vandalism on Public Land Policy 2016 Fisheries Management Act (protection of marine vegetation) MEMS Marine Vegetation Strategy	Low
	5.4	Clearing / disturbance of littoral rainforest habitat	✓	✓	✓	✓	✓	✓	Likely	Moderate	Moderate	Moderate	Moderate	Moderate	Tweed Vegetation Vandalism on Public Land Policy 2016	Low
	5.5	Clearing / disturbance of terrestrial habitat	✓	✓	✓	✓	✓	✓	Likely	Moderate	Moderate	Moderate	Moderate	Moderate	Tweed Vegetation Vandalism on Public Land Policy 2016	Low
	5.6	Introduction of invasive fauna pest species (e.g. carp, tilapia, foxes, etc)	✓	✓	✓	✓	✓	✓	Likely	Major	High	High	High	High	Tweed Vertebrate Pest Animal Management Strategy (under development)	Low
	5.7	Introduction of invasive flora pest species (e.g. aquatic weeds)	✓	✓	✓	✓	✓	✓	Likely	Major	High	High	High	High		Low
Hydrologic Modifications	6.1	Increasing groundwater extraction / use			✓			✓	Likely	Moderate	Moderate	Moderate	High	High	Water Sharing Plan Tweed River Area Unregulated and Alluvial Water Sources 2010	Moderate
	6.2	Modified freshwater flows (in estuaries)	✓	✓	✓				Almost Certain	Moderate	Moderate	Moderate	High	High		Moderate
	6.3	Sedimentation & infilling channels and changing flows	✓	✓	✓	✓	✓	✓	Almost Certain	Moderate	High	High	High	High	NSW Coastal Dredging Strategy 2017-2026 Tweed River Entrance Sand Bypass Project	Low
	6.4	Navigation & entrance management and modification	✓		✓	✓	✓		Almost Certain	Moderate	Moderate	Moderate	Moderate	Moderate	NSW Coastal Dredging Strategy 2017-2026	High
Long Term Hazards	7.1	Tidal Inundation of Estuaries		✓					Almost Certain	Minor	Low	Moderate	High	High	NSW Tidal Inundation Exposure Assessment (OEH, 2018d) Tweed River Estuary CMP Tidal Inundation Modelling and Mapping	Moderate
	7.2	Long-term Coastal Shoreline Recession					✓		Unlikely	Major	Low	Low	Moderate	Moderate		Low
	7.3	Estuary foreshore erosion and bank erosion		✓	✓	✓		✓	Almost Certain	Major	High	High	High	High	Tweed River Bank Erosion Management Plan 2014	Low
	7.4	Entrance instability		✓	✓				Unlikely	Moderate	Low	Low	Low	Low		Low
	7.5	Cliff and slope instability							Possible	Moderate	Low	Low	Low	Low		High
Event Based Hazards	8.1	Coastal Storm Impacts - Inundation			✓		✓		Almost Certain	Moderate	Moderate	Moderate	High	High		Low
	8.2	Coastal Storm Impacts - Erosion					✓		Almost Certain	Major	High	High	High	High		Moderate
	8.3	Catchment Flooding & Overland Flooding		✓	✓			✓	Almost Certain	Moderate	Moderate	Moderate	High	High	Tweed Valley Floodplain Risk Management Plan 2012 Coastal Creeks Floodplain Risk Management Study and Plan 2015	Moderate

Threat Category	ID	Threat	Available Knowledge, Management Plans & Strategies in Place to Address Risk						Present Day Risk			Future Risk			Other Management Plans & Strategies	Knowledge Gap Criticality
			MEMS 2018-2028**	TRE CMP 2019#	TCE CZMP 2013^	C&TB CZMP 2010##	TCMP 2005^^ KDB CZMP	Other →	Likeli-hood	Conse-quence	Risk	20 yr Risk	50 yr Risk	100 yr Risk		
	8.4	Bushfire						✓	Almost Certain	Major	High	High	High	High	Far North Coast Bush Fire Risk Management Plan 2009	Low
	8.5	Drought						✓	Likely	Moderate	Moderate	Moderate	High	High	Tweed Drought Management Strategy 2009	Low
	8.6	Tsunami						✓	Rare	Major	Low	Low	Low	Low	NSW State Tsunami Plan 2018	Moderate
Climate Change Impacts	9.1	Altered ocean currents & nutrient inputs	✓	✓								Low	Low	Moderate		Moderate
	9.2	Ocean Temperature Increase	✓	✓		✓						Low	Moderate	High		Moderate
	9.3	Ocean Acidification	✓	✓								Low	Low	Moderate		Moderate
	9.4	Altered Storm Frequency & Severity	✓	✓	✓	✓						Moderate	Moderate	Moderate		Moderate
	9.5	Sea Level Rise (SLR)	✓	✓	✓	✓	✓					Moderate	High	High		Moderate
	9.6	Long term shoreline recession due to SLR					✓					Moderate	High	High		Moderate
	9.7	SLR Altered salinity levels / profile	✓	✓	✓	✓						Low	Moderate	High		Moderate
	9.8	SLR Habitat migration & squeeze	✓		✓	✓						Low	Moderate	High		Moderate
Public Health & Safety	10.1	Wildlife interactions (sharks attacks etc)						✓	Unlikely	Major	Low	Low	Low	Low	QLD Shark Control Program 2019 NSW Shark Management Strategy & SharkSmart Program	Low
	10.2	Water pollution/contamination affecting human health and safety	✓	✓	✓	✓		✓	Likely	Major	High	High	High	High	The Tweed River Estuary Health Monitoring and Reporting Program	Moderate
	10.3	Seafood contamination	✓	✓		✓		✓	Likely	Major	High	High	High	High	The Tweed River Estuary Health Monitoring and Reporting Program	Low
	10.4	Coastal hazards (rip currents, hazardous surf conditions, coastal erosion, wave overtopping)					✓		Likely	Major	High	High	High	High		Low
	10.5	Public safety risk from aging and/or degraded coastal/estuary infrastructure					✓	✓	Possible	Major	Moderate	Moderate	Moderate	Moderate	NSW Maritime Infrastructure Plan Tweed River Domestic Structures Strategy	High
	10.6	Radioactivity along areas historically used for sand mining (storage and stockpiling).					✓		Almost Certain	Minor	Low	Low	Low	Low	Mapped layer for contaminated land and mining paths	Moderate
Governance	11.1	Ambiguity or lack of agreement on governance & jurisdiction between agencies	✓	✓	✓	✓	✓	✓	Likely	Major	High	High	High	High	Tweed Coast Regional Crown Reserve Plan of Management 2006 NSW Coastal Management Manual	High
	11.2	Inadequate, inefficient regulation, or over-regulation (agencies)	✓						Likely	Moderate	Moderate	Moderate	Moderate	Moderate		Low
	11.3	Lack of compliance with regulations (by users) or lack of regulation effort (by agencies)	✓				✓	✓	Almost Certain	Moderate	Moderate	Moderate	Moderate	Moderate	The hiring of a Tweed Coastal Ranger has been undertaken, as per recommendations of TCMP 2005	Low
	11.4	Lack of funding for investigation and action implementation		✓	✓	✓	✓		Likely	Major	High	High	High	High	NSW Coast and Estuary Grants Program	High
	11.5	Lack of or ineffective community engagement or participation in governance	✓	✓	✓	✓	✓		Possible	Major	Moderate	Moderate	Moderate	Moderate	NSW Coastal Management Manual	High
Information Gaps	12.1	Incomplete coastal process information (including climate change impacts)	✓	✓	✓	✓	✓		Possible	Major	Moderate	Moderate	Moderate	Moderate		Moderate
	12.2	Incomplete ecological information (including climate change impacts)	✓	✓	✓	✓	✓		Likely	Major	High	High	High	High		High
	12.3	Inadequate and/or incomplete European and Indigenous Heritage information	✓	✓	✓	✓	✓		Almost Certain	Moderate	Moderate	Moderate	Moderate	Moderate	Tweed Aboriginal Cultural Heritage Management Plan	Moderate
	12.4	Inadequate social and economic information	✓	✓	✓	✓	✓	✓	Likely	Moderate	Low	Moderate	Moderate	Moderate	Tweed Community ID Portal	Moderate

7.3.1 Priority Risks

The risk assessment identified 21 high risk threats which presently affect the Tweed coast and estuaries. An additional 22 threats were identified that were deemed as likely to become high risk over future planning horizons as a result of climate change, population pressures and future development.

TABLE 7-8 IDENTIFIED HIGH RISK THREATS

Present Day High Risk Threats	Emerging Threats to Become High Risk in Future
▪ Urban Stormwater Discharge ▪ Agricultural Runoff ▪ Industrial Discharges ▪ Sewage Effluent and Septic Runoff ▪ Stock related damage of riparian and marine vegetation (in estuaries) ▪ Clearing / disturbance of riparian and adjacent habitat including wetland drainage ▪ Introduction of invasive fauna pest species (e.g. carp, tilapia, foxes, etc) ▪ Introduction of invasive flora pest species (e.g. aquatic weeds) ▪ Sedimentation and infilling channels and changing flows ▪ Estuary foreshore erosion and bank erosion ▪ Coastal Storm Impacts - Erosion ▪ Bushfires ▪ Water pollution/contamination affecting human health and safety ▪ Seafood contamination ▪ Coastal hazards (rip currents, hazardous surf conditions, coastal erosion, wave overtopping) ▪ Ambiguity or lack of agreement on governance and jurisdiction between agencies ▪ Inadequate, inefficient regulation, or over-regulation (agencies) ▪ Lack of funding for investigation and action implementation ▪ Lack of or ineffective community engagement or participation in governance ▪ Incomplete coastal process information (including climate change impacts) ▪ Incomplete ecological information (including climate change impacts)	▪ Recreational fishing (boat and shore based) ▪ Recreational boating ▪ Overcrowding / congestion of waterways and user group conflict ▪ Overcrowding / congestion of beaches and user group conflict ▪ Limited or lack of foreshore and waterway access ▪ Limited or lack of supporting infrastructure (for boating and recreation) ▪ Foreshore / urban development ▪ Increasing groundwater extraction / use ▪ Modified freshwater flows (in estuaries) ▪ Tidal Inundation of Estuaries ▪ Long-term coastal shoreline recession ▪ Estuary foreshore erosion and bank erosion ▪ Cliff and slope instability ▪ Coastal storm Impacts – inundation ▪ Drought ▪ Ocean temperature increase ▪ Altered storm frequency and severity ▪ Sea level rise (SLR) ▪ Long Term Shoreline Recession due to SLR ▪ Altered salinity levels / profile ▪ Habitat migration and squeeze ▪ Catchment flooding and overland flow

It should be noted that in general, a detailed risk assessment will be required when there are proposals for significant new infill or greenfield development in areas exposed to current and future risk from coastal hazards, or there is a high degree of uncertainty.

8 KNOWLEDGE GAPS

8.1 Adequacy of Existing Information and Knowledge Gaps

A review of existing information and a gap analysis has been undertaken in order to identify the focus areas for CMP actions, and to assist within planning of additional studies to be undertaken in Stage 2 of the CMP process.

The *NSW Coastal Management Manual Part B: Stage 2 – Determine risks, vulnerabilities and opportunities* sets forth the requirements for the nature and rigour of the information required in Stage 2 to provide information to support decision-making in later stages of the planning process. Information requirements are provided for each of the four (4) coastal management areas, and these requirements have been used as a basis for determining the adequacy of the existing information, and subsequently the potential knowledge gaps to be filled during Stage 2 of the CMPs.

The analysis has been undertaken for three (3) different geographic areas, which is based on the geographic breakdown of existing management studies and plans:

- The Tweed Open Coastline
- The Tweed Coastal Estuaries (Cudgen, Cudgera and Mooball Creeks); and
- The Cobaki and Terranora Broadwaters.

An assessment of data gaps the Tweed River Estuary is provided in the Tweed River Estuary CMP (Hydrosphere, 2019)

8.1.1 Tweed Open Coastline

The values, threats and risks along the Tweed Open Coastline have been studied and assessed in detail in the Tweed Coastline Hazard Definition Study (WBM, 2001), the Tweed Coastline Management Plan (Umwelt, 2005) and then the Tweed Shire Coastal Hazards Assessment (BMT WBM, 2013).

It is worth noting that the Tweed Coastline Management Plan of 2005 is nearby 15 years old. Therefore, the social, environmental, and economic values, physical and ecological threats and associated management recommendations are in need of an update – particularly with regards to:

- Changes to population and recreational and commercial usage pressures;
- Changes to coastal management policy and legislation;
- Changes to local and state governance arrangements, roles and responsibilities;
- Changes to local strategic planning direction strategy; and
- Projections of climate change impacts and associated pressures to the coastal zone

A key piece of information for assessment of several of the risks identified within the first-pass risk assessment is the definition of coastal hazards along the Tweed Open Coastline. ***Coastal erosion hazards*** (that include short term storm erosion and long-term shoreline recession) have been mapped for present day (immediate hazard), as well as the 2050 and 2100 planning horizons. The mapping comprises:

- Hazard Lines for the select developed coastal areas from Pottsville to Kingscliff have been mapped as part of the Tweed Shire Coastal Hazards Assessment (BMT WBM, 2013).
- Hazard Lines for the remaining stretches of the Tweed Coastline (comprising mainly undeveloped coastal reserve) are mapped as part of the 2010 update of the original 2001 hazard lines.

The more recent Tweed Shire Coastal Hazards Assessment (BMT WBM, 2013) includes a robust assessment of the prevailing coastal processes, coastal hazards and climate change impacts. However, the coastal hazard lines, as outlined above, require an update for methodological reasons. The derivation of the existing hazard lines is based on the traditional "deterministic" approach. That is, a single value is applied to each of the inputs to the hazard line – storm erosion, sea level rise and long-term shoreline recession – and they are combined to generate a single estimate (prediction) of shoreline movement over a given planning horizon. Until recently, there has been no rigorous assessment of the validity of traditional hazard lines in terms of what constitutes an acceptable risk to coastal land and infrastructure (RHDHV, 2017).

However, in recent years, there has been a shift in the approach used to define coastal hazard lines along the NSW Coastline – to a 'risk-based' or probabilistic approach. This approach recognises the inherent uncertainty within the inputs contributing to the definition of coastal hazard lines. The probabilistic approach allows each input parameter to vary randomly over a range of values which are pre-defined through probability distribution functions. The process of repeatedly combining these randomly sampled values is known as Monte-Carlo simulation.

All outputs from the Monte-Carlo simulation are collated to develop a probability curve for future shoreline retreat that describes the range of possible future outcomes over a specific planning period. The likelihood of the future shoreline position is then assessed in terms of the consequence of such movement - in order to determine an appropriate coastal hazard line position that corresponds to an acceptable level of risk. This type of hazard data may be used to inform cost benefit analysis in accordance with the NSW Treasury Guidelines, and is an appropriate form of hazard information to include in a planning proposal for the purpose of mapping the coastal vulnerability area in the Coastal Management SEPP (2018). It is important to note that the BMT WBM (2013) coastal hazard work is not necessarily considered outdated, but that probabilistic hazard data is most appropriate for informing these aforementioned assessments in the coastal zone should Council wish to pursue them.

Therefore, it is recommended that updated coastal hazard mapping is completed for the developed areas of the Tweed LGA open coastline as part of Stage 2 of the CMP process - in order to define updated, risk-based, coastal hazard lines for use in assessing risks to current and future development. This update would also allow up-to-date shoreline and beach profile data to be incorporated into the derivation of the hazard mapping, where applicable. It is not considered that the probabilistic hazard data is required for undeveloped coastal crown reserve or NPWS estate, as the deterministic hazard work is considered fit for purpose for those areas (as they will largely be used for managing beach access tracks and vegetated reserves).

The ***coastal inundation mapping*** undertaken as part of the Coastal Hazards Assessment (BMT WBM, 2013) is considered to be robust from a data and methodology perspective and has been undertaken relatively recently. Subsequently, it is not anticipated that updated coastal inundation mapping will be required as part of Stage 2 of the CMP.

Coastal cliff and slope instability have not been investigated as part of any historical hazard studies or management plans. Therefore, it will be necessary to undertake an LGA wide coastal cliff and slope stability hazard assessment in order to identify areas at risk of coastal cliff instability and landslide hazards. The main areas of focus of these studies would be:

- Tweed Heads along Coral Street
- Fingal Head;
- Norries Head; and
- Hastings Point

Whilst none of the area above are in the vicinity of residential dwellings, some of these locations are situated in close proximity to areas of high public use and public infrastructure – such as Coral Street at Tweed heads

(see Figure 8-1). Other locations, such as Fingal Headland and Hastings Point also have high recreational and cultural heritage value (see Section 3.6).

The ***Kingscliff - Dreamtime Beach CZMP*** (BMT WBM, 2017) addresses a number of coastal management issues across that particular study area, and a number of the recommended management actions are currently being implemented and are ongoing.

FIGURE 8-1 COASTAL CLIFF AREA AT CORAL ST, TWEED HEADS (SOURCE: GOOGLE STREETVIEW©)

8.1.2 Tweed Coastal Estuaries

The predominant source of information regarding coastal zone threats across these estuaries is contained within the Tweed Coast Estuaries Coastal Zone Management Plan (Hydrosphere, 2013) and associated documents. The CZMP contains an assessment of the health of the estuaries (the *Tweed Coast Estuaries and Catchments: Baseline Ecosystem Health Assessment* is included as part of the CZMP) and the various pressures affecting the health of the estuaries. This includes an assessment of urban development and stormwater, wastewater management, bank erosion, acid sulfate soils and agriculture. The document also contains data pertaining to resource use and associated pressures such as public access, and recreational/commercial use of the estuaries. The CZMP included extensive community consultation regarding community uses and values.

There are several hazards addressed in the CZMP, including bank erosion and entrance instability. Furthermore, the Tweed Shire Coastal Hazards Assessment 2012 (BMT WBM, 2013) includes analysis of coastal (oceanic) inundation in the lower estuary due to storm tide conditions. Additionally, the Tweed-Byron Coastal Creeks Flood Study (WBM, 2009) assesses the joint occurrence of coastal and catchment flooding and includes the preparation of flood maps for a range of ARI events.

However, ***tidal inundation*** (often referred to as “sunny-day flooding”) has not yet been modelled and mapped throughout the Tweed Coastal Estuaries. The three estuaries are wave dominated barrier estuaries with attenuated tidal ranges compared to the open coast, and spatially variable tide ranges in the upstream direction. An assessment is required of the extent of tidal (non-storm related) inundation across these estuaries – under both present-day conditions, but also importantly under future sea level rise conditions. Much of the estuary foreshores are low lying, and it is important to understand how the frequency and magnitude of tidal inundation will affect the social, environmental and economic values of the study area over future planning horizons. As discussed in Section 5.2.4, DPIE has undertaken a state-wide estuary tidal inundation exposure assessment (OEH, 2018d), along with associated mapping of tidal inundation extents. This assessment indicates a significant impacts to residential properties and agricultural land under a 1.0 m SLR scenario (see

Section 5.2.4). However, the assessment is broad scale in nature – and DPIE notes that it does not replace the need to undertake flood or inundation studies for individual estuaries during Stage 2 of the CMP process.

In addition to data provided in the CZMP, information regarding estuary health is available through Councils water quality monitoring program and ***Annual Water Quality Report Card*** for the Tweed's waterways, including estuaries, catchments and coastal creeks. The report card rates the quality of waterways across the Shire and describes the projects that Council and the community implement to manage it.

8.1.3 Cobaki and Terranora Broadwaters

The predominant source of information regarding coastal zone threats across these estuaries is contained within the ***Cobaki and Terranora Broadwaters CZMP*** (AW and ABER, 2010). The CZMP contains an in-depth assessment of the ecological, cultural and socio-economic values of the Broadwaters. The study also includes other relevant assessments, including:

- A riparian and geomorphic assessment;
- A water quality assessment; and
- Ecosystem response modelling of the system for relevant threats including urban development and runoff, sedimentation of the Broadwater, wastewater management, dredging and climate change.

FIGURE 8-2 COBAKI BROADWATER (SOURCE: AW & ABER, 2010)

The study and its associated assessments are thorough. However, it is noted that the study is approximately ten years old. The NSW Coastal Management Manual recommends that Ps should be reviewed and updated at least every 10 years – and so it is recommended that a similar approach be adopted to the existing CZMP for the Cobaki and Terranora Broadwaters. Therefore, the CZMP is in need of a revision to incorporate new scientific knowledge regarding ecological process and climate change impacts, changes to the physical environment (in particular the large-scale urban development planned for the catchment) and recent legislative and policy changes.

In terms of coastal hazards, the threats of coastal inundation and tidal inundation across the Broadwaters have been assessed as part of the Tweed Estuary Tidal Inundation Assessment and Mapping (BMT WBM, 2019). Bank erosion has been assessed as part of the CZMP but is in need of an update as it is approximately ten (10) years old.

8.1.4 Tweed River Estuary

The existing information for the Tweed River Estuary CMP has been undertaken as part of Stages 2, 3 and 4 of that CMP (Hydrosphere, 2019). This CMP is in final draft stage, and it is not anticipated that any additional studies will be required (other than those outlined in the CMP) until the periodic ten-year review in approximately 2030.

The CMP includes a suite of coastal planning and management actions that aim to protect and conserve estuarine and terrestrial ecosystems, whilst optimising the value of the coastal zone for existing agricultural, commercial, recreational and cultural purposes (Hydrosphere, 2019). The management actions addressed in the CMP were developed and prioritised based on the assessed risk of the threats to the estuary values. The threats addressed in the CMP include many of those outlined as high risk in this Scoping Study, including:

- Bank Erosion;

- Habitat loss and barriers to habitat connectivity;
- Water quality issues relating to diffuse source agricultural runoff, wastewater treatment plant discharges and overflows, stormwater and industrial discharges;
- Tidal inundation and coincident coastal and catchment flooding;
- Overcrowding / congestion of waterways and user group conflict; and
- Long term pressures related to climate change.

The threats and key issues identified in the Tweed River Estuary CMP are largely consistent with those outlined in this Scoping Study and those identified through identified through the NSW Threat and Risk Assessment developed for the NSW Marine Estate Management Strategy Threat and Risk Assessment.

8.1.5 Summary

This section provides a summary of the adequacy of the existing information. Some guidance regarding how to assess the adequacy of existing information is provided on the CM Manual (OEH, 2018b). The criteria to assess fast-tracking addresses the adequacy of existing technical information (such as hazard studies and data) to inform management actions. Many that apply to technical information have been used as criteria to assess the existing coastal hazard information across the LGA.

The conditions for whereby fast tracking may be appropriate are outlined in Section 1.11.2 of the CM Manual (OEH, 2018b), and are reproduced below:

a) the first-pass risk assessment indicates that the vulnerability is low and the risks are acceptable

b) the management issues are not complex, and the council can demonstrate that they are adequately managed

c) there are few stakeholders and/or there is an existing, successful management partnership between stakeholders, including adjoining councils, public authorities and key community groups

d) council has previously prepared a detailed study to evaluate all relevant coastal hazards and risks and has robust, up-to-date scientific information about coastal change, and

e) council has a clear understanding of trends in the condition of natural systems in the coastal environment area, and the ecosystem services they provide, based on up-to-date scientific evidence

f) the council demonstrates that it has adopted and is implementing best practices in its role in protecting the condition of the coast

g) there have been no major events or new studies released that would change the previous assessment of risk, including likely changes in socioeconomic conditions

h) council has a clear understanding of community satisfaction with coastal management processes, costs and benefits distribution and outcomes, that supports continuation of the current approach

i) council has a sustainable funding strategy in place for coastal management, which is integrated with its resourcing strategy and asset management plan under the IP&R process.

For each of the seven coastal hazard listed in the CM Act (see Section 5.2.4), the adequacy of the existing information has been assessed based on the outcomes of the FPRA (see Section 7) and the fast-tracking criteria listed above.

- The adequacy of the data for the Tweed Coast and Coastal Estuaries CMP is provided in Table 8-1.
- The adequacy of the data for the Cobaki and Terranora Broadwaters CMP is provided in Table 8-2.

In these tables:

- **Green** indicates where hazard information and mapping from existing studies is sufficient, and the assessment of this hazard during Stage 2 can therefore be fast-tracked. The source of information/mapping has been provided.
- **Orange** indicates that the existing information is inadequate, and will require further studies, analysis and mapping during Stage 2 of the CMP.

TABLE 8-1 ADEQUACY OF EXISTING INFORMATION FOR THE TWEED COAST AND COASTAL ESTUARIES CMP

Hazard Type	Adequacy of Information	Justification & Comments
Coastal Vulnerability Area		
Beach erosion	**To be updated in Stage 2**	It is recommended that updated coastal hazard mapping is completed for the developed areas of the Tweed LGA open coastline as part of Stage 2 of the CMP process - in order to define updated, risk-based, coastal hazard lines for use in assessing risks to current and future development. This update should adopt a 'risk-based' or probabilistic approach as described in Section 8.2.1. It is not considered that the probabilistic hazard data is required for undeveloped coastal crown reserve or NPWS estate, as the deterministic hazard work is considered fit for purpose for those areas (as they will largely be used for managing beach access tracks and vegetated reserves).
Shoreline recession	**To be updated in Stage 2**	
Estuary entrance instability	**Fit for Purpose: Assessed in Tweed Shire Coastal Hazard Assessment (2013) Satisfies FT Criteria: (a) (d) (g)**	Estuary entrance stability has been addressed in the CZMP For Tweed Coastal Estuaries (Hydrosphere, 2013), and no data or new information since this time is likely to significantly modify the outcomes of that assessment. Furthermore, the CZMP and the first-pass risk assessment showed that the risk pertaining to entrance instability is considered to be low - as the Cudgen and Mooball Creek entrances are stable within the boundaries of their training walls, and that while the Cudgera Creek mouth is not trained, natural rock outcrops provide stability against any significant effects of migration of the creek to the south.
Tidal inundation (including SLR)	**To be assessed in Stage 2**	Tidal inundation has not yet been modelled and mapped throughout the Tweed Coastal Estuaries. As discussed in Section 5.2.4, DPIE has undertaken a state-wide estuary tidal inundation exposure assessment (OEH, 2018d), along with associated mapping of tidal inundation extents. This assessment indicates that a large amount of low-lying agricultural land and residential properties may be exposed to this hazard under a 1.0 m SLR scenario. However, the DPIE assessment is broad scale in nature – and DPIE notes that it does not replace the need to undertake flood or inundation studies for individual estuaries during Stage 2 of the CMP process. Therefore, a robust and detailed tidal inundation study is required in order to further investigate the risks associated with tidal inundation.
Coastal inundation (storm tide and wave run-up)	**Fit for Purpose: Assessed in Tweed Shire Coastal Hazard Assessment (2013) Satisfies FT Criteria (d) (g)**	Coastal inundation assessed as part of the Tweed Shire Coastal Hazard Assessment (2013) is considered to be robust and incorporates that latest sea level rise estimates and established and approved methods for assessing wave run-up. The data used in the assessment includes design wave conditions and ocean levels, and prevailing nearshore & estuary bathymetry. The mapping is of high resolution and it is not anticipated that any new data or knowledge would significantly modify the outcomes of the assessment.
Cliff/slope instability	**To be assessed in Stage 2**	Coastal cliff and slope instability have not been investigated as part of any historical hazard studies or management plans. Therefore, it will be necessary to undertake an LGA wide coastal cliff and slope stability hazard assessment in order to identify areas at risk of coastal cliff instability and landslide hazards.

Hazard Type	Adequacy of Information	Justification & Comments
Estuary foreshore (bank) erosion	**Fit for Purpose: CZMP For Tweed Coastal Estuaries (2013) Satisfies FT Criteria (d) (g)**	The assessment of Bank Erosion in the CZMP For Tweed Coastal Estuaries (based on Tweed Coast Estuaries Bank Erosion Study) was undertaken in 2013. The study provided high resolution and detailed mapped areas of high, low and medium bank erosion risk, based on mapping and field observations. The underlying causes or erosion are well understood, and high-risk sites have been prioritised for management purposes.
Estuary foreshore inundation from combined coastal and catchment flooding	**Fit for Purpose: Tweed-Byron Coastal Creeks Flood Study (2009) Satisfies FT Criteria (d) (g)**	Tweed-Byron Coastal Creeks Flood Study was undertaken in 2009 and has modelled flood behaviour across the catchments of the Tweed Coast estuaries and resulted in the preparation of flood maps which predict inundation depth and flow velocity for events ranging from 5-year ARI to probable maximum flood (PMF). Modelling and mapping were undertaken at a high spatial resolution that is sufficient for planning. It is not anticipated that any new data or knowledge would significantly alter the outcomes of the assessment.
Coastal Use, Coastal Environment Area, Coastal Wetlands and Littoral Rainforests		
Estuary Health Pressures and Community Uses	**Fit for Purpose: CZMP For Tweed Coastal Estuaries (2013) Satisfies FT Criteria (d) (g)**	The CZMP includes an in-depth assessment of existing and emerging local environmental health pressures for each of the three estuaries - including urban development and stormwater, wastewater management, bank erosion, acid sulfate soils and agriculture. The document also contains data pertaining to resource use and associated pressures such as public access, and recreational/commercial use of the estuaries. The development of the plan included extensive community consultation regarding community uses and values. Given how recently the CZMP was developed, the various pressures affecting the estuaries are considered to be well understood. However, as per the recommendations in the CZMP the management actions developed therein are scheduled for review and reassessment before 2023 – in order to assess whether the desired outcomes are being achieved.

TABLE 8-2 ADEQUACY OF EXISTING INFORMATION FOR THE COBAKI AND TERRANORA BROADWATERS CMP

Hazard Type	Adequacy of Information	Justification & Comments
Coastal Vulnerability Area		
Beach erosion	N/A	N/A
Shoreline recession	N/A	N/A
Estuary entrance instability Tidal inundation (including SLR) Coastal inundation (storm tide and wave run-up)	**Assessed in Tweed River Estuary Coastal Management Program (2019)** **Satisfies FT Criteria (d) (g)**	The Tweed River Estuary CMP included a detailed assessment of coastal inundation, tidal inundation and estuary entrance stability of the wider estuary – that *includes* the Cobaki and Terranora Broadwaters. This assessment includes best practice, high resolution modelling and technical analysis the outputs of this assessment for the CMP study area can be adopted for this study.
Cliff/slope instability	N/A	N/A
Estuary foreshore (bank) erosion	**To be updated in Stage 2**	Bank erosion across the study area was assessed as part of the Cobaki and Terranora Broadwaters CZMP (AW and ABER, 2010). This bank erosion assessment is over ten (10) years old and is in need of an update. The NSW Coastal Management Manual recommends that CMPs should be reviewed and updated at least every 10 years – and so it is recommended that a similar approach be adopted to the existing CZMP for the Cobaki and Terranora Broadwaters.
Estuary foreshore inundation from combined coastal and catchment flooding	**Assessed in Tweed River Estuary Coastal Management Program (2019)**	Combined coastal and catchment flooding for the Cobaki and Terranora Broadwaters has been addressed as part of the Tweed River Estuary CMP.
Coastal Use, Coastal Environment Area, Coastal Wetlands and Littoral Rainforests		
Estuary Health Pressures and Community Uses	**To be updated in Stage 2**	The Cobaki and Terranora Broadwaters CZMP (AW and ABER, 2010) contains an in-depth assessment of the ecological, cultural and socio-economic values of the Broadwaters. The study also includes other relevant assessments, including: a riparian and geomorphic assessment, a water quality assessment; and ecosystem response modelling of the system for relevant threats including urban development and runoff, sedimentation of the Broadwater, wastewater management, dredging and climate change. However, this assessment is over 10 years old and is in need of an update. The NSW Coastal Management Manual recommends that CMPs should be reviewed and updated at least every 10 years – and so it is recommended that a similar approach be adopted to the existing CZMP for the Cobaki and Terranora Broadwaters.

8.2 Studies to be Prepared in the CMP

The need for additional studies has been assessed based on the outcomes of the FPRA, the review of the adequacy of existing information and the stakeholder engagement workshop. For each of the threats listed in Table 7-7, the need for additional studies has been identified based on the following criteria:

- Where the knowledge gap criticality is defined as **High**; **OR**
- Where the knowledge gap criticality is defined as **Medium**, **AND** the overall risk associated with the threat is given as **High** over a future planning period of 20 years.

This method provides a consolidated list of knowledge gaps across the study area. From here, a list of additional studies has been compiled, and where multiple knowledge gaps can be addressed in a single study this has also been identified and recommended. The recommendations for further detailed studies and associated tasks are described in Table 8-3 for the Tweed Coast and Coastal Estuaries CMP and Table 8-4 for the Cobaki and Terranora Broadwaters CMP.

It should be noted that some of these studies will need to be undertaken during Stage 2 of the CMP process – as this information will be fundamental for identifying the evidence-based management strategies that can be developed during Stage 3.

The tables below also identify potential studies, strategies and management plans that will likely be recommended for development as part of Stages 3 and 4 of the CMP. These generally pertain to management roles and responsibilities and will be crucial in managing the threats and risks to the coastal zone outlined in Section 7. However, the needs for these studies should be revisited after the more detailed risk assessment to be undertaken as part of Stage 2, and the evaluation of management options in Stage 3. They have been flagged here to precipitate further investigation and consideration during those latter stages.

The studies outlined herein are in addition to, and in coordination with, the stakeholder and community consultation activities outlined in Appendix A.

8.2.1 Tweed Coast and Coastal Estuaries

TABLE 8-3 STUDIES TO BE PREPARED FOR THE TWEED COAST AND COASTAL ESTUARIES CMP

Knowledge Gap	Description
Stage 2 – Determine Risks, Vulnerabilities and Opportunities	
Coastal Hazard Mapping Update Study **Present Day Risk: High** **Threat(s) Addressed: 7.2, 8.1, 9.5, 9.6**	This study should include an assessment of hazard mapping suitable for preparing a planning proposal to update the coastal vulnerability area maps in the CM SEPP. The hazard mapping should be undertaken for the entire LGA coastline, and include the following coastal hazard components: ▪ Beach erosion: The storm bite allowance that determines extent of retreat of the dune scarp during a major storm event or series of storms; ▪ Shoreline recession: The underlying long-term change in the position of the shoreline due to the prevailing coastal processes as well as the effects of sea level rise; The study should build on the data collation tasks undertaken as part of the Tweed Shire Coastal Hazards Assessment (BMT WBM, 2013), and update data where applicable with update metocean and beach profile data. The timeframes to be assessed should include

Knowledge Gap	Description
	2050, 2080 and 2100 for consistency with the Tweed Estuary Tidal Inundation Assessment and Mapping. The key component of the study should be the adoption of a probabilistic hazard assessment approach - in order to develop risk-based coastal hazard lines for use in assessing the risks to current and future development.
Coastal Geotechnical Instability Assessment **Present Day Risk: Low** **Threat(s) Addressed: 7.4**	This study should include a coastal geotechnical instability assessment and associated mapping for all developed cliff top and bluff locations in the coastal zone, including wave exposed headlands. The main areas of focus would be: ▪ Tweed Heads along Coral Street; ▪ Fingal Head; ▪ Norries Head; and ▪ Hastings Point. Whilst none of the areas above are in the vicinity of residential dwellings, some of these locations are situated in close proximity to areas of high public use and public infrastructure – such as Coral Street at Tweed heads (see Figure 8-1). Other locations, such as Fingal Headland and Hasting Point also have high recreational and cultural heritage value (see Section 3.6).
Letitia Beach Behaviour Study **Present Day Risk: Moderate** **Threat(s) Addressed: 7.2, 8.1, 8.2, 12.1**	In recent years, community concern has arisen regarding the potential impacts from the operation of the Tweed Sand Bypassing (TSB) on coastal erosion and coastal processes from Fingal Head to Letitia Beach. TSB manages an ongoing coastal monitoring program to determine the performance of the project and to gain a better understanding of the local coastal environment. In order further TSB's local coastal process knowledge, a study is to be undertaken that assesses local coastal processes (including morphological processes such as longshore sediment transport) and the potential impacts of TSB operation on these process – including impacts on the coastal compartment sediment budget. The study is to be undertaken by TSB from data and analysis available through the TSB program.
Tidal Inundation and Sea Level Rise Study and Risk Assessment **Present Day Risk: High** **Threat(s) Addressed: 7.1, 9.5, 9.7, 9.8**	At present there is no detailed tidal inundation modelling undertaken for the Tweed Coastal Estuaries. Therefore, a Tidal Inundation and Sea Level Rise Study and Risk Assessment should be undertaken for the Tweed Coastal Estuaries of Cudgen Creek, Cudgera Creek and Mooball Creek in order to identify those areas exposed to tidal inundation, and to assess the associated social, environmental and economic risks. As part of this study, detailed numerical modelling should be undertaken regarding tidal inundation across these estuaries, considering both temporary inundation (e.g. storm surge and catchment events) and permanent inundation associated with future sea level rise conditions. The Tidal Inundation Study and Risk Assessment should include the following components: ▪ A detailed assessment of tidal inundation across the estuaries, and associated mapping. This should include potential changes to tidal regime (including tidal planes) and tidal hydrodynamics within the estuaries.

Knowledge Gap	Description
	▪ Identification of sites within the estuaries that will be exposed to temporary and/or permanent tidal inundation under both present-day conditions and for future sea level rise conditions. ▪ Consideration of potential impacts regarding habitat 'squeeze' and upslope migration of macrophytes across the estuarine coastal zone due to rising sea levels and altered salinity profiles and opportunities for habitat expansion. ▪ Consideration of permanent groundwater impacts, including those associated with ecosystem functioning, built asset and infrastructure risks and contamination impacts. A risk assessment that identifies the social, environmental and economic risks associated with sea level rise across the estuaries.
Stormwater System Hydraulic Capacity Assessment **Present Day Risk: Moderate** **Threat(s) Addressed: 7.1, 8.1, 8.3, 9.5, 10.5**	A comprehensive survey of the stormwater system is currently underway. On completion, an assessment of the future hydraulic capacity of susceptible stormwater networks will be required. Impacts from increased tidal inundation and network hydraulics from sea level rise will need to be assessed and management options developed. The interaction between stormwater systems and rural drainage systems and floodgate management will also need to be considered under sea level rise scenarios.
Stage 2 CMP Risks, Vulnerabilities and Opportunities Synthesis Report (including community consultation)	The Stage 2 CMP Risks, Vulnerabilities and Opportunities Synthesis Report should synthesis the overall risk and vulnerabilities facing the coast zone, based on the Stage 2 studies listed above, and the existing body of work pertaining to coastal hazards deemed adequate for Stage 2 (as described in Section 8.1.5). This should also include the Community and Stakeholder Engagement Activities for Stage 2 as outlined in the Community and Stakeholder Engagement Strategy outlined in Appendix A. This will be an interactive community conversation (a workshop) where the community has the opportunity to communicate its uses and values for the coastal zone.
Studies and Plans likely to be recommended during Stages 3 and 4	
Coastal Infrastructure Management Strategy **Present Day Risk: High**	There is presently a lack of understanding regarding the ownership and management responsibilities of Council and other organisations regarding: ▪ Breakwaters; and ▪ Training walls. A key outcome of the literature review and stakeholder engagement was the need to gain clarity around the ownership and management responsibilities for coastal infrastructure with DPIE and Crown Lands. A clear understanding needs to be obtained so that management can be more effectively coordinated. Therefore, a management strategy should be prepared in conjunction with

Knowledge Gap	Description
Threat(s) Addressed: 10.5, 11.1	DPIE, Crown Lands and MIDO to clearly define ownership and management responsibilities of coastal infrastructure. This strategy should include an assessment of the condition of these structures and identify maintenance requirements and future management needs. The strategy should consider the NSW Maritime Infrastructure Plan 2019-2024 and the Tweed River Domestic Structures Strategy 2008.
Plan of Management for Commercial Use of Tweed Foreshore **Present Day Risk: Moderate** **Threat(s) Addressed: 3.2**	A key pressure affecting the coastal zone has been identified as being the increasing use of the Tweed Foreshore for commercial purposes such as public events, filming on the beach, surf contests and tourist operations (e.g. horse and camel rides). This increasing demand of commercial use generates user group conflict, and places pressure on the environmental and social values of the beaches and foreshore parks. Therefore, a plan of management should be developed in order to establish better oversight processes for commercial use of these zones. This should include developing a detailed understanding of the carrying capacity of individual sites. The plan should consider the vision, guiding principles and strategic outcomes of the *Tweed Open Space Strategy 2018 – 2028*. It will also need alignment with the *Tweed Shire Commercial Recreation Activities on Public Open Space Policy*. This plan may be developed as part of Stage 3 of the CMP, or as a separate body of work.
Tweed Beach Nourishment Strategy **Present Day Risk: Moderate** **Threat(s) Addressed: 7.2, 8.2**	A key finding of the stakeholder engagement process and literature review, including the recommendations of the Kingscliff-Dreamtime Beach CZMP (BMT WBM, 2017), was the need for the development of a long-term strategy for the nourishment of the Tweed Coast Beaches. The strategy should include a sand sourcing study, in order to determine a reliable long-term source of sand for ongoing beach nourishment to maintain erosion buffers and recreational amenity along the LGA beaches. This sand sourcing study should consider opportunities to work with the Tweed Sand Bypass, and/or the NSW Coastal Dredging Strategy, to provide a suitable source(s) of sand. Offshore sources of sand should also be considered. The strategy should investigate possibilities for streamlining the approvals process in order to allow a more agile response to storm erosion. It should identify the need to collaborate with regional and indeed state-wide councils to improve the viability of an offshore sand extraction for beach nourishment scheme whereby a large international dredge may need to be procured.
Entrance Management Study and Plan for Coastal Estuaries **Present Day Risk: High**	There are presently no entrance management plans in place for the Cudgen Creek, Cudgera Creek and Mooball Creek estuaries. These estuaries are wave dominated barrier estuaries and are technically considered to be intermittently closed and open coastal lagoons (ICOLLs). Cudgera Creek (which is not trained), and to a lesser extent Cudgen and Mooball Creek, are prone to infrequent and episodic entrance closures associated with occasional 'slugs' of sand being transported by longshore drift. Whilst closed, the estuaries are exposed to increased flood risk and potential water quality issues.

Knowledge Gap	Description
Threat(s) Addressed: 4.1, 4.2, 4.3, 6.4, 8.3, 9.5, 10.2	Therefore, entrance management plans are required for all three estuaries. For each estuary, the objectives of the plan should be to: ▪ Detail the decision-making framework for artificially opening the estuary; ▪ Ensure the appropriate level of environmental assessment and consultation are undertaken before the estuary is artificially opened (particularly in regard to managing blackwater events and fish kills); ▪ Undertake an environmental risk assessment in order to understand the potential impacts of artificially opening the estuary; ▪ Undertake a flood risk assessment in order to define trigger levels for artificial opening; ▪ Detail a procedure for when, where and how the estuary is artificially opened; ▪ Define the roles and responsibilities for artificially opening the estuary; ▪ Streamline the decision-making and the approvals process in relation to artificial opening events; ▪ Consider how entrance management will address sea level rise over future planning horizons, with regards to flooding and ecological impacts; and ▪ Gain broad community understanding and support for the management of the estuary entrance The development of the entrance management plans will require consultation and engagement with Council, DPIE, Fisheries and NPWS. These plans may be developed as part of Stage 3 of the CMP, or as a separate body of work.
Recreational Access Plan for Tweed Coast Estuaries **Present Day Risk: Moderate** **Threat(s) Addressed: 2.3, 3.1, 3.3, 10.5**	Develop a plan that identifies areas where the community currently access and use each of the coastal creeks and the condition and suitability of existing access structures. The plan would allow for identification of investment required to provide safe and sustainable infrastructure now and over the planning period. This would include consideration of priority areas for provision of Access for All.

8.2.2 Cobaki and Terranora Broadwaters

TABLE 8-4 STUDIES TO BE PREPARED FOR THE COBAKI AND TERRANORA BROADWATERS CMP

Knowledge Gap	Description
Stage 2 – Determine Risks, Vulnerabilities and Opportunities	
Estuary Process Study **Present Day Risk: High** **Threat(s) Addressed: 7.1, 7.15, 7.17, 7.18**	The estuary process assessment undertaken as part of the Cobaki and Terranora Broadwaters CZMP (AW and ABER, 2010) is in need of an update. Therefore, it is anticipated that Stage 2 of the Cobaki and Terranora CMP should include the delivery of an Estuary Process Study - in order to refine and update the understanding of key management issues, develop a comprehensive understanding of the interaction between development, physical and biological processes affecting the Cobaki and Terranora systems and assess future and current risks. The study should revise and update the work undertaken during the CZMP, and it is likely that efficiencies could be created by leveraging of the existing knowledge in the CZMP document. The study should relate to all four coastal management areas across the Broadwaters, and include the following components: ▪ Values of the Broadwaters - An assessment of the environmental, social, cultural, and economic values of the estuaries; ▪ Hydraulic processes - including tidal behaviour, estuarine water levels, flushing times, catchment inflows and groundwater inflow ▪ Water quality processes – including catchment processes associated with current and future land use, urban stormwater discharge, agricultural runoff, industrial discharges, sewage effluent and septic runoff. ▪ Morphological processes – including fluvial and estuarine morphology, sedimentology, sedimentation, and sediment quality and acid sulfate soils. The study should include an update to the Bank Erosion assessed in the CZMP. ▪ Ecological Processes – including an assessment of estuarine flora and fauna, and key impacting processes. An ecological assessment of the condition, connectivity and ecosystem services associated with the Broadwaters; ▪ Cultural Heritage Values – an assessment of indigenous and non-indigenous heritage. ▪ Recreational Usage and Values – an assessment of existing social ▪ Critical factors influencing the vulnerability of the Broadwaters, and potential impacts (linked to exposure, sensitivity and vulnerability) that may result from changes in future land use and climate change (including landward migration of ecological communities. This should include a detailed risk assessment. ▪ An outline of opportunities to protect, rehabilitate, improve the resilience of, and support the environmental, social and cultural values of the Broadwaters The findings should be collated into a Stage 2 CMP Risks, Vulnerabilities and Opportunities Synthesis Report. The report should provide a summary of the above, along with a synthesis of the overall risk and vulnerabilities facing the Broadwaters. The development of the study will require Stakeholder Engagement and Community Consultation – as per the activities outlined in the plan in Appendix A.

8.2.3 LGA Wide

An additional suite of investigations has been identified that may be recommended during Stage 3 and 4 of both CMPs, and may require an LGA wide study approach. These are listed in Table 8-5 below.

TABLE 8-5 LGA WIDE STUDIES WHICH MAY BE RECOMMENDED DURING STAGES 3 AND 4 OF THE CMPS

Knowledge Gap	Description
Stormwater Outlet Access Audit **Present Day Risk: High** **Threat(s) Addressed: 4.1**	An audit should be undertaken regarding the access to, and maintenance of, stormwater drainage outlets across environmentally sensitive areas. This should include an assessment of, as a minimum: ▪ approvals, ▪ sediment removal, ▪ vegetation clearing, and ▪ mangrove encroachment The audit may be undertaken on an LGA wide basis for efficiency. With outlets targeted based on the outcomes of Stage 2 of the CMPs.
Stormwater Plastic Pollution Investigation **Present Day Risk: High** **Threat(s) Addressed: 4.1**	It is recommended that Council undertakes an LGA wide investigation of plastic pollution via stormwater outlets. Council has many untreated outlets discharging into its various waterways, and while some have been retrofitted with proprietary treatment devices, there remains no current solution for the other outlets that can be managed safely and cost effectively. This investigation should identify problem areas, and potential solutions to this issue.

9 BUSINESS CASE

A preliminary business case has been developed to outline economic benefits and rationale for preparation of two CMPs, for:

- The Tweed Coast and Coastal Estuaries; and
- The Cobaki and Terranora Broadwaters;

It should be noted that the Business Case developed herein only covers the development of Stages 2 through to 4 of the CMP processes. The scope of Stage 5 will only be known when the full suite of coastal management actions is developed during the preceding stages, and as such Stage 5 has been excluded from the Business Case. Stage 4 of the CMP process includes the development of a Business Case for the actions proposed in the CMP.

9.1 The Benefits of Undertaking a CMP

The coastline and estuaries of the Tweed are amongst its greatest assets. The coastline is highly valued by the local community and visitors alike for its aesthetic beauty and coastal lifestyle that provides access to iconic beaches and important coastal waterways. The coastal zone possesses significant environmental values and is a major contributor to the social and cultural wellbeing of the community.

As discussed in Section 3.5, the Tweed coastal zone is also a vital economic resource and contributes to the local economy in a number of important ways. Some of these include:

- ***The economic value of tourism in the Tweed is around $250m p.a – of which the coastal zone is a major drawcard.***
- ***The economic value of the ecosystem services provided by the coastline and estuaries is approximately $250m p.a (high level estimate only)***
- ***The economic value of commercial fishing, aquaculture and support services in the LGA is currently around: $12m p.a***

It is reasonable to state that the economic wellbeing of the LGA is heavily linked to the condition and health of the coastal environment in the Tweed – and therefore, sustainable coastal zone management.

The estimated costs of preparation of the two (2) CMPs are outlined in Section 9.3. It can be observed from this business case, that the cost of the development of the two CMPs is less than 1% of the annual economic value of the coastal zone – in terms of the value of economic activity in the area that is dependent on the coast, and the economic and ecosystem service value of a healthy coastal environment. Therefore, the development of the CMPs are a sound investment in the coastal economy of the Tweed Shire LGA.

FIGURE 9-1 RIVERBOAT TOURISM IN THE TWEED (SOURCE: DESTINATION NSW)

The coastal zone of the Tweed (and NSW more generally) is under increasing pressure from urbanisation, population growth and climate change. As discussed in Section 7, there are a range of threats that currently present a risk to the environmental, social and economic values of the Tweed coastal zone. The development of a Coastal Management Program, in line with the NSW Government Coastal Management Framework, is the most effective way to identify and manage the various threats facing the coastal zone, and achieve the objects set forth in the Coastal Management Act. A CMP will set the long-term strategy for the coordinated management of the Tweed coastal zone – and ensure that the values and benefits of the coastal zone are enhanced and maintained for future generations.

It is anticipated that the ***benefits*** of a CMP include (but are certainly not limited to):

- The CMP will provide an opportunity to develop a ***strategic and integrated long-term plan***. The systems approach of a CMP means that Council can more effectively address catchment scale issues, threats and risks, and approach coastal zone issues in a broader strategic context.
- Improved ***coordination and collaboration*** across local and state government agencies – and a clarification of jurisdictional ambiguity across the coastal zone - leading to more effective and efficient coastal zone management.
- The CMP will provide a robust and defensible platform to ***secure funding*** from the NSW Government's Coastal and Estuary Grants Program.
- The structure and mandatory requirements of a CMP process are specifically designed to address the ***objectives of the CM Act*** – and will allow Council to more directly address issues across the 4 coastal management areas defined in the Act.
- The CMP process provides significant pathways for ***community and stakeholder engagement***, and can establish strong working relationships with community networks and stakeholders which are built on mutual trust and respect (OEH, 2018c).
- The ***risk-management*** process outlined in a CMP promotes the identification of current and future risks across a range of planning horizons – allowing Council to adequately prepare for emerging threats.
- Potential exemption for Council from ***liability*** under Section 733 of the *Local Government Act 1993*.
- The preparation of a CMP will enable the funding and implementation of a number of projects that will provide ***benefits to the local community*** by improving and maintaining safe and sustainable access to the coastal zone, and protecting public assets in areas subjected to current and future coastal hazards.

Additionally, there are a number of ***risks*** associated with *not developing* a CMP. These include:

- A ***lack of understanding*** of key threats to coastal values and areas exposed to coastal hazards can result in inadequate or ineffective management practices and development controls.
- The lack of a system wide approach promoted by the CMP process can result in an ***inability*** to properly address wider, catchment scale issues and threats.
- The lack of an adequate risk management process can result in a lack of ability to effectively evaluate and prioritise management actions - reducing the ***cost-effectiveness*** of Council efforts and resources.
- A lack of engagement with the local community (as per the CM Manual requirements) can result in a lack of support or even opposition amongst the community and key user groups. This can result in a ***deficit of credibility and trust*** between Council and the community, and can derail the implementation of future management actions.
- A lack of engagement with the local community around key values and issues can result in an incomplete or understanding of local community values – and a ***misdirection of management effort*** and resources.
- The continuation (or exacerbation) of ***jurisdictional ambiguity*** between local and state government agencies and organisations.

9.2 Support for the CMP Process

The Stakeholder Engagement workshop undertaken as part of this scoping study demonstrated significant support for the development of Tweed Coast and Coastal Estuaries CMP, and the Cobaki and Terranora Broadwater CMP across a broad range of local and state government agencies.

The Stakeholder Engagement workshop demonstrated that there is a clear desire amongst stakeholders for a strategic, coordinated, and collaborative approach to coastal management across the LGA. It was recognised that the development of the CMPs (each driven by Council and advised by a Project Advisory Group comprising a range of stakeholders) would be the most effective vehicle to achieve these outcomes.

9.3 Costing and Work Plan

A preliminary cost plan has been prepared based on the five-stage process for preparing CMPs outlined in the NSW Coastal Management Manual (OEH, 2018b) - see Figure 1-2. The cost plan includes an outline of the various tasks to be undertaken for each stage of the CMP, and a preliminary estimate of the required budget. Potential funding mechanisms to meet these costs are presented in Section 9.4.

- Table 9-1 presents the Cost Plan for the Tweed Coast and Coastal Estuaries CMP.
- Table 9-2 presents the Cost Plan for the Cobaki and Terranora Broadwaters CMP.

TABLE 9-1 PRELIMINARY COST PLAN – TWEED COAST AND COASTAL ESTUARIES CMP

Component	Overview (more detail is provided in Table 8-3)	Preliminary Cost Estimate
Stage 2 – Determine Risks, Vulnerabilities and Opportunities		
Coastline Erosion Hazard Mapping Update	▪ Data Review. ▪ Coastal hazard assessment, including beach erosion and long-term shoreline recession. ▪ Development of probabilistic hazard mapping. ▪ A risk assessment of affected coastal assets and infrastructure. ▪ Summary report.	$40,000
Coastal Geotechnical Instability Assessment	▪ Data and Literature review. ▪ Coastal geotechnical instability assessment and associated mapping. ▪ A risk assessment of affected land and assets. ▪ Summary Report.	$25,000
Letitia Beach Behaviour Study	▪ Definition of the coastal processes around Fingal Head and Fingal Beach to Letitia Beach. ▪ Study to be undertaken by the Tweed Sand Bypassing from existing monitoring information.	To be part funded by TSB (around $30,000)*
Coastal Estuaries Tidal Inundation and Sea Level Rise Study and Risk Assessment	▪ Data and Literature review. ▪ Numerical modelling of tidal inundation for present day and future sea level rise scenarios. ▪ Tidal inundation mapping. ▪ Impact and risk assessment for coastal environment, assets and infrastructure. ▪ Assessment of potential ecological impacts including upslope migration of macrophytes.	$70,000

Component	Overview (more detail is provided in Table 8-3)	Preliminary Cost Estimate
	▪ Assessment of permanent groundwater impacts. ▪ Summary Report.	
Stormwater System Hydraulic Capacity Assessment	▪ Assessment of the future hydraulic capacity of susceptible stormwater networks. ▪ Assessment of the impacts from increased tidal inundation and network hydraulics from sea level rise. ▪ Assess the interaction between stormwater systems and rural drainage systems and floodgate management will also need to be considered under sea level rise scenarios. ▪ Assess risk and develop recommendations for future management and remediation. ▪ Summary Report.	$50,000
Stage 2 CMP Risks, Vulnerabilities and Opportunities Synthesis Report (including Community and Stakeholder Engagement)	▪ Stage 2 Community and Stakeholder Engagement Activities as per the Strategy outlined in Appendix A. ▪ Prepare Summary (and Synthesis) Risks and Vulnerabilities Report for Stage 2 of the CMP, as per requirements of CM Manual. ▪ Submit Draft Report to Council and DPIE for review. ▪ Incorporate changes required by Council and DPIE.	$25,000
	Approx. Stage 2 Subtotal	**$210,000***
Stage 3 - Identify and Evaluate Options		
Options Assessment and Business Plan (including Community and Stakeholder Engagement)	Stage 3 involves the identification and evaluation of management options. This options assessment should include the following, as per the CM Manual: ▪ Identify and collate information on management options. ▪ Evaluate management actions, considering their feasibility, CBA, acceptability to stakeholders. ▪ Select preferred management actions and determine priorities. ▪ Stage 3 Community and Stakeholder Engagement Activities as per the Strategy outlined in Appendix A, including community conversations and online survey. ▪ Engage public authorities about implications for their assets or responsibilities. ▪ Identify pathways and timing of management actions. ▪ Prepare a business plan for implementation.	$60,000
Stage 3 CMP Management Actions Report	▪ Prepare Stage 3 Management Actions Report. ▪ Submit Draft Report to Council and DPIE for review. ▪ Incorporate changes required by Council and DPIE.	$10,000
	Approx. Stage 3 Subtotal	**$70,000**
Stage 4 – Prepare, Exhibit, Finalise and Adopt CMP		
Draft Coastal Management Program	Stage 4 involves the development of the draft CMP document. The CMP should include the following, as per the CM Manual: ▪ Literature and information review.	$45,000

Component	Overview (more detail is provided in Table 8-3)	Preliminary Cost Estimate
	▪ Snapshot of issues (coastal processes, coastal hazards, threats to biodiversity, resilience and integrity of coastal ecosystems and ecological values etc). ▪ Actions to be implemented by Council. ▪ Actions to be undertaken by public authorities. ▪ Business Plan identifying the full capital, operational and maintenance costs, and timing, of coastal management actions. ▪ Development of a coastal zone emergency action subplan (CZEAS) ▪ Mapping of coastal management areas (including any proposed changes to current coastal management areas, or mapping of new coastal vulnerability areas).	
Community and Stakeholder Engagement	Stage 4 Community and Stakeholder Engagement Activities as per the Strategy outlined in Appendix A.	$10,000
Final Coastal Management Program	▪ Update of Draft CMP document in response to comments. ▪ Council approval of changes made by consultant. ▪ Final CMP submitted to Council.	$5,000
	Approx. Stage 4 Subtotal	**$60,000**
	Approx. Total for Stages 2 to 4	**$340,000**

* *This excludes the cost of the Letitia Beach Behaviour Study, which is to be part funded by TSB.*

TABLE 9-2 PRELIMINARY COST PLAN – COBAKI AND TERRANORA BROADWATERS CMP

Component	Overview (more detail is provided in Table 8-4)	Preliminary Cost Estimate
Stage 2 – Determine Risks, Vulnerabilities and Opportunities		
Estuary Process Study and Stage 2 Report	▪ Knowledge review and update of estuary process and hazard knowledge from the Cobaki and Terranora CZMP, including: ▪ Review of available physical data. ▪ Assessment of hydraulic, water quality, morphological and ecological processes. ▪ Update of Bank erosion assessment. ▪ Assess system threats, risks and vulnerability. ▪ Prepare Summary (and Synthesis) Report for Stage 2 of the CMP. ▪ Submit Draft Report to Council and OEH for review. ▪ Incorporate changes required by Council.	$70,000
Community and Stakeholder Engagement	Stage 2 Community and Stakeholder Engagement Activities as per the Strategy outlined in Appendix A.	$15,000
	Approx. Stage 2 Subtotal	**$85,000**
Stage 3 - Identify and Evaluate Options		
Options Assessment and Business Plan (including Community and Stakeholder Engagement)	Stage 3 involves the identification and evaluation of management options. This options assessment should include the following, as per the CM Manual: ▪ Identify and collate information on management options. ▪ Evaluate management actions, considering their feasibility, CBA, acceptability to stakeholders. ▪ Select preferred management actions and determine priorities. ▪ Stage 3 Community and Stakeholder Engagement Activities as per the Strategy outlined in Appendix A, including community conversations and online survey. ▪ Engage public authorities about implications for their assets or responsibilities. ▪ Identify pathways and timing of management actions. ▪ Prepare a business plan for implementation.	$50,000
Stage 3 CMP Management Actions Report	▪ Prepare Stage 3 Management Actions Report ▪ Submit Draft Report to Council and DPIE for review prior to public exhibition. ▪ Incorporate changes required by Council and DPIE.	$10,000
	Approx. Stage 3 Subtotal	**$60,000**
Stage 4 – Prepare, Exhibit, Finalise and Adopt CMP		
Draft Coastal Management Program	Stage 4 involves the development of the draft CMP document. The CMP should include the following, as per the CM Manual: Literature and information review.	$40,000

Component	Overview (more detail is provided in Table 8-4)	Preliminary Cost Estimate
	▪ Snapshot of issues (coastal processes, coastal hazards, threats to biodiversity, resilience and integrity of coastal ecosystems and ecological values etc). ▪ Actions to be implemented by Tweed Shire Council. ▪ Actions to be undertaken by public authorities. ▪ Business Plan identifying the full capital, operational and maintenance costs, and timing, of coastal management actions. ▪ Development of a coastal zone emergency action subplan (CZEAS) ▪ Mapping of coastal management areas (including any proposed changes to current coastal management areas, or mapping of new coastal vulnerability areas).	
Community and Stakeholder Engagement	▪ Stage 4 Community and Stakeholder Engagement Activities as per the Strategy outlined in Appendix A.	$10,000
Draft Coastal Management Program	▪ Update of Draft CMP document in response to comments. ▪ Council approval of changes made by consultant. ▪ Final Coastal Management Program submitted to Council.	$5,000
	Approx. Stage 3 Subtotal	**$55,000**
	Approx. Total for Stages 2 to 4	**$200,000**

9.4 Funding Mechanisms

The above costs associated with delivery of the CMP can be partly funded by the Coastal and Estuary Grants Program administered by DPIE. The program supports coastal and estuary planning projects and the implementation of works identified in certified CZMP's or CMPs. Funding is available under 5 funding streams: a planning stream and four (4) implementation streams.

The development of the CMPs could be partly funded through the planning stream, which provides funding for planning projects that aim to:

- Develop a CMP;
- Transition an existing CZMP into a CMP; and,
- Undertake investigations and designs or cost benefit analyses for infrastructure works recommended in a certified CZMP or CMP.

Furthermore, there is additional incentive for Tweed Shire Council to prepare a CMP - in that future Coastal and Estuary Grants Program funding for the implementation streams will require Council to have a certified CMP.

10 FORWARD PLAN

10.1 Forward Program

10.1.1 Methodology

Councils will be ineligible for funding under the NSW Governments' Coast and Estuary Grant Program (implementation stream) if they do not have a certified CMP by 31 December 2021. A forward program for Tweed Shire Council's delivery of CMPs has been developed based on the required studies and key milestones presented in Section 9. The indicative timing and duration of each Stage of each CMP has been assessed based on the required scope of works provided in Section 9.3, noting that where possible studies can be undertaken simultaneously and/or in parallel.

The timeframes provided below consider the following elements:

- The requirements of the community and stakeholder consultation program;
- Timing around Coast and Estuary Grant acquisition; and
- The required timeframes for procurement and facilitation of consultants to undertake the work.

The timing provided herein has assumed that Council will engage a consultant to undertake Stages 2 to 4 as a single package of works (for each CMP) – as has been common across initial state-wide rollout of CMPs so far. If consultants are to be engaged for Stages 2 to 4 as individual packages of work, then additional time will be required in the forward program (for each stage) for the following:

- Preparation of project brief;
- Release of the brief for professional services; and
- The tender process and engagement of a consultant.

Given the uncertainties associated with the above components of the two CMPs, the timing provided in the Forward Plan should be considered as indicative only – for the purposes of providing an approximate assessment of where the various project stages are likely to sit within Councils IP&R framework.

10.1.2 Rationale for CMP Development Order

As discussed in Section 1.5, the suite of CMPs across the Tweed Shire LGA has been discretised into three (3) separate programs (refer to Figure 1-9 and Figure 1-11). CMP for the Tweed River Estuary has been developed and is to be finalised in 2020 (Hydrosphere, 2019). Therefore, consideration needs to be given to the timing of the remaining two CMPs for the Tweed Coast and Coastal Estuaries, and the Cobaki and Terranora Broadwaters. Council resources (staff and funding) are such as it has only limited capacity to take on multiple CMPs at a given time. Therefore, a staged approach is recommended.

The order of staging should consider prioritisation of the risks and threats across the coastal zone that are outlined in this Scoping Study. Based on the size of each study area, and the magnitude of risks across each, it is recommended that the Tweed Coast and Coastal Estuaries CMP should be prioritised and developed first. The CMP for Terranora and Cobaki can commence at a later date in order to enable focus on finishing the initial Stages of the CMP for the Coast and Coastal Estuaries.

Following certification of the CMP, a planning proposal will be prepared – see Section 10.3.

10.1.3 Forward Plan

The forward plan for the CMP's are provided in Table 10-1 and Table 10-2 below.

TABLE 10-1 FORWARD PROGRAM FOR TWEED COAST AND COASTAL ESTUARIES CMP

CMP Stage	Indicative Cost	Indicative Duration	Indicative IP&R Delivery Plan	Indicative IP&R Operational Plan
Stage 2 – Determine Risks, Vulnerabilities and Opportunities	**$210,000**	**Jun-20 to Jun-21 (9-12 months)**	**2017-2021**	**2020/21**
Coastline Erosion Hazard Mapping Update	$40,000	2 months	2017-2021	2020/21
Coastal Geotechnical Instability Assessment	$25,000	1 month	2017-2021	2020/21
Fingal Beach Processes Study	$30,000*	2 months	2017-2021	2020/21
Coastal Estuaries Tidal Inundation and Sea Level Rise Study and Risk Assessment	$70,000	2 months	2017-2021	2020/21
Stormwater System Hydraulic Capacity Assessment	$50,000	3 months	2017-2021	2020/21
Stage 2 CMP Risks, Vulnerabilities and Opportunities Synthesis Report (including community consultation)	$25,000	2 months	2017-2021	2020/21
Stage 3 – Identify and Evaluate Options	**$70,000**	**Jul-21 to Mar-22 (6-9 months)**	**2021-2025**	**2021/22**
Options Assessment and Business Plan	$60,000	4 months	2021-2025	**2021/22**
Stage 3 CMP Management Actions Report	$10,000	2 months	2021-2025	**2021/22**
Stage 4 – Prepare, Exhibit, Finalise and Adopt CMP	**$60,000**	**Apr-22 to Jan-23 (6-9 months)**	**2021-2025**	**2021/22**
Draft Coastal Management Program	$45,000	3 months	2021-2025	**2021/22**
Community and Stakeholder Engagement	$10,000	2 months	2021-2025	**2022/23**
Final Coastal Management Program	$5,000	1 month	2021-2025	**2022/23**
Total	**$340,000**	**1.5-2.5 yrs**	**As above**	**As above**

* *This excludes the cost of the Letitia Beach Behaviour Study, which is to be part funded by TSB.*

TABLE 10-2 FORWARD PROGRAM FOR COBAKI AND TERRANORA BROADWATERS CMP

CMP Stage	Indicative Cost	Indicative Duration	Indicative IP&R Delivery Plan	Indicative IP&R Operational Plan
Stage 2 – Determine Risks, Vulnerabilities and Opportunities	**$85,000**	**Sep-21 to Jun-22 (6-9 months)**	**2021-2025**	**2021/22**
Estuary Process Study and Stage 2 Report	$70,000	6 months	**2021-2025**	**2021/22**
Community and Stakeholder Engagement	$15,000	1 month	**2021-2025**	**2021/22**
Stage 3 – Identify and Evaluate Options	**$60,000**	**Jul-22 to Mar-22 (6-9 months)**	**2021-2025**	**2022/23**
Options Assessment and Business Plan	$50,000	4 months	2021-2025	**2022/23**
Stage 3 CMP Management Actions Report	$10,000	2 months	2021-2025	**2022/23**
Stage 4 – Prepare, Exhibit, Finalise and Adopt CMP	**$55,000**	**Apr-23 to Dec-23 (6-9 months)**	**2021-2025**	**2022/23**
Draft Coastal Management Program	$40,000	3 months	2021-2025	**2022/23**
Community and Stakeholder Engagement	$10,000	2 months	2021-2025	**2023/24**
Final Coastal Management Program	$5,000	1 month	2021-2025	**2023/24**
Total	**$200,000**	**1.5-2.5 yrs**	**As above**	**As above**

10.2 Potential for Fast-Tracking

Potential options for fast tracking during Stage 3 have not been identified for either CMP. The reasons for this are as follows:

- Each CMP will require new/additional studies regarding coastal hazards and estuary health pressures. Therefore, this represents an opportunity the undertake a renewed, holistic assessment. Furthermore, actions identified in previous management plans should be reviewed in light of the findings of technical studies undertaken in Stage 2.
- Existing management plans of significant are generally been in place for 6 years or more. Therefore, these studies are reaching a natural point where management actions should be periodically reviewed and reconsidered, and Stage 3 of the CMP represents an opportunity to undertake this in an integrated and holistic approach:
  - Tweed Coastline Management Plan (2005)
  - CZMP for Cobaki Broadwater and Terranora Broadwater (2010)
  - Tweed Coast Estuaries CZMP (2013)
  - The Kingscliff – Dreamtime Beach Coastal Zone Management Plan (2017)

10.3 Planning Proposals

The mechanism by which a LEP is made or amended is via a ***planning proposal*** – which is a document that explains the intended effect of a proposed local environmental plan (LEP) and sets out the justification for making that plan (DPE, 2016).

Sections 3.33 to 3.37 of the EP&A Act outline the processes, including the preparation of a document explaining the intended effect and the justification for the proposal. The Act requires that a planning proposal includes stated objectives, an explanation of the provisions to be included in the instrument (in this case the LEP), the justification of those provisions, details of community consultation undertaken, and maps which show the proposed application of the changes.

To assist this process, DPIE has published a *Guide to Preparing Planning Proposals* (DPE, 2016) which outlines the requirements in respect of content and process for a planning proposal.

As part of this process, The Minister for Planning (or their delegate) can issue a Gateway determination. It specifies whether a planning proposal is to proceed and if so, in what circumstances. The purpose of the Gateway determination is to ensure there is sufficient justification early in the process to proceed with a planning proposal. The Gateway determination will confirm the information (which may include studies) and consultation required before the LEP can be finalised.

TABLE 10-3 PLANNING PROPOSAL OVERVIEW FOR COASTAL MANAGEMENT AREAS

Coastal Management Area	Planning Proposal Overview at Stage 1 of CMP
Coastal Environment Area	The Stage 1 Scoping Study has not yet identified that the CM SEPP Maps for these coastal management areas need to be amended. However, this will be assessed in more detail in Stages 2 to 4 of the CMP process.
Coastal Use Area	
Coastal Wetland or Littoral Rainforest	

Coastal Management Area	Planning Proposal Overview at Stage 1 of CMP
Coastal Vulnerability Area	At the time of preparing this Scoping Study, there was no map published under the CM SEPP to identify the CVA in the Tweed Shire LGA. Therefore, a planning proposal will be required to prepare an LEP which declares a map (based on the outcomes of the CMP) to be a CVA for the purposes of the CM SEPP in Tweed Shire LGA.

10.4 Implementation

Following approval of the Stage 4 of each CMP document, Stage 5 will be implemented by Council via Councils IP&R framework, and the Tweed Shire Council Community Strategic Plan 2017–2027. This framework will guide the implementation of the CMP and ensure all required monitoring and reporting is completed - and will provide a framework for the review and assessment of CMP outcomes. Figure 10-1 below shows how the CMP process informs, and is informed by, the elements of the IP&R framework as per the CM Manual.

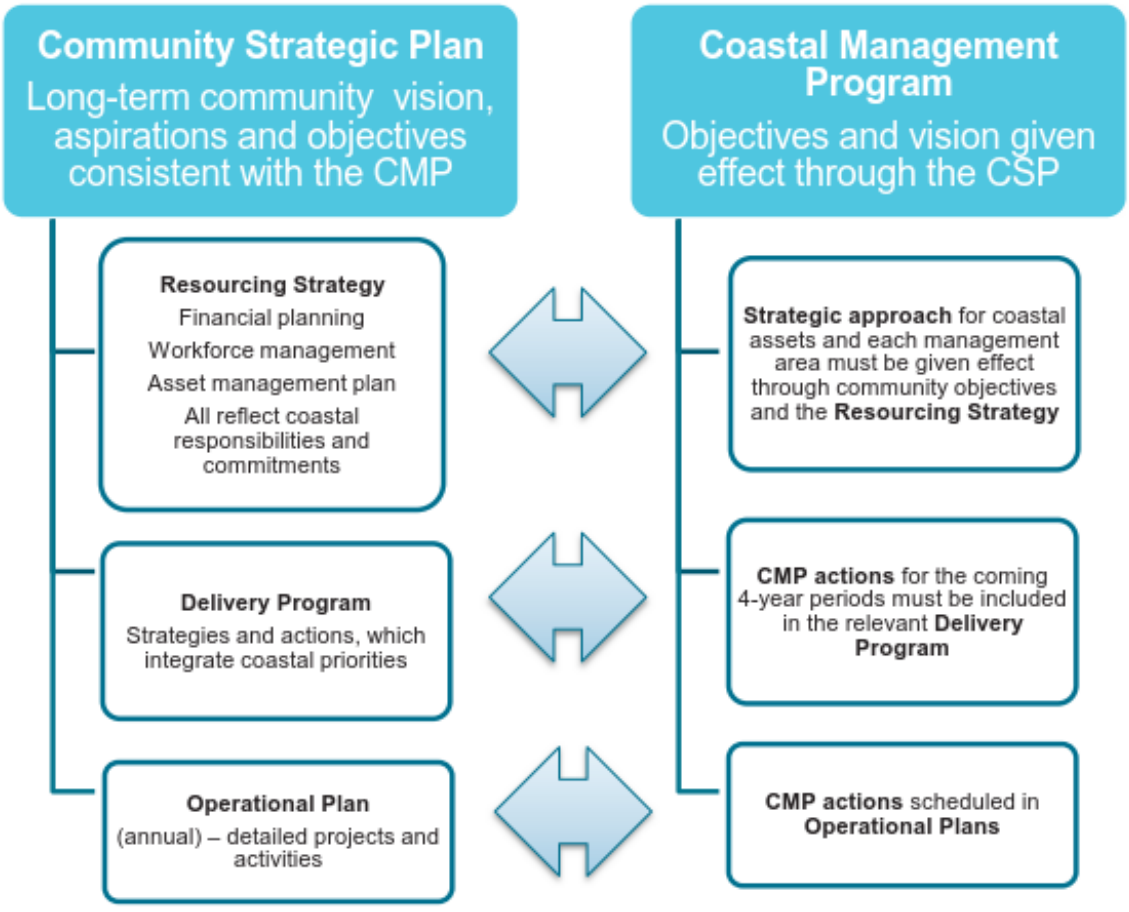

FIGURE 10-1 RELATIONSHIP BETWEEN ELEMENTS OF THE IP&R FRAMEWORK AND THE CMP (SOURCE:NSW COASTAL MANAGEMENT MANUAL)

11 REFERENCES

Adapt NSW (2019) *Impacts of climate change.* Accessed online at https://climatechange.environment.nsw.gov.au/Impacts-of-climate-change

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WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

APPENDIX A
COMMUNITY AND STAKEHOLDER ENGAGEMENT PLAN

WATER TECHNOLOGY
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Tweed Shire Coastal Management Program

Community and Stakeholder Engagement Strategy

Tweed Shire Council

24 February 2020

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24 February 2020

Jane Lofthouse
Unit Coordinator Natural Resource Management
Tweed Shire Council
Via email janel@tweed.nsw.gov.au

Dear Jane

Community and Stakeholder Engagement Strategy

Please find attached our Community and Stakeholder Engagement Strategy – which has been prepared as part of the Tweed Coastal Management Program (CMP) Stage 1 Scoping Study.

Water Technology welcomes the opportunity to respond to a review of the strategy by Council. If you have any queries, please do not hesitate to contact me at any time.

Yours sincerely

Chris Beadle
Senior Coastal Engineer
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WATER TECHNOLOGY PTY LTD

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1 INTRODUCTION

1.1 Background

The NSW Government has recently established a modern and integrated coastal management framework in order to better equip coastal communities to respond to existing and future coastal management challenges (DPIE, 2019). As part of this framework, the NSW government is encouraging local governments to prepare Coastal Management Programs (CMP) to assist in the integrated management of the state's various coastlines and estuaries.

The Tweed Shire coastal zone is a major social, environmental and economic asset for Tweed Shire Council (Council). It contains beautiful iconic beaches, sprawling estuaries and areas of significant social and cultural significance. Along with being a key economic driver for the region, the coastal zone also contains a passionate local community, who are heavily invested in its utility and management. However, the system is facing increasing pressures from population growth, urbanisation and climate change. Therefore, the CMP process will set the long-term strategy for the management of its coastline and estuaries, in order to maintain and enhance their social, economic and environmental values.

The CMP process will be a vehicle for the coordinated and strategic management of the coastal zone, that can effectively address system-wide issues and risks, and promote coordination & collaboration across government agencies (DPIE, 2019).

Council is required to prepare a CMP for its LGA coastal zone – which will be undertaken through a five-stage risk management procedure described in the State Government's Coastal Management Manual, as depicted in Figure 1-1. The development of the program will include extensive engagement with the local community and user groups, relevant government agencies, and neighbouring councils. The intent is for Council to have the full CMP process finalised and in place by the end of 2021.

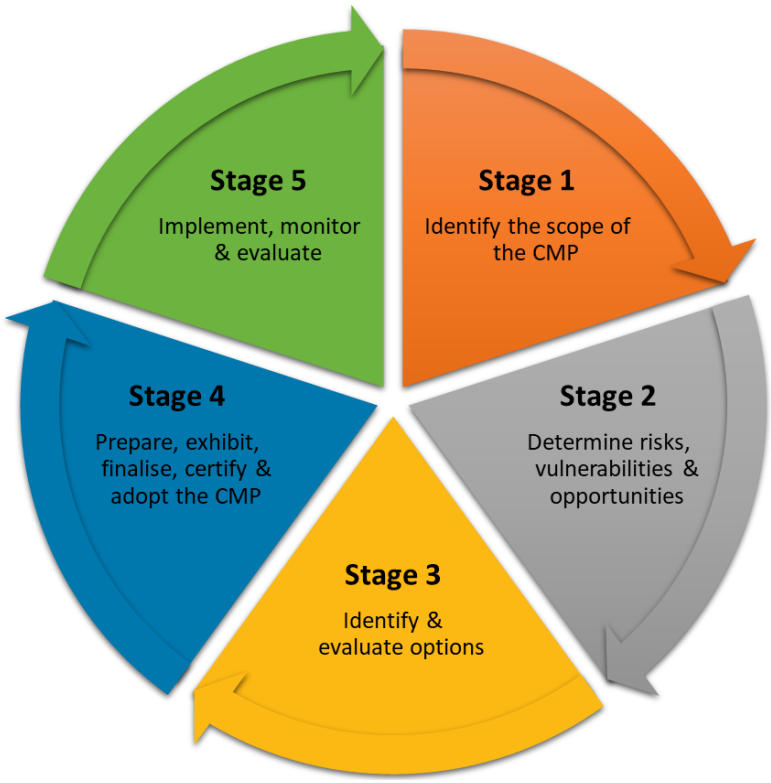


FIGURE 1-1 THE NSW CMP PROCESS

Tweed Shire Council are presently at Stage 1 in the CMP process. The primary purpose of a Stage 1 Scoping Study is to:

- Review the history of managing the coastal zone;
- Develop a shared understanding of the current situation; and
- Identify the focus of the new CMP.

Stage 1 builds on and integrates with previous work, including existing plans and strategies, technical studies and stakeholder input. It guides council in formulating appropriate strategies and actions in later stages of the process (Stages 2 to 5).

Effective engagement and communication are important aspects of a successful CMP. A key component of this Stage 1 Scoping Study is the development of a Community and Stakeholder Engagement Strategy. This strategy outlines which organisations should be involved in the preparation and implementation of the CMP, how they will be offered engagement opportunities, and how their input will be incorporated into the planning process.

1.1.1 The Tweed CMP Process

As per the Scoping Study (Water Technology, 2020), Tweed Shire Council have determined that the CMP process for their LGA will comprise a suite of three (3) discrete programs as depicted in Figure 1-2 below.

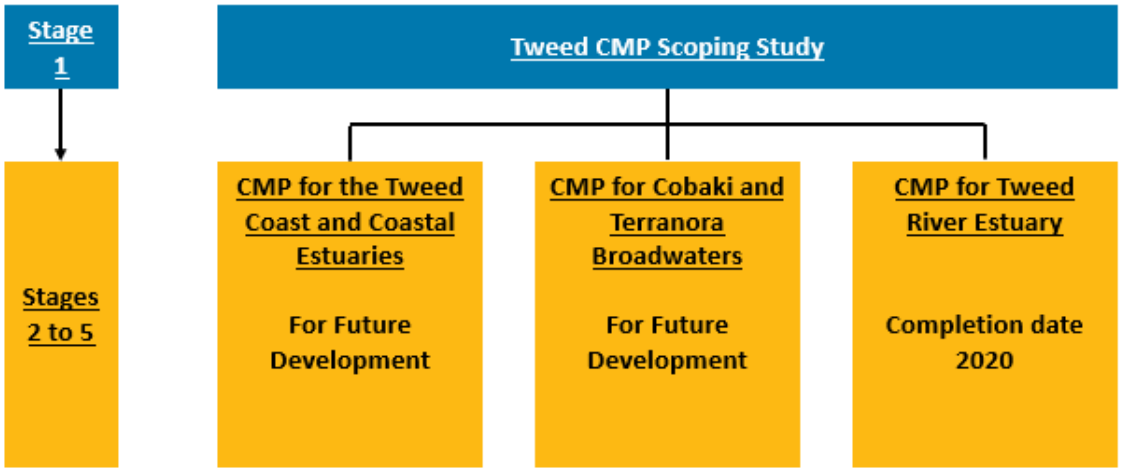


FIGURE 1-2 STRUCTURE OF TWEED CMPS

The first of these, the Tweed River Estuary CMP has been developed and is to be finalised in 2020. Therefore, this Community and Stakeholder Engagement Strategy is to apply to each of the remaining two (2) CMPs:

- The Tweed Coast and Coastal Estuaries CMP;
- The Cobaki and Terranora Broadwaters CMP

1.2 The Stakeholder Engagement Strategy

Section 16 of the Coastal Management Act 2016 requires that all NSW Council's consult the community and relevant stakeholders before and during the CMP process. In order to ensure an effective and targeted consultation process, a Community and Stakeholder Engagement Strategy is to be prepared during the Stage 1 Scoping Study. The purpose of the strategy is to identify relevant stakeholders, and determine the structure and pathways for their engagement through the multi-staged CMP process.

This strategy has been prepared in accordance with the requirements of, and for consistency with, the following documents:

- *The Tweed Community Engagement and Participation Plan (TSC, 2019)*
- *The Tweed Shire Council Community Strategic Plan 2017–2027 (TSC, 2017)*
- *The NSW Coastal Management Manual - Guidelines for community and stakeholder engagement in coastal management (OEH, 2018)*
- *The International Association of Public Participation (IAP2) documentation*

The overarching objectives of the community and stakeholder engagement strategy for the CMP are:

- To assist Council in gaining internal buy-in for development of the CMP;
- To gain external buy-in from relevant organisations who will be involved in the CMP development and ongoing implementation;
- To ensure all stakeholders have up to date information about the CMP, and the broader coastal management framework that supports the project; and
- To provide the community and relevant stakeholders the opportunity to have direct input into the development and delivery of the CMP.

It is important to note the engagement approach provided in this strategy should be considered adaptive and flexible, and if necessary, can be further refined during latter stages of the CMP process.

1.3 Requirements of the Strategy

The NSW Coastal Management Manual recommends that the scoping study includes a community and stakeholder engagement strategy. The strategy should outline (as per OEH, 2018):

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

This Strategy has been prepared in accordance with the requirements of CM Act and the Coastal Management Manual.

1.4 Summary of Stage 1 Stakeholder Engagement

An initial round of stakeholder engagement has already been undertaken during the development of the Stage 1 Scoping Study. This took the form of a stakeholder engagement workshop, which was held on Wednesday 24 July 2019 at Council's Murwillumbah Administration Office. The workshop included an initial presentation by Water Technology to provide background and context of the CMP process, and was then followed by a series of round-table discussion sessions that were intended to inform key aspects of the Scoping Study.

The purpose of the workshop was to:

- Communicate the strategic context and drivers of the CMP to participants;
- Confirm management roles and responsibilities across the coastal zone;
- Identify key coastal management issues, including historical, present day and emerging/future; and
- Identify any tacit knowledge or non-documented issues and/or risks.

Organisations in attendance included:

- Tweed Shire Council - including officers responsible for sustainability and environment, biodiversity, recreation, parks and open space, stormwater and wastewater;
- DPIE (Crown Lands);
- DPIE (NSW National Parks and Wildlife Service);
- DPIE (Fisheries); and
- Byron Shire Council.

Notably, a series of scheduling conflicts prevented attendance from some representatives from the Department of Planning, Industry and Environment (DPIE). Representatives from several other organisations were invited to attend but were not able to, including the Transport for NSW (NSW Maritime), Tweed Byron Local Aboriginal Land Council, Gold Coast City Council and the Tweed River Entrance Sand Bypassing Company (TRESBPCo). A full summary of the Stage 1 Engagement Workshop is provided in Appendix D of the Stage 1 Scoping Study Document (Water Technology, 2020).

2 STAKEHOLDER IDENTIFICATION & ANALYSIS

2.1 Project Governance Structure

The NSW Coastal Management Framework provides for some flexibility around the structure and governance arrangements of a CMP. The lead applicant for CMP development will be Tweed Shire Council. It is recommended that Council will retain ownership of the process and be responsible for day-to-day management of the CMP.

The development and implementation of the Tweed Open Coasts and Estuaries and the Cobaki and Terranora Broadwaters CMPs will require engagement and coordination across a range of relevant agencies and organisations. Therefore, it is imperative that the CMP governance structure foster and facilitate collaboration across these agencies.

To this end, a recommended governance structure for the CMP is provided in Figure 2-1. It is recommended that the governance structure for each CMP includes a Project Advisory Group (PAG). The PAG will be comprised of a range of stakeholders from the Tweed Coast and Waterways Committee with management roles and responsibilities across the Tweed LGA coastal zone and catchment land. These stakeholders are listed in Figure 2-1.

The purpose of the PAG will be to:

- Provide input into the technical aspects of the project;
- Exchange information and data where relevant and available; and
- Inform and support decision making regarding technical and managerial matters.

In addition to the PAG, a group of Key Referral Agencies will also be utilised – comprising representatives from a series of state government agencies, whose various roles and responsibilities across the study area are discussed in Section **Error! Reference source not found.** of the Scoping Study (Water Technology, 2020). The referral agencies will provide technical advice and information, as well as the provision of decision-making support for technical aspects of the project. As Stages 2 and 3 evolve, additional agencies may be consulted if required.

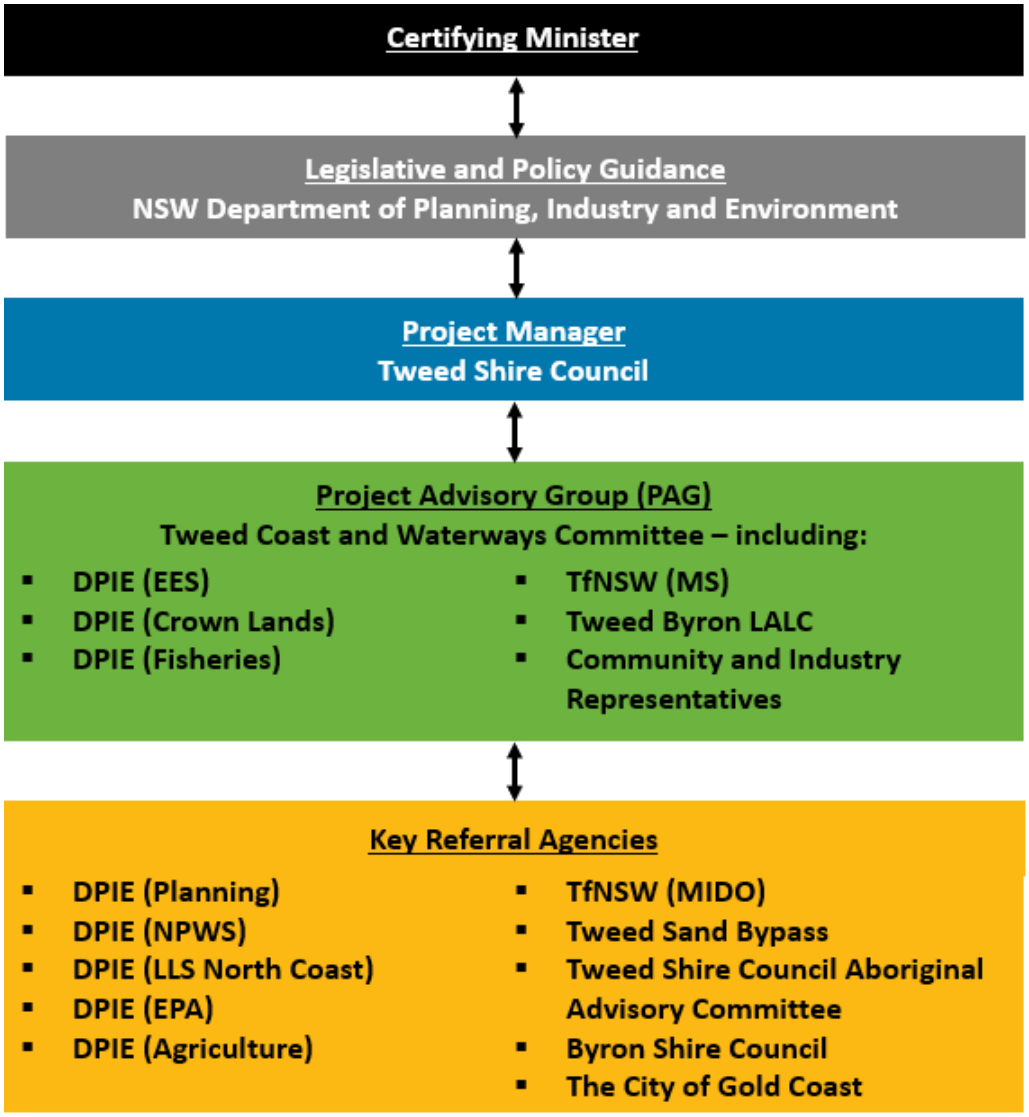


FIGURE 2-1 PROPOSED CMP GOVERNANCE STRUCTURE (SOURCE: WATER TECHNOLOGY, 2020)

2.2 Internal Stakeholders

Internal stakeholders are those who are part of the decision-making team. The Project Advisory Group (PAG) will be comprised of the Tweed Coast and Waterways Committee (TCWC), which includes of representatives from:

- Tweed Shire Council;
- The NSW Department of Planning, Industry and Environment (DPIE);
- Transport for NSW (Maritime Services);
- Tweed Byron Local Aboriginal Land Council; and
- Representatives of localities, industry and interest groups.

Members of the Steering Committee are invited to take part in all engagement activities. Practically, it may be that a subset of members is involved in each, and this is reported back to the group during the Steering Committee meetings. Outcomes and summaries of each engagement activity would be incorporated into the overall project deliverables and included in progress updates to Councils project manager.

2.3 External Stakeholders

External stakeholders are those that are not decision-makers, but who are affected by the project. They might live near the coast, use an asset or resource located in the coastal zone, or simply have an interest in the coastal foreshore reserve. Some external stakeholders have been identified below; each engagement activity will be publicly advertised to ensure those not captured below still have an opportunity to engage.

2.3.1 State Government Agencies

A number of NSW state government agencies will play a role in this project. A major stakeholder will be DPIE. The Scoping Study has identified seven (7) agencies within the broader DPIE structure that should be engaged as stakeholders, including:

- DPIE - Environment, Energy and Science (EES)
- DPIE - Planning and Assessment (Planning)
- DPIE - Crown Lands and Water (Crown Lands)
- DPIE - NSW Fisheries (Fisheries)
- DPIE - Local Land Services North Coast (LLS)
- DPIE - National Parks and Wildlife Services (NPWS)
- DPIE - Environmental Protection Agency (EPA)

Additional NSW Government agencies include:

- The Marine Estate Management Authority (MEMA)
- The Marine Infrastructure Delivery Office (MIDO)
- Transport for NSW (TfNSW)
- The NSW State Emergency Service (SES)

2.3.2 Other Key Stakeholder Organisations

Other key internal stakeholders include the following organisations and agencies:

- Tweed Byron Local Aboriginal Land Council (TBLALC)
- Neighbouring Councils, including Byron Shire Council and The City of Gold Coast
- The Tweed River Entrance Sand Bypassing Company (TRESBPCo)

It will be particularly important to engage with local indigenous communities throughout the CMP process. During the process, Council should liaise with TBLALC in order to identify appropriate pathways and avenues for engagement. However, it is recognised that the TBLALC may be limited in the extent that it represents the interests of the local indigenous people. Engaging successfully with local indigenous communities will require an appreciation of indigenous history, cultures and contemporary social dynamics (Hunt, 2013). The engagement strategy provided in Section 4 provides for opportunities through one-on-one or small group interviews, where deemed preferable or more appropriate. Further mechanisms to engage with indigenous communities can be drawn from *Sea countries of New South Wales: a benefits and threats analysis of Aboriginal people's connections with the marine estate* (Feary et al, 2015).

2.3.3 Community and User Groups

A range of stakeholders have been identified through the Scoping Study analysis, and with reference to the Tweed *Community Engagement and Participation Plan 2019-2024* and NSW Coastal Management Manual. These stakeholders are listed in Table 2-1. Please note that this list should be considered non-exhaustive and additional community and user groups may be engaged if considered appropriate.

TABLE 2-1 COMMUNITY AND USER GROUPS

Stakeholder Type	Stakeholders	
Ratepayers	▪ Individual residents and ratepayers	▪ Non-resident ratepayers
Resident & Community Advocacy Groups	▪ Banora Point & District Residents Association ▪ Burringbar Community Association ▪ Cabarita Beach / Bogangar Residents Association ▪ Casuarina Salt Seaside Residents Association (CASSRA) ▪ Chillingham Community Association ▪ Chinderah and District Residents Association ▪ East Banora Residents Association ▪ Fingal Head Community Association ▪ Terranora Residents Committee/ Friends of Terranora ▪ Hastings Point Residents Group and Progress Association ▪ Kingscliff Ratepayers and Progress Association	▪ Mooball and District Moovers ▪ Murwillumbah Ratepayers and Residents Association ▪ Oxley Cove Community Group ▪ Piggabeen and Cobaki Progress Association ▪ Pottsville Community Association Inc ▪ Salt Village Residents Association Inc ▪ Terranora Residents Committee/Friends of Terranora ▪ Tweed District Residents and Ratepayers Association ▪ Tumbulgum Community Association ▪ Tyalgum District Community Association ▪ Uki Village and District Residents Association
Environmental and Conservation Groups	▪ Burringbar and Mooball Catchment Landcare Group (Tweed Landcare) ▪ BirdLife Northern Rivers ▪ Cabarita Beach Community Dune Care ▪ Fingal Head Coastcare Inc	▪ Friends of Cook Island Aquatic Reserve ▪ Hastings Point Dune Care Group ▪ Pottsville Community Dune Care Group ▪ Tweed Landcare Inc ▪ Tweed Valley Wildlife Carers

Stakeholder Type	Stakeholders	
Business Organisations	▪ Tweed Chamber of Commerce & Industry Inc ▪ Tweed River Charter Operators Association Inc. ▪ Pottsville Beach Business Association	▪ Kingscliff and District Chamber of Commerce ▪ Caravan and Camping Industry Association - Tweed Branch ▪ Caba Progressive
Agricultural Groups	▪ Combined Tweed Rural Industries Association ▪ Tweed Branch of NSW Cane Growers Association	▪ Tweed Fruit and Vegetable Growers Association Inc
Community Recreational Groups	▪ Fingal Rovers SLSC ▪ Cudgen SLSC ▪ Surfing NSW ▪ Salt Beach SLSC ▪ Cabarita SLSC ▪ Black Rocks Boardriders Club	▪ Cabarita Boardriders Club ▪ Dbah Boardriders ▪ Kingscliff Boardriders Club ▪ Tweed Aboriginal Corporation for Sport ▪ Tweed Valley Sailing Club
Commercial Boating and Tourism Operators	▪ Aquatic Blue Charters ▪ Brad Smith's Fishing Charters - Tweed River ▪ Catch a Crab Boat Tours ▪ Coolangatta Whale Watch ▪ Cushy Fishing Charters ▪ Down Under Charters Tweed Heads ▪ Kirra Dive on the Tweed	▪ Life Of Water ▪ Mount Warning Tours ▪ Northern Rivers Sportfishing ▪ Reelfishn Charters ▪ Tweed Eco Cruises ▪ Tweed Endeavour Cruises Pty Ltd ▪ Tweed Gold Coast Dive Charters ▪ Tweed River Shore Dives ▪ Tweed Sea Sports
Commercial Fishers and Aquaculture Farmers	▪ XL Oysters ▪ Steinhardt's Oysters	▪ Brunswick Seed Oysters ▪ Birds Bay Oyster Farm

2.4 Stakeholder Analysis Matrix

A preliminary stakeholder analysis has been undertaken in the development of this strategy, for both internal and external stakeholders. For this task, each stakeholder has been assessed for the following indicators as recommended by the International Association of Public Participation (IAP2):

- The benefits of their involvement – that is, what can the stakeholder bring to the project that is of benefit? This includes:
  - Provision of data and information
  - Understanding of key issues
  - Knowledge and input re: operational & managerial processes
  - Feedback and review
- The level of interest in the final outcomes of the project;

- The level of influence that the stakeholder will have on the final outcomes; and
- The level of impact that the project will have on the stakeholder group.

Results are provided in Table 2-2 below.

TABLE 2-2 STAKEHOLDER ANALYSIS

Stakeholder Group	Benefits of Involvement				Level of Interest	Level of Influence	Level of Impact
	Provision of Data and Information	*Understanding of Key Issues*	*Knowledge and Input regarding Managerial Processes*	*Feedback and Review*			
Tweed Shire Council	✓	✓	✓	✓	High	High	High
DPIE							
EES	✓	✓	✓	✓	High	High	High
Crown Lands	✓	✓	✓	✓	High	High	High
Fisheries	✓	✓	✓	✓	High	High	High
LLS	✓	✓	✓	✓	High	High	High
NPWS	✓	✓	✓	✓	High	High	High
EPA	✓	✓	✓	✓	Moderate	Moderate to High	Moderate
Additional NSW Government Agencies							
MEMA	✓	✓	✓	✓	High	Moderate	High
MIDO	✓	✓	✓	✓	High	Moderate	High
TfNSW	✓	✓	✓	✓	High	Moderate	High
Additional Stakeholders							
TBLALC	✓	✓	✓	✓	High	High	High
Byron Shire Council		✓	✓		Moderate	Moderate	Low
City of Gold Coast		✓	✓		Moderate	Low	Moderate
TRESBPCo	✓	✓	✓	✓	High	Moderate	High
Community and User Groups							
Residents / Ratepayers	✓	✓		✓	High	Low to Moderate	High
Commercial Boating and Tourism Operators	✓	✓	✓	✓	High	Moderate	High
Commercial Fishers and Aquaculture Farmers	✓	✓	✓	✓	High	Moderate	High
Environmental and Conservation Groups	✓	✓	✓	✓	High	Low to Moderate	High
Resident Groups	✓	✓	✓	✓	High	Low to Moderate	High
Agricultural Groups	✓	✓	✓	✓	High	Low to Moderate	High
Community Groups	✓	✓	✓	✓	High	Low to Moderate	High

3 ENGAGEMENT APPROACH

3.1 Level of Consultation

As per Council's Community Engagement and Participation Plan (CEPP)and the IAP2 Spectrum of Public Participation, levels of engagement have been defined as the following:

- **Inform** stakeholders about the outcomes of the hazard assessment and the risks identified through the project.
- **Consult** with stakeholders on the draft CMP.
- **Involve** stakeholders in assessing the management actions presented.
- **Collaborate** with stakeholders to determine the level of risk tolerance, community values attributed to coastal assets and to identify potential management actions.

Each phase of consultation is assigned a level of consultation, allowing the consultation activity to be scoped appropriately. At the commencement of each activity, the level of influence their contribution will have on the overall outcome should be clearly defined. Managing stakeholder expectations regarding their involvement will assist with ownership and acceptance of the CMP.

Levels of impact increase as per Figure 3-1, adapted from IAP2.

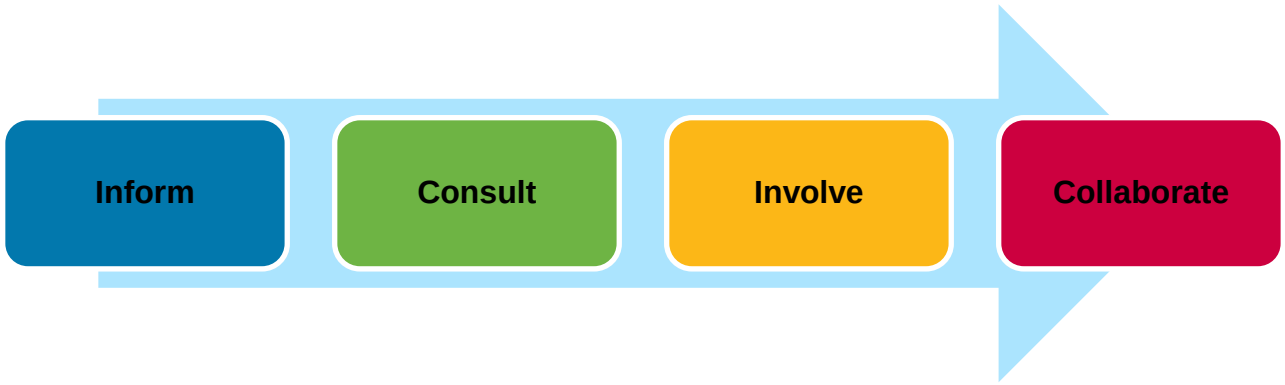
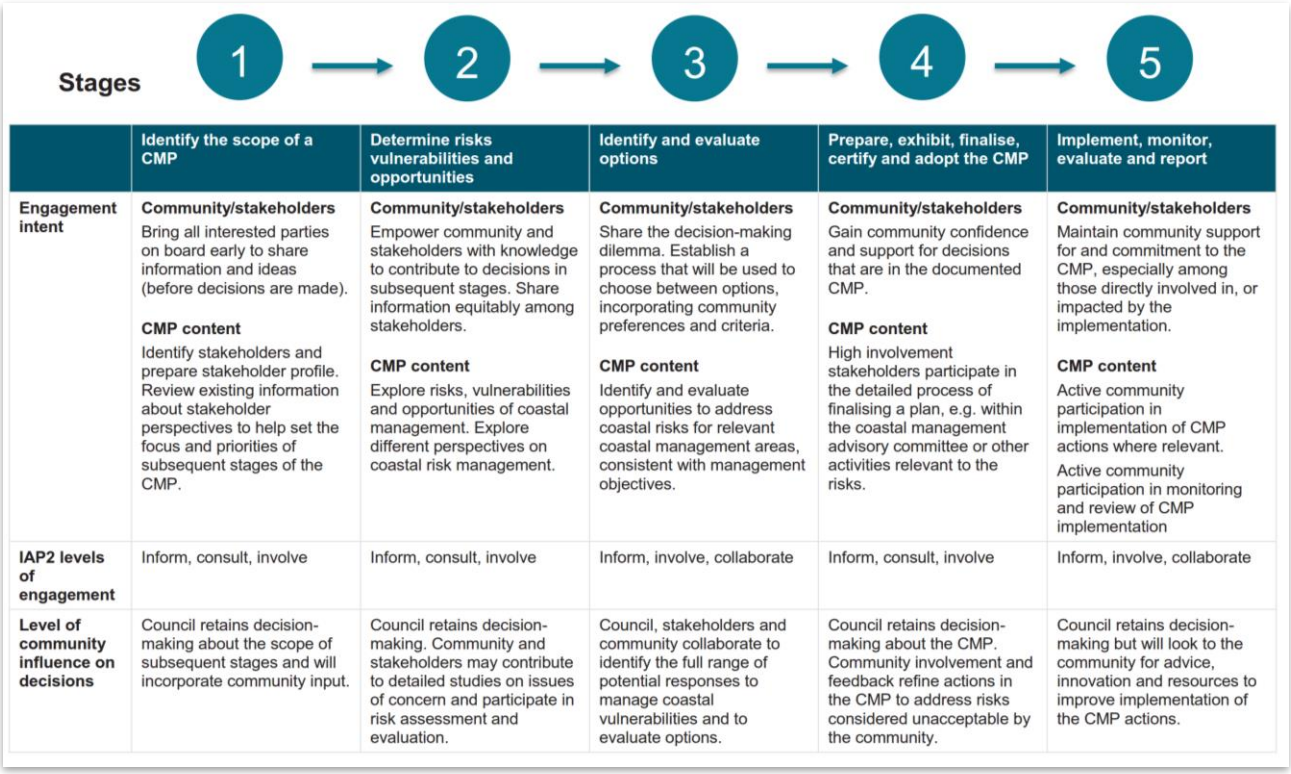


FIGURE 3-1 IAP2 SPECTRUM OF PUBLIC PARTICIPATION; IMPACT ON THE DECISION INCREASES FROM LEFT TO RIGHT

3.2 Coastal Management Manual Guidance

The NSW Coastal Management Manual - Guidelines for community and stakeholder engagement in coastal management (OEH, 2018) provides a generic overview of the requirements for engagement at each of the CMP stages - and a summary of these are provided in Figure 3-2 below. The messaging, methods and logistics within this strategy are consistent with this framework.



	Identify the scope of a CMP	Determine risks vulnerabilities and opportunities	Identify and evaluate options	Prepare, exhibit, finalise, certify and adopt the CMP	Implement, monitor, evaluate and report
Engagement intent	**Community/stakeholders** Bring all interested parties on board early to share information and ideas (before decisions are made). **CMP content** Identify stakeholders and prepare stakeholder profile. Review existing information about stakeholder perspectives to help set the focus and priorities of subsequent stages of the CMP.	**Community/stakeholders** Empower community and stakeholders with knowledge to contribute to decisions in subsequent stages. Share information equitably among stakeholders. **CMP content** Explore risks, vulnerabilities and opportunities of coastal management. Explore different perspectives on coastal risk management.	**Community/stakeholders** Share the decision-making dilemma. Establish a process that will be used to choose between options, incorporating community preferences and criteria. **CMP content** Identify and evaluate opportunities to address coastal risks for relevant coastal management areas, consistent with management objectives.	**Community/stakeholders** Gain community confidence and support for decisions that are in the documented CMP. **CMP content** High involvement stakeholders participate in the detailed process of finalising a plan, e.g. within the coastal management advisory committee or other activities relevant to the risks.	**Community/stakeholders** Maintain community support for and commitment to the CMP, especially among those directly involved in, or impacted by the implementation. **CMP content** Active community participation in implementation of CMP actions where relevant. Active community participation in monitoring and review of CMP implementation
IAP2 levels of engagement	Inform, consult, involve	Inform, consult, involve	Inform, involve, collaborate	Inform, consult, involve	Inform, involve, collaborate
Level of community influence on decisions	Council retains decision-making about the scope of subsequent stages and will incorporate community input.	Council retains decision-making. Community and stakeholders may contribute to detailed studies on issues of concern and participate in risk assessment and evaluation.	Council, stakeholders and community collaborate to identify the full range of potential responses to manage coastal vulnerabilities and to evaluate options.	Council retains decision-making about the CMP. Community involvement and feedback refine actions in the CMP to address risks considered unacceptable by the community.	Council retains decision-making but will look to the community for advice, innovation and resources to improve implementation of the CMP actions.

FIGURE 3-2 OEH (2018) RECOMMENDED ENGAGEMENT APPROACH

3.3 Objectives of the Strategy

The objectives of the strategy are split below in Table 3-1 across the various stages of the CMP.

TABLE 3-1 STRATEGY OBJECTIVES BY CMP STAGE (AS PER OEH, 2018)

Stage	Purpose	Engagement Level
Stage 1: Identify the scope of the CMP *(IN PROGRESS)*	▪ Identifies stakeholders. ▪ Gather information from stakeholders regarding coastal zone values, threats and risks to inform the first-pass risk assessment ▪ Establish the roles and responsibilities of the organisations acting across the coastal zone (across all levels of government) ▪ Develop the Community & Stakeholder Engagement Strategy.	▪ Inform ▪ Consult
Stage 2: Determine risks, vulnerabilities and opportunities	▪ Build awareness in the community of the coastal risks, vulnerabilities and opportunities so as to consider management options and actions in Stage 3. ▪ Development of the success criteria for the CMP. That is, what are the coastal values, and what corresponding risks are tolerable / intolerable to the community. ▪ Obtain additional information from the stakeholders on coastal hazards.	▪ Inform ▪ Collaborate ▪ Involve

Stage	Purpose	Engagement Level
Stage 3: Identify and evaluate options	▪ Community and stakeholders have a strong understanding of potential management options, and their cost and benefits ▪ Obtain input and feedback on the management options from internal and external stakeholders – Feedback covers options, beneficiaries and costs ▪ Any changes to CM SEPP coastal management mapping has been communicated. ▪ Options to be prioritised with regard to the success criteria and their level of risk.	▪ Inform ▪ Involve ▪ Collaborate
Stage 4: Prepare, exhibit, finalise, certify and adopt the CMP	▪ Develop support amongst community and stakeholders for management actions and priorities in the CMP. ▪ Garner support amongst public authorities and organisations for the roles and responsibilities put forth in the CMP. ▪ Create awareness about funding options and implementation of the CMP.	▪ Inform ▪ Consult
Stage 5: Implement, monitor, evaluate and report	▪ Community and Stakeholders informed about the progress of CMP actions. ▪ Create awareness about the effectiveness of CMP actions. ▪ Facilitate ongoing community and stakeholder involvement in implementing, monitoring, evaluating and reporting.	▪ Inform ▪ Involve ▪ Collaborate

3.4 Strategy Messaging

A consistent, central information source will be helpful in managing the consultation process. Council should prepare a webpage of information related to the project as a central repository for the community, and this could be located on the *Your Say Tweed* Page. This would include a brief description of the project, upcoming steps for the community to be involved in, and links to relevant materials such as The NSW Coastal Management Framework.

The *Your Say Tweed* Page should contain a set of key messages for the project, including:

- The project is initiated by Tweed Shire Council. The project is funded jointly through Council, and the NSW State Government's Coast and Estuary Grants Program.
- The Tweed Coast and Waterways Committee of Council will oversee preparation and completion of the CMP, including review of project deliverables.
- The CMP will provide an opportunity to develop a strategic, long-term approach to coastal management and improve coordination across local and state government agencies.
- The programs will enable the funding and implementation of projects that will provide tangible benefits to the local community - through ensuring safe and sustainable access to the coastal zone, protecting public assets from current and future coastal hazards, and maintaining healthy ecosystems and biodiversity.
- The project will provide information about Council's response to the challenges of climate change and its impacts in the coastal areas across the Tweed Shire LGA. This will enable Council to optimise its use of the coastal foreshore reserve in present day, and plan for how this may change in the future.
- The development of the program will include extensive engagement with the local community and user groups, relevant government agencies, and neighbouring Councils.
- Unless otherwise stated, information gathered from stakeholders during the project will only be applied to the project and will remain confidential.

4 ENGAGEMENT STRATEGY

The engagement process has been split into the CMP Stages as described below. It is anticipated these activities will be refined during the scoping of each individual stage and will evolve as the results of the CMP come to light. The timing of the activities outlined herein cannot be determined at this stage, however indicative timing is provided in the Forward Program provided in the Scoping Study report document (Water Technology, 2020). Engagement with the Steering Committee will be in addition to that listed below.

4.1 Stage 2

To achieve the engagement objectives of this stage, we propose the activities listed in Table 4-1. The key outcomes of the engagement of Stage 2 are building awareness of the project, ascertaining the coastal community values within the LGA, and supplementing the coastal engineering assessment with stakeholder observations of coastal hazards.

The first task will be to create a *Your Say Tweed* page as an information base. This will describe the key messages presented in Section 3.4, and outline the project information. This website will be updated throughout the project and will be the key source of information for all stakeholders.

As per Table 4-1, a Community Information Sheet will be developed to advertise the Community Conversations. This will also allow attendees to be informed as to the purpose of the session. Additional focus groups / semi structured interviews should be held as required to ensure that all stakeholder groups' views are captured. This is particularly important for the internal stakeholders presented in Section 2.2. Council should decide if two Community Conversations are required – each aimed at external and internal stakeholders respectively. Alternatively, if one community conversation with all stakeholders in attendance is selected, this could be an opportunity for building relationships across the stakeholder groups.

The workshop aims to collate the community's values. The community conversation(s) will be an interactive process. Aerial imagery / maps will be presented, and community members allowed the opportunity to identify areas and assets of high social, environment and cultural value.

Values may be grouped during or after the community conversation, as appropriate. Our experience in values assessment suggests that the following groupings may be appropriate:

- Recreational
- Commercial
- Environmental
- Historic / heritage
- Physical infrastructure

Depending on the number of attendees, it may be appropriate to run multiple community conversations over a series of days in order to keep the number of attendees at a workable level.

The outputs from the community conversations will be used to generate the success criteria / evaluation criteria for the risk assessment component of the CMP. These will be key to the whole CMP as it is these that will ultimately drive the selection of management actions. It is important that a comprehensive approach be applied at this stage of the project, in order to provide a CMP that is relevant for Council and stakeholders.

The workshop will also cover the aims of the CMP, and request data on coastal hazards from attendees. A follow-up online survey will be developed to supplement information received at the workshop. This will potentially reach a wider audience and ensure a representative group are consulted for this important information.

TABLE 4-1 PROPOSED ENGAGEMENT ACTIVITIES: STAGE 2

Engagement Activity	Engagement Level	Description
Your Say Tweed page	Inform	▪ Advertise the project ▪ Provision of terminology definitions ▪ Maps and draft documents
Community Information Sheet	Inform	▪ A summary sheet that describes the CMP process, and advertises the upcoming Community Conversations - Coastal Values
Community Conversation(s) - Coastal Values	Inform & Collaborate	▪ This will be an interactive workshop where the community has the opportunity to communicate its uses and values for the coastal zone. Values will be categorised to aid the identification process. ▪ Potential locations for the workshop are provided in Section 5.
Focus groups / interviews	Inform & Collaborate	▪ Some stakeholder groups may respond more effectively through one-on-one or small group interviews. Council can identify such groups at the commencement of the stage, using the Stakeholder analysis in Section 2; they can then be consulted in a more focussed, one-on-one approach in order to ensure their needs are met and views heard.
Online survey	Inform & Involve	▪ The survey will obtain additional feedback on coastal values. This will provide equity of access for those who were not able to attend the community conversations. The survey should remain open for a period of three weeks and provide the community with an opportunity to outline their uses and values for the coastal zone. ▪ An online survey link will be posted to the *Your Say Tweed* page and Councils Facebook page along with other relevant CMP information: – Hard copies can be made available at Libraries and Council's offices – Murwillumbah and Tweed ▪ The survey should commence around the time of the Community Conversations, in order to maximise engagement. ▪

4.2 Stage 3

To achieve the engagement objectives of this stage, we propose the activities listed in Table 4-2. The key outcomes of the engagement of Stage 3 are educating the community about the coastal hazards specific to Tweed Shire, and the corresponding management options. It is important that the funding mechanisms and responsibilities are well communicated. Feedback on the management options will be sought so they best represent what is achievable within the Shire. At this time the options can be appropriately prioritised. Together with Stage 2, the engagement during these stages is of the utmost importance to the CMP, as the coastal values and management actions developed will drive the future behaviours along the coast. Engagement early on will ensure success of the CMP.

Due to the detailed discussions around costs and responsibility of various management options, engagement will be split between internal and external stakeholders. The scope of the engagement of Stage 3 should be

revised at the commencement of the Stage, based on the engagement and coastal engineering findings of Stage 2, to ensure all stakeholders are suitably engaged.

At the commencement of Stage 3 the *Your Say Tweed* page should be updated with outcomes of Stage 2, and more detail provided about Stage 3.

A series of community conversations should be conducted to discuss, refine and communicate the proposed management options. These should take place in the following order:

1. Internally within Tweed Shire Council
    a. Attendees will be across different departments such as land use planning, asset management, community development, communications and engagement, sustainability and environment. The CMP and its outcomes should be discussed so as to integrate the project across all relevant areas of Council. The evaluation criteria / success criteria developed in Stage 2 will be discussed to ensure they are appropriate.
2. Externally with adjoining Councils
    a. For synergies with the bordering Councils and their CMPs
3. Externally with stakeholders – community and state government
    a. For input into the options assessment, and informing the community of funding mechanisms
    b. Allow community to be informed, so community projects can add value to the CMP process

Upon completion of the interactive sessions, an online survey should be produced to seek further feedback on the management options. The survey can also be used to provide additional educational material.

Focus groups will include those identified in Stage 2, as well as public authorities if their assets are predicted to be affected.

TABLE 4-2 PROPOSED ENGAGEMENT ACTIVITIES: STAGE 3

Engagement Activity	Engagement Level	Description
Your Say Tweed page	Inform	▪ Update with outcomes from Stage 2, including hazard maps ▪ Provide information about Stage 3
Community Information Sheet	Inform	A summary sheet that describes the CMP process, and advertises the upcoming engagement activities
Community Conversations	Inform & Collaborate	This will be tailored to each audience described above – Tweed Shire Council, adjoining councils, and general public. They all aim to gain feedback from the management options, and ensure the evaluation of options appropriately prioritises them. The community conversation(s) will include allowance for informal drop-ins either side of the allotted time.
Focus groups / interviews	Inform & Collaborate	Some stakeholder groups may not respond well to workshops and surveys. Council can identify such groups at the commencement of the stage, using the Stakeholder analysis in Section 2; they can then be consulted in a more focussed, one-on-one approach in order to ensure their needs are met and views heard. E.g., public authorities may be consulted in this way for Stage 3.

Engagement Activity	Engagement Level	Description
Online survey	Inform & Involve	An online survey link will be posted to the website and Shire Facebook page(s): ▪ Hard copies can be made available at Libraries and Council's offices – Murwillumbah and Tweed Survey will obtain additional feedback on success criteria, and management actions presented.

4.3 Stage 4

Stage 4 involves the preparation, exhibition and submission of a draft CMP to the Minister for certification. As per the NSW Coastal Management Manual, Section 16 of the CM Act requires that before adopting a draft CMP, a council must consult with the community. It also requires the council to consult with other public authorities if the draft CMP (as per OEH, 2018):

- proposes actions or activities to be carried out by that public authority
- proposes specific emergency actions or activities to be carried out by a public authority
- under the coastal zone emergency action subplan
- relates to, affects or impacts on any land or assets owned or managed by that public authority.

To achieve the engagement objectives of this stage, we propose the activities listed in Table 4-3. The engagement of this stage is largely fixed, but the results of Stages 1 to 3 will drive the requirements for any additional activities or focus areas.

A key component of Stage 4 will involve the public exhibition of the draft CMP. The exhibition process is an opportunity for the community and stakeholders to provide feedback on the proposed management of the coastal zone. It is a mandatory requirement that a draft CMP must be exhibited for public inspection at the main offices of Council (during ordinary office hours) for a period of not less than 28 calendar days (OEH, 2018).

The nature and extent of the public exhibition activities will depend on the extent and complexity of the management actions outlined in the CMP. Where the CMP involves complex, high impact or high-cost management proposals, it may be preferable to include face-to-face consultation, such as information sessions and community conversations. Garnering this level of community involvement can improve the confidence in decision-making (OEH, 2018).

TABLE 4-3 PROPOSED ENGAGEMENT ACTIVITIES: STAGE 4

Engagement Activity	Engagement Level	Description
Your Say Tweed page	Inform	▪ Update with outcomes from Stage 3 ▪ Provide information about Stage 4
DPIE	Inform & Consult	▪ Submit draft CMP to DPIE for their review prior to public exhibition
Public Exhibition	Inform & Consult	▪ It is a mandatory requirement that a draft CMP must be exhibited for public inspection at the main offices of Council (during ordinary office hours) for a period of not less than 28 calendar days (OEH, 2018)

Engagement Activity	Engagement Level	Description
		▪ Depending on the extent of management actions outlined in the CMP, the public exhibition activities associated with this Stage may include a series of drop-in information sessions and/or community conversations. These sessions may include a range of information materials, such as: – Information sheets (web based and hard copy) – Technical reports and other documents that support the CMP; – Maps of the four (4) coastal management areas (see Water Technology, 2020) – Information on how prior engagement has influenced decision-making to date – Information about how feedback will be used in finalising the CMP ▪ Public exhibition should also include making the draft report available online at the *Your Say Tweed* page. Community responses and comments on the draft CMP can also be submitted on this page.
Present to Council	Inform & Consult	▪ After the exhibition period, Council may find it helpful to collate and review all responses and prepare a submissions report that documents issues raised during the exhibition period (OEH, 2018) ▪ Present updated CMP post public exhibition to Council for their endorsement
DPIE	Inform & Consult	▪ Submit updated draft CMP to DPIE for their review
Public Authority	Inform & Consult	▪ Public authorities to confirm support for the CMP
Submit to Minister	Inform & Consult	▪ Council adopts the finalised draft; submits to Minister
Council Gazettes the CMP	Inform	▪ After the CMP has been certified by the Minister, a local council must publish it in the Gazette. ▪ Section 19 of the CM Act requires that a copy of a CMP must be available for inspection by the public without charge at the office of the local council. A copy of the CMP must be available for public inspection on the council's website within seven days of publication in the Gazette (OEH, 2018). ▪ Council should notify the community that the CMP is certified, adopted and gazetted. This should be undertaken through Tweed Link (Tweed Shire Council's weekly newspaper), media releases and social media.

4.4 Stage 5

This stage is largely dependent on the outcomes of the CMP. Targeted engagement as management actions roll-out will be defined in line with these actions. As a minimum, the following activities are recommended:

- Informing all stakeholders via email of next steps, and what to expect

- Keep Council's website up to date with implementation of management actions
- Encourage the community to be involved in implementing actions such as beach monitoring, dune revegetation and other 'citizen science' programs
- Consider the use of 'report cards' as updates on the status of coastal management across the LGA
- Continue to engage with public authorities and adjoining councils

Part of the CMP will include a plan for monitoring and reviewing the program. At this time, the engagement for Stage 5 should be drafted in more detail.

5 LOGISTICS

5.1 Advertising:

The various engagement activities can be advertised to the community and stakeholders through a number of different channels, including:

- The Tweed Link (Tweed Shire Council's weekly newspaper)
- Media releases
- Social media (including Councils channels on Facebook, Instagram and Twitter).
- Advertisements in local media such as Tweed Daily News, and The Tweed Valley Weekly

5.2 Venues

Venues to display information and hold meetings across the LGA include:

- Banora Point Community Centre
- Cabarita Beach Sports Centre – Hall
- Crabbes Creek Hall
- Kingscliff Community Hall
- Murwillumbah Civic and Cultural Centre – Auditorium
- Murwillumbah Civic and Cultural Centre - Canvas & Kettle
- Murwillumbah Community Centre
- Piggabeen Hall
- Pottsville Beach Community Hall
- Pottsville Beach Neighbourhood Centre – Beachbreak
- Tumbulgum Hall
- Tweed Heads Civic & Cultural Centre - Administration Building
- Tweed Heads Civic & Cultural Centre – Auditorium
- Tweed Heads South Community Centre

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6 MONITORING & EVALUATION

Monitoring and evaluating the CMP is part of Stage 5 and is described in Section 4.4. This section relates to monitoring and evaluating the engagement activities during the development of the CMP.

Following initial engagement, each subsequent engagement activity will clearly include how previous engagement has been applied. This builds community trust, as stakeholders can see they have been listened to and views were recorded. In addition, transparency of the CMP process will aid community acceptance.

Additional feedback mechanisms are as follows:

- Each community conversation session will issue a post-workshop evaluation survey.
- The survey itself will include a feedback component
- Feedback sought from the PAG at each deliverable submission.
- A summary of the engagement process will be included in the Final CMP.

Upon completion of each stage of the CMP, the Engagement Strategy should be revised to ensure it meets requirements.

7 REFERENCES

Feary (2015) *Sea countries of New South Wales: a benefits and threats analysis of Aboriginal people's connections with the marine estate.* Accessed online at: https://www.marine.nsw.gov.au/__data/assets/pdf_file/0009/594216/Sea-countries-of-NSW-a-benefit-and-threats-analysis-of-Aboriginal-peoples-connections-with-the-marine-estate.pdf

Hunt (2013) *Engaging with Indigenous Australia—exploring the conditions for effective relationships with Aboriginal and Torres Strait Islander communities.* Issues paper no. 5 produced for the Closing the Gap Clearinghouse

NSW Office of Environment and Heritage (OEH, 2018) *Guidelines for community and stakeholder engagement in coastal management*, ISBN 978-1-925753-20-2, State of NSW and Office of Environment and Heritage

Tweed Shire Council (2018) *Community Engagement and Participation Plan 2019-2024*, Tweed Shire Council

Water Technology (2020) *Tweed Coastal Management Program Stage 1 Scoping Study (Draft)*. Prepared for Tweed Shire Council.

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APPENDIX B
EXISTING STUDIES AND PLANS

TABLE B-1 EXISTING STUDIES AND PLANS

Ref#	Document	Date	Author
Tweed Shire Coastal & Estuary Management Plans & Studies			
1.01	Tweed Estuary Tidal Inundation Assessment and Mapping	2019	BMT WBM
1.02	Tweed River Estuary: Coastal Management Program 2020-2030	2019	Hydrosphere
1.03	Kingscliff – Dreamtime Beach Coastal Zone Management Plan	2017	BMT WBM
1.04	Kingscliff Coastal Risk Management Study	2015	BMT WBM
1.05	Tweed Coastal Creeks Floodplain Risk Management Study	2015	BMT WBM
1.06	Tweed River Bank Erosion Management Plan	2014	Tweed Shire Council
1.07	Tweed Valley Floodplain Risk Management Study & Plan 2014	2014	BMT WBM & Bewsher
1.08	Coastal Zone Management Plan for Tweed Coast Estuaries	2013	Hydrosphere
1.09	Tweed Coast Estuaries Bank Erosion Study	2013	Hydrosphere
1.10	Tweed Shire Coastal Hazard Assessment	2013	BMT WBM
1.11	Coastal erosion at Kingscliff Advice to the Minister for the Environment	2011	NSW Coastal Panel
1.12	Coastal Zone Management Plan for Cobaki Broadwater and Terranora Broadwater	2010	Australian Wetlands & ABER
1.13	Tweed Coastline Management Plan	2005	Umwelt
1.14	Tweed Shire Coastline Management Study	2005	Umwelt
1.15	Tweed Coastline Hazard Definition Study	2001	WBM Oceanics
State Level Plans, Strategies and Policies			
2.01	NSW Coastal Dredging Strategy	2019	MIDO
2.02	NSW Marine Estate Threat and Risk Assessment (TARA)	2019	BMT WBM
2.03	NSW Maritime Infrastructure Plan 2019-2024	2019	NSW Government
2.04	Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions	2019	NSW OEH and the EPA
2.05	NSW Marine Estate Management Strategy 2018-2028	2018	Marine Estate Management Authority
2.06	Commercial Fisheries Business Adjustment Program - Social and Economic Impact Monitoring Framework	2017	Schirmer et al
2.07	NSW Climate Change Policy Framework	2016	NSW OEH

Ref#	Document	Date	Author
2.08	NSW Oyster Industry Sustainable Aquaculture Strategy 2016	2016	Department of Primary Industries
2.09	NSW Regional Ports Strategy	2016	DPI (Lands)
2.10	NSW Coastal Management Manual	2018	NSW OEH
Regional Level Plans and Strategies			
3.01	North Coast Regional Strategic Pest Animal Management Plan 2018 - 2023	2018	LLS North Coast
3.02	North Coast Regional Plan 2036	2017	Department of Planning & Environment
3.03	Local Land Services North Coast Local Strategic Plan 2016-2021	2016	LLS North Coast
3.04	North Coast Integrated Regional Vulnerability Assessment and Enabling Regional Adaptation	2016	NSW OEH
3.05	Regional Boating Plan for Tweed – Clarence Valley Region	2015	TfNSW
3.06	Northern Rivers Catchment Action Plan 2013-2023	2013	Northern Rivers Catchment Management Authority
3.07	Byron and Tweed Shire Councils Climate Change Adaptation Action Plan	2009	GHD
Local Level Plans, Strategies and Policies			
4.01	Tweed Shire Council Resourcing Strategy 2019	2019	Tweed Shire Council
4.02	Tweed Shire Council Aboriginal Cultural Heritage Management Plan 2018	2018	Tweed Shire Council
4.03	Tweed Shire Council Draft Open Space Strategy 2018 – 2028	2018	Tweed Shire Council
4.04	Tweed Shire Council Operational Plan 2018–2019	2018	Tweed Shire Council
4.05	Tweed Shire Council Commercial Recreation Activities on Public Open Space Policy	2017	Tweed Shire Council
4.06	Tweed Shire Council Community Strategic Plan 2017–2027	2017	Tweed Shire Council
4.07	Tweed Shire Council Delivery Program 2017–2021	2017	Tweed Shire Council
4.08	Tweed Sustainable Agriculture Strategy 2016	2016	Tweed Shire Council
4.09	Tweed Urban Stormwater Quality Management Plan 2016	2016	Tweed Shire Council
4.10	Vegetation Vandalism on Public Land Policy 2016	2016	Tweed Shire Council
4.11	Tweed Shire Council Local Environmental Plan 2014	2014	Tweed Shire Council
4.12	Tweed River Domestic Structures Strategy September 2008	2008	Tweed Shire Council
4.13	Tweed Shire Council Development Control Plan 2008	2008	Tweed Shire Council

Ref#	Document	Date	Author
4.14	Tweed Coast Regional Crown Reserve Plan of Management	2006	NSW Land and Property Management Authority
4.15	The Tweed Vegetation Management Strategy 2004	2004	Tweed Shire Council
4.16	Tweed Urban and Employment Land Release Strategy 2009	2009	Tweed Shire Council
4.17	Tweed City Centre LEP 2012	2012	Tweed Shire Council
4.18	Tweed Local Environmental Plan 2014	2014	Tweed Shire Council
4.19	Tweed LEP 2000	2000	Tweed Shire Council
4.20	Tweed Development Control Plan 2008	2008	Tweed Shire Council

APPENDIX C
COASTAL MANAGEMENT AUDIT OF IMPLEMENTATION

KINGSCLIFF DREAMTIME BEACH CZMP ACTIONS (2017)

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
KD1	Develop and implement a beach monitoring program, particularly for Kingscliff Beach. Ideally, the monitoring program should extend southwards to Cabarita and northwards to Fingal Head, to capture the formation and movement of sediment 'slugs' bypassing Cudgen Headland. Beach monitoring data will also be used to assess downdrift impacts of seawall (addressing Risk 15) and inform future studies on coastal hazard risk.	Commenced, not actively undertaken.	DPIE Sciences
KD2	Undertake periodic nourishment using available sand sources to remediate erosion in areas of high public access demand, including areas affected by edge erosion effects from the Kingscliff seawall (e.g. beach fronting Jack Bayliss Park, Faulks and Lions Parks). Sand sources may include, but not be limited to, dredged marine sand from Cudgen Creek or Tweed River, as may become available from time to time (see Kingscliff CRMS, BMT WBM 2015 for further details).	Active & Ongoing	(MIDO) / Crown Lands
KD3	Determine preferred option for extraction of sand from Area 5 of the Tweed River (downstream of Barneys Point Bridge), for use as sand nourishment on Kingscliff - Dreamtime Beach. This action shall provide an interim sand nourishment source of up to 660,000 m3 to support environmental beach amenity on Kingscliff - Dreamtime Beach, until a large-scale nourishment program is investigated in 2030 (see Section 3.5.1).	In action. At this stage only Kingscliff - Dreamtime Beach requires nourishment.	TRESBPCo Crown Lands MIDO
KD4	Re-establish a coastal dune along the foreshore of Faulks Park and Lions Park. Volume of sand required is approximately 20,000m3. Source of sand can be terrestrial or marine (e.g. Tweed River, Cudgen Creek, Area 5, as noted in Actions KD2 and KD3 above). Dunes to be vegetated and protected.	Completed. Councils Vegetation Vandalism on Public Land Policy	
KD5	Upgrade the seawall along the Kingscliff Beach Holiday Park shoreline, as part of the Kingscliff Beach Holiday Park Renewal and Central Park developments. The design shall cater for improved public access and amenity, and stormwater outflow and treatment. The Kingscliff Holiday Park Renewal shall include reducing the number of sites to make space for a Central Park; and new amenities, recreational elements, landscaping and other facilities. Central Park shall include a promenade, landscaping, picnic shelters, barbeques, and a cenotaph. The action will be jointly funded by Council, the Holiday Park (owned by Council) and the Australian Government's National Stronger Regions Fund.	Project completed. Seawall constructed in 2017	Crown Lands MIDO
KD5A	Manage, maintain and mitigate impacts from the Kingscliff foreshore seawall.	Ongoing. (funded from Tweed Holiday parks)	Crown Lands MIDO
KD6	Modify/protect vertical seawall in front of Cudgen Headland SLSC to ensure compatibility with adjacent foreshore protection structures.	Monitoring for future action.	
KD7	Develop a staged implementation plan for a "rolling vegetation easement" that will facilitate (through plantings and fencing) the migration of dune vegetation into the parkland behind, as required in the future due to progressive beach recession. The easement should extend from Fingal Head to Jack Bayliss Park. The rolling easement shall aim to improve the dune buffer, irrespective of other (protection) works on the beach. The rolling easement would need to accommodate nesting birds (e.g. bush stone curlew that requires cleared	Yet to commence.	Funding options include: Coast & Estuary Program - and Dune Care groups

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
	unvegetated areas); and installation of facilities, e.g. play equipment. The action should be promoted within the community as part of education regarding dune vegetation values (see Community Education action).		
KD8	Identify, protect and enhance habitat for threatened species known to occur in the Plan area (Bush Stone-curlew and Glossy Black-cockatoo). A program will be developed to identify, protect and enhance critical habitat features for threatened bird species including foraging and watering sites for the Glossy Black-cockatoo and roosting and nesting sites for the Bush Stone-curlew.	Currently ongoing – and applicable across entire coastal zone	
KD9	Fund a Coastal Compliance Ranger, to monitor: ▪ Shorebird and turtle nesting sites, and fence off nesting sites or close beach access points as necessary over the breeding season; ▪ Wildlife Protection Areas; ▪ Off-leash dog access, particularly during shorebird and turtle nesting seasons ▪ Beach vehicle use, particularly during shorebird and turtle nesting season ▪ Damage to dune vegetation due to illegal camping, illegal pruning, creation of informal tracks etc.; ▪ Protection and rehabilitation of adjacent dune vegetation required as part of development conditions of consent; and ▪ Other recreational or access issues that may affect coastal biodiversity values.	Commenced - Starting in FY20 Funded through Tweed Holiday Parks	Tweed Holiday Parks Council runs 7 holidays parks on Crown Land (revenue from Holiday Parks is directed into management of Crown Land – Environmental management)
KD10	Undertake a comprehensive coastal Community Education Strategy, targeting: ▪ The use of native species and weed management in residential gardens to reduce weeds escaping into adjacent native habitat (dunes, littoral rainforest etc.); ▪ Shorebird and turtle nesting, particularly when accessways must be closed or areas cordoned off for the breeding season; ▪ Aboriginal heritage and culture on the coast; ▪ The important values provided by dune vegetation particular to discourage its destruction, and the vegetation "rolling easement" concept; ▪ Coastal processes and the movement of large volumes of sand that periodically causes erosion, which could be supported with the results of beach sand monitoring; and ▪ Management actions being implemented, such as small scale sand nourishment, and the new seawall. The strategy may be delivered via a range of media, including brochures (e.g. for species in gardens, values of dune vegetation, shorebird and turtle nesting for animal owners and 4WDers), signage (e.g. celebrating Aboriginal culture, shorebird and turtle nesting), website links (e.g. for implementation of coastal management actions), street workshops (e.g. for dune vegetation values and species selection with residents adjacent to native habitat), beach walk & talks (e.g. to explain periodic occurrence of erosion, management actions etc.), school visits (explaining coastal processes, dune vegetation values) and so on. The strategy should also link with existing successful programs, for example, Dogs Breakfast.	Across whole of coastal zone Ongoing Grant funded (high reliance on grant funding)	Coast & Estuary Program

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
KD11	Review off-leash and prohibited dog areas following development of Tweed Shire Council Guidelines. Considerations for Dreamtime Beach include impact on nesting turtles, migratory and shore birds.	Completed – but the wider issues of animals on beaches (horses, camels etc) is requiring a study of itself.	NPWS
KD12	Upgrade signage regarding off leash and prohibited areas making the extents of the designated areas very clear, and to provide education about nesting animals and responsible pet ownership.	As above	Related to Councils Open Space Strategy.
KD13	Develop guidelines for placing restrictive covenants on new subdivisions to limit and control keeping of companion animals to reduce impacts on wildlife.	In progress	Dep of Planning (model provisions for incorporating them)
KD14	Investigate development of a Council Policy for Responsible Cat Ownership. This Policy will consider options for promoting and managing responsible cat ownership including community education and awareness strategies.	Education component – in progress	
KD15	Develop and implement a vertebrate pest animal management strategy.	Commenced (ongoing)	
KD16	Prepare and implement a broad-based Vegetation Management strategy and principles for the whole of the Tweed coast.	Requires review – action to be considered / reviewed Incorporated in Councils Vegetation Vandalism on Public Land Policy	DPIE Vegetation Management
KD17	Update and expand site specific Dune Vegetation Management Plans to fill the gaps between Dunecare work areas.	Commenced - but needs to be included as a periodic activity (ongoing review) Incorporated in Councils Vegetation Vandalism on Public Land Policy	
KD18	Review environmental zones, including areas currently identified as deferred matter in accordance with the environmental zone criteria specified by the Final Recommendation Report of the Northern Councils EZone Review.	In progress	Needs to consider linkages with coastal SEPP mapping (inc established linkages)
KD19	Refer to the process to be followed for the inadvertent discovery of an object and inadvertent discovery of burial or human remains as outlined in the Aboriginal Cultural Heritage Management Plan (in prep).	Councils ACHMP has been adopted - implementation ongoing	Tweed Byron LALC Crown Lands NPWS

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
		Implications for Council waterways & coastal projects Linkages in the estuary plan	
KD20	Coordinate within Council to enable the provision of maintenance activities in cross-over regions between parks, beach accesses and dunes, and cycle ways, which are managed respectively by Recreation Services Unit, NRM Unit - Coastal and Roads and Stormwater maintenance crews. These groups manage adjacent areas of land (parks and adjacent beach accesses and dunes) and the assets within these areas. The action is aimed at enabling the different works crews to undertake pruning, grass cutting and other minor maintenance tasks at the edges of their respective areas of responsibility, e.g. where a park leads into a beach accessway bounded by dune vegetation. The action may require some limited "sharing" of budget, to provide for the maintenance tasks, plus training of the respective crews for correct methods in their adjacent regions.	Not commenced – future Management Action	
KD21	As necessary, facilitate working groups with relevant stakeholders (state agencies, members from different Council departments, etc.) to co-ordinate action on coastal management issues.	To be developed during CMP	

TWEED COASTAL ESTUARIES CZMP ACTIONS (2013)

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
1A	Ecosystem Health monitoring program - Implementation of a coordinated catchment-wide monitoring program to monitor estuary health, measure the success of management actions and inform decision making in accordance with the NSW Natural Resources Monitoring, Evaluation and Reporting (MER) Strategy.	Undertaken – but not done effectively. TSC did one follow up seagrass assessment and continue with WQ but have not resourced anything else	DPI Fisheries MEMA
1B	Review of CZMP progress and monitoring of KPIs - Ensure continuous improvement towards the CZMP objectives across the full range of identified pressures.	Implemented and Ongoing	
1C	10-year review of CZMP - The CZMP will be reviewed to assess whether the desired outcomes are being achieved, and updated to incorporate any new scientific knowledge or changes in community attitudes, government policy, strategic planning and estuary management issues	To be rolled into the CMP Process for Tweed Open Coast and Estuaries	DPIE Project Stakeholders
2A	Investigation of seagrass decline in Mooball creek - Determine the sources of decline in seagrass extent in the Tweed Coast Estuaries and recommend remedial action where possible to address root causes	Not done - to be reviewed under CMP process (processes, cont. factors, review etc)	DPI Fisheries MEMA
2B	On-going protection of estuary habitat (seagrass, saltmarsh and mangroves) within the Tweed Coast Estuaries	Implemented and Ongoing	DPI Fisheries MEMA
3A	Aquatic habitat restoration and protection - Identify opportunities and undertake aquatic habitat restoration and protection works	Implemented and Ongoing as part of MEMS	MEMA DPI Fisheries NSW EPA Dep of Agriculture Tweed Cane Industry
3B	Christies Creek fish surveys - Undertake surveys on Christies Creek to determine the extent of Swordtail infestation and determine the feasibility of removal of this species at this location	Not commenced. ASS and resultant fish kills upstream > big management issue	MEMA DPI Fisheries NSW EPA Dep of Agriculture Tweed Cane Industry
4A	On-going protection of shorebirds and their habitat in the study area - Support existing programs to reduce impacts on shorebirds and carry out further work to identify vulnerable habitats and protect them from disturbance.	Implemented and Ongoing – of high importance	NPWS DPIE (Threatened Species)

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
4B	Management of dogs within vicinity of shorebird habitat at Cudgera Creek mouth - Extension of dog exclusion areas to cover important nesting, foraging and roosting habitat and clear signage, regulation and community education.	Implemented and Ongoing	
5A	Identify priority riparian areas for rehabilitation - Prioritisation of riparian areas for protection and rehabilitation to provide the greatest benefits for the effort expended	Very little riparian vegetation rehabilitation in the floodplain or upper catchments reaches of the coastal estuary catchments. Areas are eligible for funding under RHG but little - no interest from land owners.	Crown Lands DPIE Agriculture Industry
5B	Riparian rehabilitation works – Carry out works to improve cover and condition of riparian areas with positive flow on effects increasing the health and resilience of waterways	As above.	As above.
6A	Bank erosion works planning for high risk sites- Plan for effective resolution of bank erosion at high risk sites identified by the Bank Erosion Study	Little work undertaken. Resources constrained to reactive repair of existing access point related erosion in highly used lower estuaries.	Crown Lands TB LALC
6B	Bank erosion remediation works - Effective remediation of bank erosion at high risk sites	As above	As above.
7A	Identify and prioritise key sites for remediation – Prioritisation of ASS hot spots for on-ground remediation works to provide the greatest benefits for the effort expended	Partly completed, but ongoing	MEMA Fisheries NSW EPA Dep of Agriculture Tweed Cane Industry
7B	Acid Sulfate Soil remediation works - Reduce the environmental impacts of ASS hotspots on the estuaries and promote communication of findings to community and decision makers	As above	As above
8A	Support and promote sustainable agricultural initiatives - Support current initiatives encouraging best practice management of agriculture in the catchments, and promote sustainable management practices to community and decision makers	Implemented and Ongoing (incorporated in the Tweed Sustainable Agriculture Strategy)	MEMA Fisheries NSW EPA Dep of Agriculture Tweed Cane Industry

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages to External Agencies
8B	Cost Benefit Analysis (CBA) of alternative options for agricultural land- Compare environmental, social and economic costs and benefits of agricultural land management practices and land uses to identify viable farming options with improved outcomes for estuary health	Not commenced.	
9A	Stormwater planning controls and regulation – Ensure on-going improvements in stormwater management resulting in reduction of contaminants transported to the estuary	Ongoing (included into DCP)	
10A	Wastewater management – Ensure optimum performance of wastewater management systems resulting in no adverse impacts to estuary health, function and recreational use	Implemented and Ongoing	NSW EPA
11A	Assessment and mapping of tidal inundation extent including potential sea level rise – Provide clear definition of potential risks due to tidal inundation for the Tweed Coast Estuaries is used to facilitate adaptation to climate change	Not commenced (some as part of hazard study - downstream). ID of potential areas for saltmarsh and mangrove migration with SLR.	NSW DPIE DPI Fisheries MEMA Crown Lands
11B	Planning for sea level rise and climate change impacts - Catchment and estuary specific information regarding climate change is used to facilitate adaptation to climate change	As above	As above
12A	Public access - Public access to estuaries and foreshores is maintained and key future risks are identified for future planning	Implemented and Ongoing	RMS (TfNSW) Crown Lands NPWS
13A	Support and promote safe and ecologically sustainable recreational use – Ensure continued recreational use of the Tweed Coast Estuaries with no adverse impacts on the environment, cultural values or public health and safety	Implemented and Ongoing	RMS (TfNSW) Crown Lands
13B	Investigation of sources of faecal contamination in Cudgera Creek - Identify the source of faecal contamination in Cudgera Creek and direct management action to address the issue so that recreational water quality objectives are achieved	Requires Review	RMS (TfNSW) Crown Lands
14A	Cultural heritage - Provide for effective protection and management of cultural heritage and where appropriate provide access and signage to cultural sites to promote the cultural values of the estuary	Refer to Tweed ACHMP	TB LALC
15A	Community education and consultation program - to improve understanding of the pressures affecting estuary values and bring about positive changes in behaviour.	Implemented and Ongoing	
15B	Signage - Raise awareness of the location of sensitive habitats to reduce damage caused by physical disturbance	Partly completed, but Ongoing	

COBAKI & TERRANORA BROADWATERS CZMP ACTIONS (2010)

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
1. Geomorphic Structural Works					
Riparian zone of major creeks.	1.1	Undertake detailed geomorphic investigation of the seven Level 1 priority sites of the catchment identified within this study. (a) Survey section (b) Undertake hydraulic analysis, evaluate potential flood hazards (c) Develop concept design and evaluate (d) Develop detailed design.	High	Not yet commenced To be reviewed	
2. Broadwater Foreshore Rehabilitation					
Terranora Broadwater	2.1	Site T1 T3, T4 and T7 (HCV remnants) – Level 1: Undertake ecological restoration such as assisted natural regeneration. Protect, maintain and expand remaining remnant. (a) Develop urban remnant action plans to address key threatening processes (b) Undertake bushland regeneration and maintenance in accordance with plans	High	Implemented and Ongoing	
	2.2	T1a, T2 (Narrow, discontinuous/fragmented vegetation, between urban area and broadwater) – Level 2: Investigate options and community interest for neighbourhood bush regeneration.	Low	Not yet commenced	
	2.3	T5 (HCV remnant) – Level 1: All remnant vegetation, including saltmarsh community at confluence of Duroby Creek, to be rehabilitated in association with development of Area E.	High	Implemented and Ongoing	
	2.4	T6 (HCV remnant) – Level 1: Investigate the area between the foreshore and houses and consider rezoning for conservation.	High	Shown as Deferred Matter in LEP, which according to Mark K means that it is effectively E zone.	
	2.5	T8 (HCV remnants/ Degraded bushland) – Level 1: (a) Develop site-based action plans (b) Fence and restore the road reserve along both banks of Bilambil Creek estuarine riparian corridor. (c) Maintenance.	High	Implemented and Ongoing	
	2.6	T8a (HCV remnant) – Level 1: Investigate saltmarsh rehabilitation in collaboration with landowner.	High	Not commenced	Land owners
	2.7	T9 (HCV remnant) – Level 1: (a) Develop urban remnant action plans to address key threatening processes (including residual rainforest on edge of Birds Bay).	High	Partly complete	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
		(b) Undertake bushland regeneration and maintenance in accordance with plans (c) Investigate potential expansion of remnant into adjacent private land to the north.			
	2.8	T10 (mostly cleared, mown grassy areas) – Level 2: Consider use of enhancement plantings to buffer against wave erosion and improve local habitat	Low	Not commenced	
	2.9	T11, T12, T13 (mostly cleared, narrow, mown grass) – Level 2: Investigate community interest in neighbourhood bush regeneration at sites in this area.	Low	Not commenced	
	2.10	Investigate the inclusion of Meebun Island and other wetland areas of conservation value into the Tweed Estuary Nature Reserve.	High	Not done	NPWS
Cobaki Broadwater	2.11	C1 (Garbino Pty Ltd): Encourage remnant riparian buffer rehabilitation in association with any development.	High	Not done	Department of Planning
	2.12	C2 (Department of Lands): Encourage management of remnants for conservation, with low impact recreation only.	High	Not done	
	2.13	C3 (Gold Coast Airport Ltd): Review Gold Coast Airport plan of management for foreshore reserve as an action associated with MoU for management of Cobaki Foreshore to ensure consistency with the overarching principles of the MoU.	High	Not done	
	2.14	C4, C5 (TBLALC), C7, C8, C9, C10 (State Crown, TSC): Review foreshore management plans to ensure consistency with the overarching principles of the MoU.	High	Not done	
	2.15	C6 (Leda Developments): All foreshore vegetation to be restored in association with the development of Cobaki Lakes, including saltmarsh restoration, consistent with the overarching principles of the MoU.	High	Management plans complete (still to be enacted)	LEDA Department of Planning
3. Rural Riparian Rehabilitation					
Transition / Mid Zone of Rural Catchment	3.1	Site-based action plans for Level 1 rehabilitation zones (mid and transition of all creeks, including ephemeral drainage lines). (a) Develop and implement an effective landowner engagement program targeting all landowners with riparian frontage to the main channel or tributaries of Piggabeen, Cobaki, Bilambil and Duroby Creeks (b) Develop and promote existing landowner incentive and assistance packages, such as the TSC River Health Grants Support for Farmers and Rural Land Owners (c) Develop action plans to address key threatening processes and have them adopted by Council. Areas of priority include the mid-transition riparian zone and ephemeral drainage lines. (d) Undertake restoration works, encourage private landholders to undertake with support from TSC outreach officers.	High	Part completed (for Bilambil)	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
		(e) Maintain restoration sites for a minimum of three years.			
	3.2	Employ a permanent extension officer to facilitate the development of site- based action plans with landowners.	High	Not done	
	3.3	Continue to protect and manage HCV vegetation in the upper riparian zone of all catchments consistent with the Tweed Vegetation Management Strategy (2004) and existing programs such as NRCMA Biodiversity Program.	Medium	Partly done, and ongoing. There will be a number of properties fitting the description that will have had 'works' undertaken, be it RHG Biodiversity Grant or other.	
	3.4	Considerations for the Draft LEP 2010: (a) Zoning Cobaki and Terranora Broadwaters W1 Natural Waterway (b) Protect riparian lands by including in zoning and a supporting clause or map overlay clause with clear policy statements relating to buffer zones.	High	Completed	
4. Industry Management					
Catchment -wide	4.1	(a) Audit existing industry management plans and compliance requirements throughout the catchment. Include: golf courses, nurseries, banana farms, other industry. (b) Develop a management strategy involving education, monitoring, auditing and industry participation. (c) Consider development of a proforma for an Industry Environmental Management Plan including routine monitoring and checklist sheets.	Medium	Not done	
5. Urban Stormwater					
Western Drainage Scheme	5.1	Undertake flow-weighted water quality sampling at major outlets of Western Drainage Scheme network (including outlet from Vintage Lakes) to ascertain major sources of nutrients in urban runoff. Minimum of four runoff events to be sampled over one year. (Target works in priority areas).	High	Partly done	
	5.2	Undertake sediment analysis (organic carbon, nutrients) within Western Drainage Scheme network to enhance understanding of internal recycling processes e.g. four sediment sampling events in one year – Summer (wet and dry), Autumn, Spring.	High	Not done	
	5.3	Conduct a workshop with key staff to discuss feasibility of all options for retrofitting and redesign of Western Drainage Scheme, to be informed by the results of water and sediment analyses.	High	Some works completed	
	5.4	Address ongoing maintenance issues of Vintage Lakes in accordance with the Banora Point Western Drainage Operational Management Plan (Periott, 2001) and investigate a trial of rafted reed beds to improve water quality.	Medium	Trial Completed	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
	5.5	Conduct an audit of the existing SQIDs throughout the existing urban priority sub-catchments including Tweed Heads, Tweed Heads South, Bilambil Heights, and Seagulls Estate so recommendations can be made for either their repair, upgrade, correct maintenance or decommission.	Medium	Not done	
	5.6	(a) Undertake a feasibility study for retrofitting SQIDs into existing stormwater system throughout priority areas of Tweed Heads, Tweed Heads South, Bilambil Heights, Seagulls Estate and surrounding urban subcatchments. (b) Undertake detailed designs (c) Implementation of SQID retrofitting throughout priority subcatchments.	Medium	Not done	
New Development	5.7	Allocate additional resources to appoint a specialist environmental compliance officer to Council's regulation staff. Duties to include monitoring compliance with erosion and sediment control, stormwater quality, vegetation clearing, vegetation rehabilitation and other relevant conditions of development approval.	High	Not done	
	5.8	Amend DCP D7 and update TSC's Urban Stormwater Quality Management Plan. Include pollutant removal efficiency/load based reduction targets consistent with industry best practice. Work towards developing catchment - specific stormwater discharge targets for Cobaki and Terranora Broadwater catchment.	Immediate	In progress	
	5.9	(a) Develop site specific Stormwater Management Plans for all new developments which comply with TSC's updated guidelines. (b) Stormwater management plans should include contingencies for scenarios where it appears treatment measures are ineffective in meeting pollutant discharge targets.	Immediate	Completed in accordance with current standards	
	5.10	Investigate the impacts of soil acidification and potentially runoff discharged from surface drains at Tugun Bypass site.	High	Not done	
	5.11	Consider sealing gravel roads throughout the catchment to reduce the export of sediment to waterways. Roadside drainage must be appropriately managed to reduce the export of sediment to waterways by preventing the erosion of table drains.	Medium	Not done	
6. Wastewater Management					
Rural Catchment	6.1	Continue to investigate pre-2002 septic systems still requiring upgrades to help eliminate this potential source of pollutants. Where possible, incorporate with results of any intensive water sampling to prioritise 'hotspot' areas to upgrade.	High	Implemented onsite SMS & inspections (Implemented & ongoing)	
Urban Catchment	6.2	Ensure continued monitoring of impacts of Banora Point Water Reclamation Plan on water quality and ecosystem health in Terranora Creek and Broadwater.	High	Implemented & ongoing	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
7. Ecology					
Rural Catchment	7.1	Incorporate Draft LEP Guidelines for Riparian Protection Area for all streams in the catchment that are not zoned E2 Environmental Conservation or E3 Environmental Management	High	Achieved through Biodiversity DCP	
	7.2	Install fish/other fauna friendly culverts throughout the catchment: (a) Audit current crossings, culverts and structures mapped as fish passage barriers (b) Prioritise the retro-fitting of structures from downstream to upstream and/or those that are having any negative hydrological impact in high flow events (c) Engage with landholders, RTA, DPI on fish and fauna passage strategies (d) Ensure that fish and fauna friendly culverts are conditioned as part of any proposed construction of waterway crossings via the planning and development approval process.	Medium	Implemented & ongoing	DPI Fisheries RMS/TfNSW
	7.3	Assess the feasibility of constructing a spring tide shorebird roost at Tommy's Island in Terranora Broadwater. (a) Discuss feasibility with state agencies and engineers. (b) Undertake Environmental Impact Assessment (c) Construction of roost (d) Prohibit boat access to roost site – install a sign 50m west of site identifying site as a shorebird roost and enforce 50m exclusion zone.	High	See below	
	7.4	If Tommy's Island is unviable for a spring tide shorebird roost, assess the feasibility of constructing a sand island roost on the existing neap tide roost at Womgin Island.	High	Completed	
	7.5	Assess the feasibility of constructing a spring tide roost around the small mangrove island in the southern part of Cobaki Broadwater or on the existing neap tide roost. Discuss feasibility with state agencies and engineers.	Medium	Not done	
	7.6	Bird roost maintenance: (a) Obtain a permit from DPI Fisheries for the ongoing control of mangroves on constructed roosts. (b) Annually remove all woody vegetation from roosts including mangrove seedlings along the foreshore. Inspect any retained patches of mangroves to determine if pruning is required. Maintenance should be undertaken in July/August each year prior to the arrival of migratory shorebirds.	High	Not done (above)	Fisheries
	7.7	Ensure constructed roosts are given appropriate protection in the Local Environment Plan.	Medium	Not done	
	7.8	Implement a study to determine the type, frequency and distribution of human recreation on and near shorebird foraging areas in the broadwaters and determine if these activities have a detrimental impact on shorebirds. Depending on the findings, consider options to reduce the impact of recreation on shorebirds.	Medium	Not done Ongoing monitoring by Bird Life northern rivers	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
	7.9	(a) Develop a policy on the management of dynamic estuarine areas for which there are often conflicting management issues involving recreation, shorebird habitat protection, mangrove and saltmarsh preservation, with consideration of likely impacts of climate change. (b) Undertake workshop with stakeholders.	High	Not done	
8. Cultural Heritage					
	8.1	Compile a heritage schedule of Aboriginal sites and places which are to be listed on the Tweed LEP and managed in accordance with stated conservation provisions to be listed in the LEP (as per Implementation Strategies listed in Cobaki and Terranora Aboriginal Cultural Heritage Management Plan, 2006).	High	Completed – by TBLALC & NPWS Mapping w/ NPWS	TBLALC NPWS
	8.2	Ensure that an appropriate Aboriginal cultural heritage study and assessment are conducted for all developments that will cause land surface disturbance within culturally sensitive landforms as mapped in Cobaki and Terranora Broadwater Aboriginal Cultural Heritage Management Plan (2006).	High	Completed through ACH Plan	TBLALC
		Establish a formal policy of appropriate consultation protocols with the local Aboriginal community (as per Implementation Strategies listed in Cobaki and Terranora Aboriginal Cultural Heritage Management Plan, 2006).	High	Completed through ACH Plan	TBLALC
		Update the Cobaki and Terranora Broadwater Cultural Heritage Management Plan to incorporate new information gained through recent site assessments.	High	Not Councils remit.	
9. Recreation					
	9.1	Investigate opportunities for canoe discovery trail in Terranora and Cobaki Broadwaters with guide brochure and interpretive signage (recreation and education). Include launch site at Boyd Family Park.	Medium	Not done	
	9.2	Investigate feasibility of extending walkway along eastern foreshore of Terranora Broadwater from approximately Ridgeview Street (south of Tweed Broadwater Village) to Daintree Close (north-west corner of Trutes Bay).	Medium	Partly done	
	9.3	Investigate the feasibility of creating a walkway along Bilambil Creek from Bilambil Village, around the western foreshore of Terranora Broadwater to Seagulls Estate.	Medium	Partly done	
	9.4	Complete final design and obtain approvals for construction of foreshore walkway in Dog Bay, Terranora Broadwater. Walkway to extend approximately from Peninsula Drive to Broadwater Esplanade.	High	Completed	
	9.5	Relace destroyed interpretive signage along foreshore in Bingham Bay.	High	Not done (not replaced)	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
	9.6	Consider practicality of walking trails on existing fire trails around Cobaki Broadwater area once developed as Cobaki Lakes (e.g. Leda land to National Estate and Boyd Family Park to the eastern side of Cobaki Creek entrance)	Low	Not done (included in Dev planning)	
	9.7	If monitoring of the shorebird roost site in Terranora Broadwater indicates success based on observable bird roosting behaviour, undertake feasibility study on construction of a bird hide on the promontory on the adjacent mainland to enable local bird watchers to observe the roost.	Low	Not done	
	9.8	Consider recreation and interpretive wetland signage opportunities in The Western Drainage Scheme waterway system. This action should be delayed until all stormwater quality and SQID investigations are completed so subsequent retrofitting designs can incorporate relevant aspects of recreation.	Low	Not done	
10. Mosquito and Biting Midge Management					
	10.1	Design considerations for stormwater treatment waterbodies may conflict with the guidelines in DCP A6 Biting Midge and Mosquito Control, however current best practice in wetland design should be adhered to, i.e. water bodies should not be designed to be deeper than 2m.	High	Not done	
	10.2	Restoration of the bund in Area E to prevent salt water intrusion into the freshwater wetland area to reduce mosquito breeding habitat.	Medium	Fish in mozzies out project	
11. Education					
	11.1	Consider the development of riparian restoration demonstration sites on public land to provide 'reference' sites in the catchment, e.g. Site 5, sportsground in Lower Bilambil Creek	Medium	Completed	
	11.2	Manufacture and install interpretive signage regarding the significant archaeological sites along the eastern foreshore of Terranora Broadwater	Medium	Not done	
	11.3	Promote an education program aimed specifically at reduction of stormwater pollution at the source to improve the stormwater quality of the rural and urban catchment.	High	Completed	
	11.4	Publicise EHMP scorecard results to educate and increase awareness of water quality issues throughout the catchment.	High	Completed	
	11.5	Undertake an education program targeting the impacts of discarded fishing materials (e.g. hooks and fishing line) and general litter including plastics on sea birds and marine life generally.	High	Implemented and Ongoing	
	11.6	Make accessible to the public the detailed flora and fauna surveys undertaken including: - native vegetation, threatened/significant flora - habitat values of native vegetation for fauna and threatened/significant species - Aboriginal heritage values	Medium	Partly done	

Strategy	Action ID	Description of Action	Priority	Status of Action (as of July 2019)	Management Linkages to External Agencies
	11.7	Promote the importance of roost sites, including those constructed. Educate importance of not disturbing sites.	High	Implemented and Ongoing	
12. Monitoring					
	12.1	Identify DIN sources in the catchment. Undertake spatially intensive water quality monitoring strategy to pin point most likely hotspots for DIN entering streams. Minimum of two sample events during median and high flow conditions. Results will reflect effectiveness of catchment rehabilitation.	Medium	Completed. DIN coming from tributary creeks and western drainage scheme.	
	12.2	Monitor the use of constructed roost sites by shorebirds to determine success based on observable bird roosting behaviour. Monitor in spring/summer during years 1, 2, 5 and 10 post construction.	High	Completed	
	12.3	Monitor the use of restored bird roost sites by shorebirds during the first spring/summer period following the completion of remediation work.	High	Completed	
	12.4	Aerial photo interpretation assessment of riparian width and % canopy cover in updated photos after 5 years to measure improvement.	At completion of Plan	Not done	
13. Climate Change					
	13.1	Undertake land and habitat vulnerability assessments.	High	Tidal inundation assessment has mapped areas predicted for increased inundation but Council have not assessed risk of coastal squeeze of wetland communities or impacts on other existing landuse yet.	
	13.2	Develop climate change adaptation strategies.	Medium	Implemented and Ongoing	
	13.3	Incorporate climate change impact actions into planning instruments, development controls and environmental assessments	Medium	Implemented and Ongoing	

TWEED CMP ACTIONS (2005)

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
WC1	Prepare a Vegetation Management Plan for coastal vegetation and fauna habitat rehabilitation and management including recommendations from existing plans	See KD16 KD17	
WC2	Implement the Vegetation Management Plan	As above	
WC3	Develop and implement a feral animal control program	Complete - see KD15	
WC4	Finalise Emergency Action Plan (EAP) for coastal erosion hazards	To be included in CMP (across LGA coastal zone)	SES
WC5	Enforce development within hazard zones through adoption of revised draft Development Control Plan No 8 for coastline including: ▪ need for deep pile foundations for development approvals within the maximum 100 year hazard line; and ▪ limiting the intensity of redevelopment within the maximum 100 year hazard line.	Now DCP B25 to be reviewed	
WC6	Routine coastline monitoring	See KD1. Commenced, but not actively undertaken.	DPIE (Environment)
WC7	Prepare a Vegetation Management Plan to confirm strategic principles and priorities for landscaping undertaken within the coastline corridor.	See KD16 KD17	
WC8	Empower Council lifeguards with the authority to fine offenders of unauthorised activities	Not undertaken.	SLSC's
WC9	A detailed management plan be compiled for the Aboriginal cultural heritage values along the coastline	Complete	
WC10	Produce interpretive/educational material, such as interpretive signs, to illustrate Aboriginal lifestyle and history and how the landscape was used	Partly complete – ongoing.	
WC11	Continue to provide financial assistance for the community-based Heritage Study	Not undertaken.	TB LALC
WC12	Increase Council ranger presence to police residential encroachment onto public lands	Complete - implementation of coastal ranger. See action KD9	
WC13	Remove all encroachments onto public land*	Ongoing	
WC14	Remove and/or reuse elsewhere redundant infrastructure, fences, signage etc and replace with consistent design (or theme) infrastructure	N/A	
WC15	View preservation from public and private lands should be investigated as part of any master plan compiled	N/A	
WC16	Explore themes for whole of coastline and individual areas to provide identity i.e. species of medium to large trees to identify prominent beach/park entry points	Ongoing - Landscape architects' remit	
WC17	Construct coastline cycleway/walkway as currently programmed by TSC	Complete	

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
WC18	Continue to support regional Coastcare facilitator	N/A	
WC19	Assist Coastcare in promotion of their rock platform/ intertidal areas educational program, via Council media.	N/A	
WC20	Maintain bus stops installed, as programmed	N/A	
WC21	Greater enforcement of regulations and development conditions by relevant agencies, TSC, DEC, Department of Lands and DIPNR including protection of coastal vegetation	See KD9	DPIE NPWS Crown Lands
WC22	Develop and implement a strategy to combat illegal clearing of coastal vegetation	Complete & being implemented Incorporated in Councils Vegetation Vandalism on Public Land Policy	
WC23	Install new, and upgrade existing, signs regarding use of companion animals on beaches, in relation to Companion Animal Act	In progress, see KD12	
WC24	Regular maintenance program of access infrastructure	Ongoing	
WC25	Install appropriate warning signage in areas where access may be dangerous	Ongoing	
WC26	Formalise public beach access points and car park areas and close and rehabilitate all inappropriate car parking areas and public access points as part of the preparation and implementation of the Tweed Coastal Reserves Plan of Management	Ongoing	Crown Lands NPWS
WC27	Identify locations for viewing platforms (including some access for all with associated car parks reserved for disabled) at intervals along the coastline as a part of the preparation of the Tweed Coastal Reserves Plan of Management	To be done – ties in with access and inclusion (access for all)	
WC28	Develop a policy with regard to future car parking requirements for beach access on the Tweed Coast (urban and non-urban)	Complete	
WC29	Physically restrict unauthorised access points e.g. bollards, rocks and/or vegetation planting	Ongoing	
WC30	Rationalise and standardise regulatory signage	Ongoing	
WC31	Increase enforcement of unauthorised vehicle use on beaches	Ongoing – see KD9	
WC32	Provide all-weather formal vehicular beach access points at preferred locations, such as designated Permit Holder Entry Points, and maintain signage about 4WD access permissibility	Complete and ongoing Provided, now maintaining	
WC33	Monitor any increase in conflicts between horses and other beach users and consider impacts at a future review of the Coastline Management Plan	To be done	
WC34	Include cycleway linkages to commercial centres	Complete	

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
WC35	Include cycleway linkages to main beach access points	Complete	
WC36	Initiate targeted residential and broader community education program about residential encroachment onto public land, such as mowing, rubbish dumping etc*	Ongoing see KD9 KD10	
WC37	Initiate public education campaign in conjunction with 4WD management actions including need for access by commercial fishers	N/A	
WC38	Ensure Council's ranger service telephone number is on signage, ranger vehicles and other locations, to enable community to assist in controlling unauthorised activities, etc	Not done N/A	
WC39	Initiate public awareness campaign about unauthorised companion animal usage, in conjunction with other actions	Ongoing	
WC40	Retain 7(f) Zone within Tweed LEP 2000 * on current alignment	N/A	
WC41	Investigate rezoning other applicable coastal lands within the 100 year hazard line to 7(f) Coastal Erosion	N/A	
WC42	Enforce 7(f) with a Development Control Plan for coastline	N/A	
WC43	All new tourist and residential development to be located landward of the 7(f) zone and/or best estimate 100 year hazard line where 7(f) does not exist	Completed - DCP B25	
WC44	Facilitate liaison between TSC, DL, DEC and TBLALC through the Tweed Coastal Committee regarding lands abutting reserves	Ongoing	Tweed Byron LALC Tweed Coastal Committee DPIE
WC45	Continue liaison between Council and DEC Parks and Wildlife Rangers regarding policing of unauthorised activity	Ongoing KD9	NPWS DPIE
WC46	Ensure integration of relevant plans of management in existence e.g. draft Tweed Coast Reserve Plan of Management, Duranbah Beach Dune Management Plan, Vegetation Plans of Management and SEPP 26 Plan of Management	Ongoing	
WC47	Undertake a Beach and Coastline Users Survey to collect and collate usage information	Done	
WC48	Preparation of Locality Plans for key locations, or activity nodes, and adjoining streets to provide implementation of the Coastline Management Plan in conjunction with the Tweed Coast Reserve Plan of Management, etc, in regard to planning of shade, shelter, toilet facilities, recreational and visual amenity aspects.	Ongoing - In progress	
WC49	DCP 48 Tweed Coast Building Heights and DCP 51 Tweed Coast Strategy can be amended to include: • a comprehensive set of guidelines for the coastline corridor to reflect its significance as a natural coastline including: - Principles for the whole coastline; - Principles for sub-units; and		

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
	- Detailed land use and master/locality plans according to priority. • Adopt standards to ensure no overshadowing of beaches and reserves by buildings, • DCP to include detailed guidelines for the type, location, and scale of uses appropriate within the public reserves, Include guidelines for the future desired character of the corridor and sub units and guidelines for the design of facilities to achieve the desired character.		
WC50	Prepare guidelines for the management and operation of facilities within the public reserves including appropriate leasing and licensing arrangements	Done – included on the *CRAPOS* Policy (Commercial Recreation Activities on Public Open Space)	
WC51	Maintain flexibility of control over uses in the coastline reserves by allowing only short to medium term leases	As above	
WC52	Ensure flexibility to meet changing needs for industry and activities within the coastline corridor	N/A	
WC53	Investigate opportunities for private supplier of transport	Not undertaken.	
KC1	Implement vegetation management actions in accordance with Action WC1 – Vegetation Management Plan	Superseded by actions in the KD CZMP	
KC2	Extend existing seawall fronting Bowls Club south, with sand nourishment program. Construction of the seawall must include: • Environmental Impact Assessment and approvals, and Appropriate access ways for all and revegetation	Superseded by actions in the KD CZMP	
KC3	Management of Cudgen Creek entrance in accordance with revised Estuary Management Plan	Superseded by actions in the KD CZMP	
KC4	Retain 7(f) Zone within Tweed LEP 2000 on current alignment	Superseded by actions in the KD CZMP	
KC5	Enforce the recommendations within the existing management plans for 7(f) zoned lands and enforce with a Development Control Plan for Coastline	Superseded by actions in the KD CZMP	
KC6	Redesign stormwater management systems with the Kingscliff Holiday Park upgrade so that no stormwater leaves the site by concentrated surface flow onto the beach. The Bowls Club car park runoff could also be diverted into an infiltration system.	Superseded by actions in the KD CZMP	
KC7	Implement illegal clearing strategy in accordance with Action WC22	Superseded by actions in the KD CZMP	
KC9	New development is required to provide public parking spaces on development consent	Superseded by actions in the KD CZMP	

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
KC10	Review off-leash dog exercise areas on Tweed Coast beaches when a future review of the Coastline Management Plan is conducted or when identifiable conflicts arise	Superseded by actions in the KD CZMP	
KC11	Move the South Kingscliff off-leash dog exercise area northwards to extend from the southern entrance wall of Cudgen Creek to the northern extent of the Salt development and undertake further consultation in relation to off-leash areas on South Kingscliff Beach	Superseded by actions in the KD CZMP	
KC12	Implement recommendations from Beach Vehicle Permit Policy review (April/May 2005)	Superseded by actions in the KD CZMP	
KC13	Maintain existing restrictions on powered vessels and PWC movement in Cudgen Creek	Superseded by actions in the KD CZMP	
KC14	Undertake public education program regarding the increase in clearing of vegetation to improve views from private property	Superseded by actions in the KD CZMP	
KC15	Public education on issues pertaining to dredging within Cudgen Creek entrance	Superseded by actions in the KD CZMP	
KC16	Implement Kingscliff Vegetation Management Plan in accordance with the principles of this Plan	Superseded by actions in the KD CZMP	
KC17	Develop community awareness of the impact of catchment activities on the quality of stormwater as part of LGA catchment management program	Superseded by actions in the KD CZMP	
FH1	Enforce policing of NSW Fisheries bag limits for taking of individual species	Implemented and Ongoing	
FH2	Implement vegetation management actions in accordance with Action WC1 – Vegetation Management Plan	See Action WC1	
FH3	Establish close working relationship with DEC in designating and protecting threatened species habitat, such as shorebird and turtle sites	Implemented and Ongoing	
FH4	Install relocatable signs and fencing to protect threatened species habitat sites	Implemented and Ongoing	
FH5	Install and maintain signage regarding unauthorised vehicular access to beach.	Implemented and Ongoing	
FH6	Physically restrict unauthorised vehicle access points	Implemented and Ongoing	
FH7	Implement actions to detour stormwater drainage at Duranbah Beach as outlined in the Duranbah Beach Dune Management Plan	Completed	
FH8	Undertake routine coastline monitoring to assist in monitoring of 50 year hazard zone line affectation.	Monitoring program	
FH9	Detailed review of hazard lines in 20 year intervals	Implemented and Ongoing	
FH10	Retain 7(f) Zone within Tweed LEP 2000 on current alignment	N/A	
FH11	Finalisation of Conservation Management Plan for Fingal Head Lighthouse	N/A	

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
FH12	Increase the heritage designation of Fingal Head Lighthouse within Tweed LEP 2000 through the Heritage Study	N/A	
FH13	Provision of sand at Duranbah from the TRESBP through a permanent outlet in sufficient quantities to sustain the existing dune and offshore bars, ensure long term surf quality and maintain sand cover over the second level rocks and Tyalgum wreck.	Implemented and Ongoing	TRESBPCo Crown Lands
FH14	Implement illegal clearing strategy in accordance with Action WC22	See KD 5, KD16, KD17	
FH15	Provision and maintenance of appropriate signage, fencing and vegetative cover in parkland and dune areas of Duranbah Beach in accordance with Dune Management Plan	Implemented and Ongoing	
FH16	Investigate the need for public safety measures for Fingal Headland including access and track maintenance matters	Implemented and Ongoing	
FH17	Formalise car parking area at Lighthouse Parade and investigate long-term measures for improved management of lighthouse access	Not undertaken.	
FH18	Monitoring undertaken as part of TRESBP should continue to be reported to the community.	Implemented and Ongoing	TRESBPCo Crown Lands
FH19	TRESBP monitoring program be reported throughout all available media, such as Council's Tweed Link	Undertaken.	TRESBPCo Crown Lands
FH20	Initiate adaptive public education program to coincide with protection of threatened species habitat	Implemented and Ongoing	
BC1	Install international standard educational signage at each rock platform entrance point – regarding the ecology and collection of intertidal species.	Not undertaken.	
BC2	Enforce policing of NSW Fisheries bag limits for taking of individual species	Implemented and Ongoing	DPI Fisheries
BC3	Implement vegetation management actions in accordance with Action WC1 – Vegetation Management Plan	See Action WC1	
BC4	For beachfront properties that are within the maximum 50 year hazard line, initiate combination of: ▪ detailed review of hazard lines in 10 and 20 years; ▪ investigate long-term planned retreat with either purchase or leaseback system to ensure retention of beach amenity and public foreshore access; ▪ foundation requirements in accordance with Action WC5 (deep pile foundations) ; ▪ redevelopment to be set back behind the maximum 50 year hazard line; and ▪ all lands within the maximum 100 year hazard line be maintained in the existing 2(a) zone:	Completed - but subject to DCP B25	
BC5	Public amenities building removed immediately after new Surf Club Building is erected and public amenities provided in the Surf Club building	Completed	
BC6	Finalise DCP 8 (Coastal Lands) to include recommendations of the Tweed Coastline Management Plan regarding Cabarita Beachfront development.	Completed - incorporated to DCP B25	

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
BC7	Increase foreshore facilities, between Pandanus Pde & Cypress Cr, such as BBQs, picnic shelters & seating	Completed	
BC8	Provide for tree landscaping at the end of Palm Avenue with seating and picnic facilities, with trees positioned to maintain views for residents	Not undertaken.	
BC9	Maintenance of site of Aboriginal cultural significance near Norries Head is undertaken in conjunction with Tweed Byron LALC	Refer to KD19	Tweed Byron LALC
BC10	Erect appropriate interpretive signage at Aboriginal cultural significance site	N/A	
BC11	Erect appropriate fencing at Aboriginal cultural significance site	N/A	
BC12	Continue to liaise with TBLALC regarding appropriate management action for culturally significant site	Implemented and Ongoing	Tweed Byron LALC
BC13	Implement stormwater outlet maintenance program, particularly after heavy rain events, to reshape dunes and remove ponding. Erect signs after rainfall events if ponding occurs to warn public of public health risk, if necessary	Completed	
BC14	Implement illegal clearing strategy in accordance with Action WC22	See KD16 KD17	
BC15	Determine the need for a new Holiday Park. If resolved that new park required, investigate all reasonable alternatives. Undertake community consultation at both stages.	Not undertaken.	
BC16	Should the proposed Holiday Park be constructed, ensure park does not encroach into 7(f) zoned land	N/A	
BC17	Implement Norries Headland Improvement Plan as adopted by Council 15/03/2000, which includes: ▪ Implement new car park at Norries Head, sensitive to existing native vegetation; ▪ Installation of new pathways/boardwalks and facilities ▪ Installation of signage at Pandanus Pde alerting people to the extra car parking at Norries Head and to the walkway. ▪ Investigate public safety at exit points on existing headland boardwalk	Partly Done – Ongoing.	
BC18	Remove Beach Vehicle Permit Access from Cudgen Nature Reserve and physically restrict unauthorised access points e.g. bollards or vegetation planting	Completed	
BC19	Develop community awareness of the impact of catchment activities on the quality of stormwater as part of LGA catchment management program.	Implemented and Ongoing	
BC20	Initiate public education campaign in conjunction with removal of Permit Holders Vehicles Permitted area from Bogangar	Completed	
HP1	Implement vegetation management actions in accordance with Action WC1 - Vegetation Management Plan	See Action WC1	
HP2	Install international standard educational signage at each rock platform entrance point – regarding the ecology and collection of intertidal species	Complete at Hastings Point near camping area.	DPI Fisheries
HP3	Enforce policing of NSW Fisheries bag limits for taking of individual species	N/A	DPI Fisheries

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
HP4	Continue to liaise with DPI Fisheries to find means to provide protection for Hastings Point rock platform in view of educational opportunities and ecological significance of the site	Not done – but a high priority for future actions	DPI Fisheries
HP5	Routine coastline monitoring	Commenced, not actively undertaken.	
HP6	Detailed review of hazard lines in 20 year intervals	Now DCP B25 to be reviewed	
HP7	Provide shade facilities using trees and improved shade structures at creek foreshore.	Completed	
HP8	Maintenance of site of Aboriginal cultural significance at Hastings Point is undertaken in conjunction with Tweed Byron LALC	Completed	Tweed Byron LALC
HP9	Erect appropriate interpretive signage at Aboriginal culturally significant site	N/A	
HP10	Erect appropriate fencing at Aboriginal culturally significant site	N/A	
HP11	Install further and modern picnic facilities & playground at headland park area	Completed	
HP12	Install low-key facilities at Hastings Point headland to increase passive recreation opportunities, such as seating	Completed	
HP13	Implement illegal clearing strategy in accordance with Action WC22	Incorporated in Councils Vegetation Vandalism on Public Land Policy	
HP14	Maintain existing restrictions on powered vessels and PWC movement in Cudgera Creek	Implemented and Ongoing	RMS, Marine Resuce
HP15	Erect warning signs regarding the dangers of crossing the Cudgera Creek entrance to access the beach	Not done (yet)	
HP16	Improve entry point to road crossing between Cudgera Creek foreshore park and shops/Holiday Park across Coast Road	Completed	
HP17	Assist Coastcare in promotion of their rock platform/intertidal areas educational program, via Council media	N/A	
HP18	Increase public reporting of monitoring data associated with the Hastings Point Dune Disposal System proposed extension	N/A	
HP19	Improve design of headland car park with landscaping and formal access ways leading away from the car park.	Not done – but a high priority for future actions	
PW1	Implement vegetation management actions in accordance with Action WC1 – Vegetation Management Plan	Incorporated in Councils Vegetation Vandalism on Public Land Policy	
PW2	Routine coastline monitoring, particularly in regard to the sections of Coast Road under threat in the long term (i.e. 100 year planning period)	Commenced, not actively undertaken. See KD1	

Action ID.	Description of Action	Status of Action (as of July 2019)	Management Linkages
PW3	Determine future management of kiosk located in Ambrose Brown Park	Completed	
PW4	Investigate the provision of facilities in the parkland on the west side of Coast Road, i.e. opposite Ambrose Brown Park. Safe pedestrian access and traffic calming would be required.	Completed	
PW5	Implement illegal clearing strategy in accordance with Action WC22	Incorporated in Councils Vegetation Vandalism on Public Land Policy	
PW6	To address car parking and vehicle access in Ambrose Brown Park: ▪ Redesign and formalise existing car parking, with permeable surface where practical ▪ Investigate additional car park locations to alleviate parking demands in peak usage times	Completed	
PW7	Review off-leash dog exercise areas on Tweed Coast beaches when a future review of the Coastline Management Plan is conducted or when identifiable conflicts arise	Completed – but the wider issues of animals on beaches (horses, camels etc is requiring a study of itself.	
PW8	Maintain existing restrictions on powered vessels and PWC movement in Mooball Creek	Implemented and Ongoing	RMS, Marine Resuce
PW9	Implement recommendations from Beach Vehicle Permit Policy review (April/May 2005)	Implemented and Ongoing	
PW10	Provide all-weather disability access at Potts Point with nearby disability designated parking area	Not yet done. To be incorporated in Councils Draft Access and Inclusion Plan 2018-2021.	
PW11	Increase Council Ranger presence in the area due to the beaches' relative remoteness	See KD9	
PW12	Develop community awareness of the impact of catchment activities on the quality of stormwater as part of LGA catchment management program.	Implemented and Ongoing	
PW13	Greater enforcement of regulations by relevant agencies TSC, DEC, Department of Lands	Implemented and Ongoing	DPIE Crown Lands NPWS

APPENDIX D
STAKEHOLDER ENGAGEMENT WORKSHOP SUMMARY

STAKEHOLDER ENGAGEMENT WORKSHOP - SUMMARY

Subject Tweed Coastal Management Program Scoping Study – Stakeholder Engagement Workshop

Date Wednesday 24th July – from 13:00 to 16:00

Location Murwillumbah Administration Office
Civic and Cultural Centre
10-14 Tumbulgum Road
Murwillumbah NSW 2484

1 INTRODUCTION

The Tweed Shire coastal zone is a major social, environmental and economic asset for Tweed Shire Council. It contains beautiful iconic beaches and estuaries, and areas of social and cultural significance. Along with being a key economic driver for the region, the coastal zone also contains a passionate local community, who are heavily invested in its utility and management. Historically, Tweed Shire Council has recognised these values, and been a pragmatic and proactive manager of its coastal zone. Council now wishes to continue this legacy and implement sustainable coastal management practices for future generations.

Under the recent NSW Coastal Reforms, future coastal management for the Tweed Shire Local Government Area (LGA) will take the form of a Coastal Management Program (CMP). As part of these reforms, Tweed Shire Council is required to prepare a CMP for its LGA coastal zone in a staged process over the next few years.

The purpose of a Coastal Management Program (CMP) is to set the long-term strategy for the coordinated management of the coastal zone. Developing a CMP will help councils clearly identify and balance competing interests and priorities in the coastal zone. Management actions will consider the benefits from economic growth, development and public access to the coastal zone along with the need for protecting and enhancing coastal environments and managing the risk to human life and property.

In order to develop a scoping study, Council needs to engage with key stakeholders across the coastal zone, and provide an opportunity for stakeholders to contribute and have their say regarding the planning for, and implementation of, the CMP. To this end, Tweed Shire Council hosted a Stakeholder Engagement Workshop to assist with the study.

2 THE STAKEHOLDER WORKSHOP

2.1 Workshop Structure

The workshop was held on the afternoon of Wednesday 24 July 2019 at Councils Murwillumbah Administration Office. The Workshop included an initial presentation by Water Technology Project Manager Chris Beadle to provide background and context of the CMP process, and was then followed by a series of open forum, round-table discussion sessions.

Figure 2-1 The Workshop Round-Table Sessions

The purpose of the workshop was to:

- Communicate the strategic context and drivers of the CMP to participants;
- Confirm management roles and responsibilities across coastal zone;
- Identify key coastal management issues, including historical, present day and emerging/future; and
- Identify any tacit knowledge or non-documented issues and/or risks.

The structure of the workshop is given below.

Table 2-1 Stakeholder Engagement Workshop Structure

Time	Component
13:00 – 13:10	**Introduction** ■ Welcome and introductions ■ Outline of the day
13:10 – 13:20	**Background & Strategic Context into the Coastal Management Program (CMP)** ■ Snapshot of the NSW Coastal Reforms ■ The Tweed Shire Coastal Management Program ■ Purpose, Vision and Objectives for the CMP
13:20 – 14:20	**Round-Table Discussion #1: Current Coastal Management Arrangements, Roles & Responsibilities** ■ Identification of roles & responsibilities across the coastal zone ■ Round-table discussion amongst stakeholders of current coastal management arrangements, what has worked? What hasn't? What could be improved? ■ Key data repositories & databases

Time	Component
14:20 – 14:30	**Afternoon Tea Break**
14:30 – 15:45	**Round-Table Discussion #2: Identification of Key Management Issues** ■ Outline of previous studies and coastal / estuary management plans ■ Round-table discussion amongst stakeholders of key coastal and estuary management issues across the LGA, including historical, present and future issues ■ Identification of important values and high priority threats
15:45 – 16:00	**Wrap Up and Discussion of Forward Program** ■ Summary and conclusion ■ How to follow up with the project group regarding additional data & information ■ The way forward for the project

2.2 Attendees

Overall 25 attendees were invited, and of these a total of 12 attended on the day. Organisations in attendance included Tweed Shire Council, Department of Industry – Lands, NSW National Parks and Wildlife Service, DPI Fisheries and Byron Shire Council. A list of attendees is provided in Table 2-2

Table 2-2 Workshop Attendees

Name	Title	Organisation	Attended?
Jane Lofthouse	Coordinator Sustainability & Environment	Tweed Shire Council	Yes
Tom Alletson	Senior Program Leader – Waterways		No
Mark Kingston	Project Officer – Biodiversity Policy		No
Scott Hetherington	Senior Program Leader – Biodiversity		Yes
Jodie Hewett	Recreation Planner		Yes
Mark Tickle	Economic Development Officer		Yes
Stewart Brawley	Manager Parks & Active Communities		Yes
Abby Wallace	Communication & Engagement Specialist		No
Pam Gray	Program Leader – Pest Animals - Wildlife Protection		No
Robyn Eisermann	Acting Unit Coordinator – Strategic Planning & Urban Design		Yes
Andrew Illingworth	Coordinator Tweed Holiday Parks		Yes
Danny Rose	Manager Roads & Stormwater		Yes
Anthony Burnham	Manager Water & Wastewater		Yes

Name	Title	Organisation	Attended?
Ben Fitzgibbon	Senior Natural Resources Officers (Coast & Estuaries)	NSW DPIE	No
Megan Gallagher	Coastal Management Specialist	Department of Industry – Lands	Yes
Derek van Leest	Group Leader Property Management	Department of Industry – Lands	No
Josh Chivers	Senior Project Officer (Coastal Landscapes)	NSW NPWS	Yes
Principal Manager	NSW Maritime	Department of Transport	No
Leweena Williams	Tweed Byron Local Aboriginal Land Council	Tweed Byron Local Aboriginal Land Council	No
Brendan Logan	Project Manager Tweed Sand Bypassing	NSW Crown Lands	No
Jonathan Yantsch	Fisheries Manager – Coastal Systems	DPI Fisheries	Yes
Shannon Hunt	Beaches & Waterways Development Officer	City of Gold Coast	No
Chloe Dowsett	Coastal & Estuary Officer	Byron Shire Council	Yes
Chris Beadle	Senior Engineer	Water Technology	Yes

3 OUTCOMES

3.1 Current Coastal Management Arrangements, Roles & Responsibilities

One of the objectives of the CMP is to facilitate the integration of management responsibilities across Tweed Shire Council, adjoining councils, land managers and public authorities. In order to develop a robust CMP that achieves Councils objectives now and into the future, it will be necessary to have an in-depth understanding of historical coastal management arrangements for the Tweed, including the roles and responsibilities of the various agencies managing the different areas of the coastal zone.

The intent of the round table sessions was to help to identify the strengths and weaknesses of past and present management actions, any previous barriers to implementation, and what could be adapted going forward for better implementation.

The task still requires input from The NSW Department of Planning, Industry and Environment (DPIE), who were not able to attend on the day. This will be facilitated through subsequent communications and engagement.

Table 3-1 Roles and Responsibilities across the Coastal Zone

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Tweed Council – Asset Management					
Tweed Shire Council	Asset management - General	Crown Lands Tweed Byron LALC Transport for NSW NPWS	Development of assets that are fit-for-purpose and resilient to climate change impacts and increased use.	Obtaining the necessary funding for capital and maintenance works. Access issues where assets exist on land managed by others.	Increased funding required for adequate maintenance of assets. Establishing protocols for accessing assets on land managed by others.
Tweed Shire Council	Asset Management – Road & Traffic Assets & Infrastructure	Crown Lands Transport for NSW	Maintain road infrastructure and transport pathways for safe and efficient road travel across the LGA.	Funding Natural disasters Erosion management Increasing population and visitor numbers	Proactive investment needs to be undertaken based on an understanding of projected road usage over management timeframes.
Tweed Shire Council	Asset Management – Coastal and Estuary Assets & Infrastructure	Crown Lands DPIE (Environment) MIDO	Sustainable life-cycle management of coastal & estuary assets. Establishing and ensuring resilience of coastal assets to climate change impacts.	Obtaining the necessary funding for capital and maintenance works. Approvals process Access issues where assets exist on land managed by others. Impacts of climate change on coastal and estuary assets.	Gaining clarity around the ownership and management responsibilities for coastal infrastructure with DPIE and Crown Lands.
Tweed Shire Council	Asset Management – Stormwater & Drainage Assets & Infrastructure	Fisheries DPIE	Effective performance of assets for flooding and overland flow Maintaining the environmental and ecological values of the waterways through effective stormwater & pollution management.	Vegetation management (where estuary vegetation encroaches on drainage infrastructure) Climate change impacts, including increased rainfall intensity and SLR Funding Approvals process	Strategic management and planning for stormwater and drainage assets
Tweed Shire Council	Asset Management – Open Space Assets	Crown Lands NPWS Tweed Byron LALC Transport for NSW	Open space management that ensures sustainability of open space assets. Assets that are fit-for-purpose and resilient to climate change impacts and increased use.	Ongoing demand for additional open space assets on coastal foreshore. Long term shoreline recession encroaching on coastal spaces. Impacts of climate change on open space assets, including impacts of SLR encroaching on estuary adjacent spaces.	Improved / more efficient coordination across Council Units and State Agency asset management.
Tweed Shire Council	Car Parking - Public	Crown Lands Tweed Byron LALC Developers DPIE (Planning)	Ensuring equity and equitable access to parking across the LGA, including the coastal zone.	Funding Managing demand during peak periods Maintaining visual amenity	Managing demand during peak periods needs to be better managed, particularly at boat ramps and beach access points.

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Tweed Shire Council – Issue Management					
Tweed Shire Council	Event Management	Council (Roads, P&AC, S&E) Crown Land Police Emergency Services Transport for NSW Local Community	Successful, well managed events that contribute to the social and cultural wellbeing of the local community.	Community fatigue Underestimation of environmental, economic and social impacts of events	There needs to be a clear identification of what the community considers to be acceptable limits for events – and plan accordingly. Processes need to be established so that there is a clear understanding of when a DA is required.
Tweed Shire Council	Cultural heritage management	NPWS Crown Lands Tweed Byron LALC DPIE (Heritage)	Reduce impact of coastal zone use on cultural heritage. Development of creative design processes to protect cultural heritage. To develop an understanding of cultural heritage	Legislative frameworks and the associated costs of assessment.	An increased focus on forward planning and education of cultural heritage issues across Council. Developing creative design processes (different way of doing things) to protect and enhance cultural heritage.
Tweed Shire Council	Recreational use of the coastal zone	Crown Lands DPIE (Planning) DPIE (Environment) Tweed Byron LALC Maritime Services	To provide for, and manage, recreational use of the coastal zone and its associated social and environmental impacts	Funding for infrastructure / maintenance The legislative framework (i.e. the Local Government Act and the Crown Lands Management Act) Competing objectives, both within Council and across Agencies	Increased coordination between agencies such as Crown Lands
Tweed Shire Council	Beach Nourishment	Crown Lands Fisheries MEMA MIDO NPWS DPIE (Planning & Environment) EPA	Recreational beach amenity for the local community. Enhancing and maintaining the local environmental & ecological values of the beach Providing storm erosion protection for coastal infrastructure.	Funding Approvals process Coastal Hazards (the variability in severity and frequency of storms can make planning difficult)	Possibilities to work with the MIDO dredging program to provide a suitable source(s) of sand. Streamlining the approvals process would allow for a more agile response to storm erosion Development of long term strategies for nourishment programs including Tweed Sand Bypass.
Tweed Shire Council	Estuary Management	Maritime Services Fisheries DPIE (Environment) Tweed Byron LALC Recreational Users	Achieving the Vision and Outcomes of the Tweed River Estuary CMP and Tweed Coastal Estuaries CZMP.	Funding Coastal and Estuarine Hazards Climate Change Impacts Population and Development Pressures Limited public waterway access.	Funding for the implementation of recommended estuary management actions
Tweed Shire Council	Floodplain Management	DPIE (Environment) ??	Reduce the vulnerability to flood hazards in order to protect the health, safety and welfare of the community's residents and visitors. Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of flood hazard events.	Funding Natural disasters & flooding events Climate change related impacts such as increased rainfall intensity, severe storm frequency and SLR.	A gaps analysis and assessment to establish what studies have been undertaken what studies and management plans are required. Proactive investment in flood infrastructure and implementation of actions identified in FPRMPs.
Tweed Shire Council	Vegetation protection and management	Local Land Services Dunecare / Landcare Vegetation management contractors NPWS Tweed Byron LALC Neighbouring Residents	To maximise the extent, protection and condition of coastal vegetation	Stress induced by recreational use Future increases to recreational use brought about by population increase and increased tourism demand Coastal hazards and climate change impacts Funding	Improvement of the coordinated management of coastal vegetation and identify priorities for investment (including planning for future shoreline recession). Identification, protection and enhancement of vegetation corridors.

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Tweed Shire Council	Fauna protection & conservation (including threatened species)	DPIE (Environment) NPWS Tweed Byron LALC Local Land Services Tweed Valley Wildlife Carers	To protect native fauna and recover threatened species	Stress induced by recreational use Future increases to recreational use brought about by population increase and increased tourism demand Coastal hazards and climate change impacts on coastal dunes. Funding	Improvement of the coordinated management of coastal ecosystems and identify priorities for investment (including planning for future shoreline recession). Identification, protection and enhancement of habitat corridors.
Tweed Shire Council	Management of licenced discharge into Waterways	NSW EPA DPIE (Environment?)	To achieve development that is consistent with the social, economic and environmental values of the coastal zone and the shire in general.	Inefficiencies of having required approvals from multiple organisations with sometimes conflicting objectives and values.	A whole of government approach to approvals would provide for greater efficiency, rather than a piecemeal approach across multiple organisations.
Tweed Shire Council – Land Management & Planning					
Tweed Shire Council	Beach access management	Crown Lands SLSCs Emergency Services Commercial Fishers Local Resident Tweed Byron LALC	Appropriate, resilient and safe beach access for the local community that has minimal environmental and ecological impact.	Funding Management of private beach access points. High visitor and weekend use. Coastal hazards and climate change impacts on coastal dunes.	Reduction in beach access points on public land.
Tweed Shire Council	Management of foreshore parks for recreation	Tweed Byron LALC Crown Lands NPWS SLSCs	To protect and restore the biodiversity and ecological values for foreshore parks. To maintain recreational and social amenity across the foreshore parks & related assets. To balance protection vs use of these zones.	Erosion impacts Encroachment impacts of climate change & SLR on open space Population and visitor growth Funding	A more detailed understanding of the carrying capacity of individual sites. Establishing better management processes for commercial use of these zones. Establishing better management processes for potentially high impact recreation use
Tweed Shire Council	Commercial use of the public space in the coastal zone (including filming)	Crown Lands DPIE (Planning) Tweed Byron LALC Local Community and Businesses	To provide for, and manage, the commercial use of the coastal zone and its associated social and environmental impacts. To provide well managed and equitable access for commercial operators.	Reaching agreement across agencies and with the local community as to what is an “appropriate” level of commercial activity across the coastal zone – particularly given the competing objectives such as economic development vs environmental protection vs recreational use. Community fatigue with filming in the coastal zone.	A clearer understanding across agencies of expectations and objectives for commercial activity across the coastal zone. Identification of “No Go” areas for filming. Establish guidelines for appropriate type, location , size and scale for filming in the coastal zone.
Tweed Shire Council	Surf Life Saving Clubs	SLS NSW Crown Lands	Robust planning for considering new, upgrades and extensions to SLS facilities in the coastal zone Appropriate levels of service and facilities to support services	Funding Managing the expectations of the SLS Clubs & historic arrangements.	Consideration of relocation of infrastructure.
Tweed Shire Council	Care, control and maintenance of Council managed Holiday Parks on Crown Land	Tweed Holiday Parks Crown Lands Tweed Shire Council The Tweed Byron LALC Industry Associations	Reinvest to maintain and improve park assets Improved access to waterways adjacent to parks	Competitors Local political climate The broader economic climate Storm related impacts such as erosion and other damage	Greater revenue from the Parks would allow for more revenue & provide more opportunities for reinvestment in the Parks and public land in the coastal zone generally.

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Tweed Shire Council	Bushland Reserve Management – including weed control, bush fire hazard reduction and bushfire risk management, management of pest animals, maintenance and installation of fencing and access points, and coordination of works with adjoining land managers.	Crown Lands NPWS Tweed Byron LALC Rural Fire Service Contractors Neighbouring Residents Recreational Users Far North Coast Weeds	To manage bushland reserve in a manner that reduces the risk of fire escaping its boundaries – in accordance with the Rural Fires Act 1997. To maximise the extent, protection and condition of bushland vegetation and minimise pest disturbances. To manage recreational use of bushland reserves.	Funding Population and visitor growth Unregulated commercial activity Bushfire hazards, and future changes to bushfire hazards associated with climate change	In order to better manage the Tweed Bushland Reserve, a better understanding of the local values (environmental, economic, social & cultural) is required. From here, the spectrum of recreational use can be identified and opportunities for investment identified.
Tweed Shire Council	Development planning and control	DPIE (Planning) Development proponents Fisheries Tweed Byron LALC	To achieve development that is consistent with the social, economic and environmental values of the coastal zone and the shire in general. To provide objective, merit-based development assessments. To manage the cumulative impact of development across the coastal zone in a sustainable manner.	Conflicting planning controls	Levels of planning controls and plans are consistent – Regional Plan, SEPPs, LEPs, DCPs
Tweed Shire Council	Development planning and control – coastal hazards and planned retreat	Asset Managers Private Landholders Development proponents	Minimise existing lands and assets exposed to coastal hazards both now and into the future.	Compensation required to support planned retreat is significant. Landholders rights and perceptions. How to adaptively reuse land that has been retreated from.	Strategic planning needs to address how to adaptively reuse land that has been retreated from. Need to identify vulnerable areas that will be retreated from / abandoned and in what time scales.
Tweed Shire Council	Development across and/or under Waterways	DPIE (Planning) Fisheries Crown Lands Tweed Byron LALC and the Aboriginal Advisory Committee	To achieve development that is consistent with the social, economic and environmental values of the coastal zone and the shire in general.	Inefficiencies of having required approvals from multiple organisations with sometimes conflicting objectives and values.	A whole of government approach to approvals would provide for greater efficiency, rather than a piecemeal approach across multiple organisations.
Department of Planning, Industry and Environment (DPIE)					
Environment, Energy and Science Group	Administer the Coastal Management Act	Local Councils The NSW Coastal Council	To ensure the NSW coastal environment is managed in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.	Availability of funding. Evolving legislative and management framework. Confusion on the linkages between relevant legislation post coastal reforms.	Greater alignment of CMP's with the Local Community Strategic Plan
Environment, Energy and Science Group	Administer the NSW Coastline Management Manual	Local Councils	To ensure councils and state agencies are adequately supported in coastal management through implementation of CZMP (until Dec 2021) and development and implementation of CMP's under the CM Act and NSW Coastal Management Manual.	Currently inadequate guidance around economic assessment requirements for coastal management actions No guidance on mapping coastal vulnerability area Manual large and bulky – hard to interpret what the acceptable requirements are when considering all the 'recommended' requirements in the manual	Greater alignment of CMP's with the Local Community Strategic Plans

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Environment, Energy and Science Group	Provide funding and technical Assistance to local councils through the Coastal and Estuary Management Program; and the provision of technical advice & financial assistance for Local Governments in Coastal & Estuary Management	Local Councils	Help fund implementation of certified CZMP's and development and implementation of CMP's Informed decision making Appropriate expenditure Implementation of CMPs	Funding issues – grants program a bit inflexible - Must have a certified plan for implementation projects - Onerous economic assessment requirements (must have CBA for capital works projects over 1M even if all public benefit) EES local staff resources – local staff stretched across region, technical and policy assistance can take some time to receive given their competing priorities	Review of grant requirements
Environment, Energy and Science Group	Flood Risk Management	Local Councils	Flood risk managed and mitigated through implementation of flood risk management plans Community safety Risk/$$ reduction	Development pressure Climate change Local government policies	Greater Alignment with the Local Community Strategic Plan Development of Flood warning systems
Environment, Energy and Science Group	Jointly Administer the Marine Estate Management Act; and MEMS – risk-based framework implementation and monitoring	DPIE – Fisheries DPIE – Planning LLS Local Councils	To ensure strategic, coordinated & holistic decision making around the marine estate. Data on estuary health, stressors and recreational WQ Derive ecological effects models based on data and research Work with local communities to determine community values	Inconsistencies with the objectives of local government, and lack of uptake. Uncertainty on avai8lability of funds through MEMS and the linkages with CMP's (will MEMA fund relevant actions in a CMP?)	Expand MEMS funding Involve local government partners Involve academic partners
Planning and Assessment	Administers CM SEPP, LUP for coastal zone, Guides Development assessment, assesses planning proposals, strategic planning, delivery of MEMA projects	DPIE – EES, DPI, Crown Lands Local Land Services	More strategic programs Better coordination (between state and councils, among councils) Improved environmental outcomes Better quality coastal development Better identification and management of coastal hazards (CCVA)	Effective engagements Lots of stakeholders Different interests and capacities Funding Changing organisational priorities	Info sharing and coordination to harness collective knowledge
Fisheries	Administer the Fisheries Management Act	Tweed Shire Council DPIE Private landholders	To ensure decisions made about land management & development avoids and minimises impacts fisheries resources. To ensure that planning and developments are designed, constructed, and operated in accordance with the objects of the Act.	Decisions and developments are often inconsistent with the objects of the Act due to competing objectives.	Knowledge, training and awareness of local government staff – which can be addressed through Council education workshops under MEMS.
Fisheries	Jointly Administer the Marine Estate Management Act	Tweed Shire Council DPIE Private landholders	To ensure strategic, coordinated & holistic decision making around the marine estate.	Inconsistencies with the objectives of local government, and lack of uptake.	Marine Estate Management Strategy is a multi-agency strategy that considers holistic management of the marine estate (quadruple bottom line) and is not just a Fisheries-centric strategy.

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
NPWS	NPW Act and management of reserves	Tweed Shire Council Crown Lands Tweed Byron LALC	The conservation of nature, including habitat, ecosystems and heritage.	A lack of understanding of Council's objectives.	Better coordination with Council, including establishing Councils objectives across adjacent land.
NPWS	Coastal Dune Management	Tweed Shire Council Crown Lands Tweed Byron LALC	Healthy and stable coastal dune systems that support environmental & ecological values and provide coastal protection. Well managed and sustainable access to the coastal zone.	A lack of clarity around emergency actions.	Provision of clarity with Council and Crown Lands regarding emergency actions (such as for bushfires and storms).
NPWS	Management and conservation of flora and fauna across the NPWS coastal zone (including threatened species and endangered ecological communities)	Tweed Shire Council Crown Lands Tweed Byron LALC	Management and protection of species and ecological communities Successful breeding events (such as for birds and turtles etc)	Ecological threats, including weeds, pests, disturbance from humans and pets, and fire. Limited opportunities for new habitats.	NPWS are under-resourced, with officers spread thin across the coastal zone. Better coordination of management activities with other land managers resulting in efficiencies.
NPWS	Management & protection of Aboriginal cultural heritage and European heritage	Tweed Byron LALC Crown Lands Tweed Shire Council	Aboriginal and Non-Aboriginal heritage recorded, conserved and protected.	Coastal hazards and climate change impacts affecting areas of heritage significance	NPWS are under-resourced, with officers spread thin across the coastal zone.
Crown Lands	Ownership and maintenance of maritime assets including harbours (Tweed Heads Boat Harbour), breakwaters, training walls, lighthouses, TSB & navigational dredging.	Tweed Shire Council (TSC) DPIE, MEMA, Fisheries and NPWS Marine Infrastructure Delivery Office (MIDO) Transport for NSW Tweed Byron LALC Fishers, boaters and commercial operators.	Maintenance of assets and navigation channels to state owned infrastructure	Funding Approvals for works Coordination amongst the numerous agencies and stakeholders Balancing needs and perceptions of stakeholders	Coordination of agencies, especially Crown Lands, Transport for NSW and MIDO – to better utilise funds and streamline the approvals process
Crown Lands	Crown Lands Management Act & Crown Lands Plans of Management	Crown Land Managers Tweed Shire Council	Consistency between Crown Lands Plans of Management and the Crown Lands Act.	Ambiguity amongst other agencies regarding Crown Lands roles & responsibilities	Consistency between PoMs and CMPs
Crown Lands	Acknowledgement of interests and obligations under the Aboriginal Land Rights Act, and the Native Title Act.	Tweed Byron LALC Tweed Shire Council	Recognition of the spiritual, social, cultural and economic importance of land to the state's Aboriginal peoples.		
NSW EPA	Administration of environment protection licences, including at: Wastewater Treatment Plants Landfill Sites and Quarries Disused Landfill Site Under Remediation	Tweed Shire Council Other Licensee's	Proper and efficient management of operations and systems system to minimise harm to the environment and public health. Publishing of Pollution Incident Response Management Plans and pollution monitoring data	Failure to abide by licence conditions Operational errors Climate Change and sea level rise	Ensuring that appropriate systems and training are in place and are followed to prevent incidents.
NSW EPA	Enforcement of operating conditions and pollution reduction programs	Tweed Shire Council	Adherence of licensee's to licence conditions	Finite and oftentimes strained resources Failure to abide by licence conditions Operational errors Climate Change and sea level rise	

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Transport for NSW (including RMS)					
NSW Maritime (TfNSW)	Maritime Safety, Waterway Management, Pollution from vessels - Through the administration of relevant legislation – Marine Safety Act, POEO, Marine Pollution Act and Ports and Maritime Administration Act	Crown Lands Fisheries MEMA NPWS DPIE (Planning & Environment) EPA Police F+R NSW Local Councils	Maintain access to waterways, minimise harm to the environment, implement State Boating Plans, Maintain and equitable use of the waterway systems.	Competing priorities with land based stakeholders.	Illegal development impacting the river system SEPPs/LEPs consistent with waterway management strategies
Byron Shire Council					
Byron Shire Council	Council responsible for management of the Coastal Zone across the Byron LGA, from Broken Head to Wooyung.	Crown Land DPIE Fisheries National Parks MEMA Tweed Byron LALC	Sustainable management of the Byron LGA Coastal Zone, both now and into the future. Protection of the coastal zone from pressures associated with tourism, development and coastal hazards.	Policy & legislation Court Actions Historical / legacy issues Coastal Hazards Funding Diverse opinions and conflicting uses and pressures across the coastal zone.	Long term coordinated strategies, such as the forthcoming Coastal Management Program(s)
Byron Shire Council	Development and implementation of Byron LGA Coastal Management Programs(s)	Crown Land DPIE Fisheries National Parks MEMA Tweed Byron LALC	Sustainable management of the Byron LGA Coastal Zone, both now and into the future. Protection of the coastal zone from pressures associated with tourism, development and coastal hazards. Prevention of negative impacts to adjacent LGA coastal zone (Tweed).	As above.	Increased funding required to properly undertake the required CMP process Increased and improved coordination with other agencies
Byron Shire Council	Land Manager of Council Land, and some Crown Land.	Crown Lands	Protect natural and cultural values of the coastal zone. Mitigate and mange impacts of coastal hazards on the values of the coastal zone.	Coastal Hazards (such as storms erosion and inundation) Climate Change	
Byron Shire Council	Management of stormwater operations		Maintain the environmental and ecological values of the LGA waterways through effective and appropriate stormwater management	Ageing infrastructure Funding	Increased funding
Byron Shire Council	Management of estuaries including ICOLLS	Crown Lands NPWS DPIE	Protect natural and cultural values of the LGA estuaries Mitigation and management of flooding across the estuaries	Weather (rainfall, coastal processes etc) Flooding impacts Community expectations regarding ICOLL management Funding	Increased funding
Tweed Byron LALC					
Tweed Byron LALC	Manager, Aboriginal heritage, land people culture & heritage, broader heritage	Management of Lands. NSWALC, crown land claims, NPWS, State Govt. OEH, CCC, DPIE EPA	To achieve economic and social long-term solutions for the indigenous Community	Tweed Byron LALC	Manager, Aboriginal heritage, land people culture & heritage, broader heritage

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
Community and Industry Groups					
Commercial Boating and Tourism Operators	Provision of tourism services	Council Maritime Services (MS) DPI - Fisheries Tweed Tourism Co	Support sustainable/passive healthy river tourism Ecological bank erosion treatments River access - safe and appropriate Limit expansion of industry to sustainable levels	Coordination between agencies (re goals) Approvals by MS for events Funding for dredging navigation channels. Upgrade/maintenance of jetties.	Inappropriate wakeboard/towing Navigation channels Bank erosion Improved riparian areas Protection of seagrass from boating Navigation markers improved
Commercial Fishers	Provision of food supply, economic and social benefits	DPI – Fisheries	Sustainable management of fish stocks Maintain appropriate navigation channels	Economic and environmental pressures Unsustainable fishing methods	Lobby for retention of riparian and aquatic habitat Voice for climate change action for retention of habitat
Dune Care & Land Care Groups	Restoration and maintenance of bushland and natural areas	TSC Crown Lands DPI NSW Environmental Trust Schools LLS Resident Associations Land owners TBLALC	Strengthening of littoral rainforest and riparian and aquatic habitat Healthy and resilient coastal vegetation communities Public Awareness of value of coastal ecosystem and the effects of degradation and public use	Population pressure Funding availability Engaging the wider community Reliance on volunteer labour	Increased compliance and monitoring Public education
Resident & Advocacy Groups	Community voice and advocacy	TSC Crown Lands Community Groups Resident Associations TBLALC	Retaining beach access Protecting the natural resources and coastal waterways health	Limited representation and self-interests	Increased engagement in decision making processes
Bushland Restoration Industry	Habitat and bushland restoration	Council TBLALC/traditional owners NPWS Care Groups Private owners Crown Lands Tweed Holiday Parks Developers	No net loss of native vegetation on Tweed Coast Increase in area of native vegetation Reduce % cover of weeds Maximise structure and floristics Protection and management of threatened species including – Koala; Bush stone-curlew; Osprey Protect existing and allow for migration of aquatic vegetation Optimise ecological quality in agricultural areas	Funding Ideological community opposition Weeds and pests Lack of strategic direction to implement restoration of native vegetation (not resourced adequately) Increasing human impact due to use of coast Increasing population Climate change and Sea Level Rise Weather events	Better coordination by land managers Long term funding consistent increase Information is available in correct documents
Tweed Sand Bypass Project	Management of the Tweed Sand Bypass under NSW *Tweed River Entrance Sand Bypassing Act 1995* and Qld *Tweed River Entrance Sand Bypassing Project Agreement Act 1995*	NSW State Government Agencies Qld State Government Agencies City of Gold Coast Tweed Shire Council	Maintain a navigable entrance to the Tweed River Provide an ongoing supply of sand to the southern Gold Coast beaches	Natural Coastal Processes Natural Hazards Climate Change Governmental department reshuffles and resulting ambiguity	Ongoing discussions and transparency around future funding arrangements and management responsibilities
Local Agriculture Stakeholders	Ecosystem services potential Manage ASS runoff	Sugar Research Australia Universities Agricultural Community DPI	Improve water quality discharge from agriculture Continue sustainable agriculture	Economic cost of not doing best management practice Climate change and sea level rise	Continue good working relationships with local government Education of farmers

Organisation	Management Role/Responsibility	Liaison with other Organisations	Desired Outcomes	Challenges to Delivery	Opportunities & What Could be improved upon?
		DEH Fisheries			Understand 900mm SLR by 2100 and impacts

3.2 Identification of Key Coastal & Estuary Management Issues

A key component of the Stage 1 Scoping Study is to determine the scope of key coastal management issues for the Tweed Shire LGA. Identifying these issues will inform the future direction of the CMP. A lot of information regarding these issues can be garnered from historical studies, data, management strategies and legislation. However, there is a significant amount of tacit knowledge across the Stakeholder group that added significant insight to this assessment.

A number of key management issues for the region exist given the complexity of the catchment in terms of environmental value, increasing population numbers and development, recreational and industrial/agricultural pressures. Issues were broken down into six overarching categories, outlined below.

- *Land use intensification:* Potential threats including for example stormwater runoff and discharge, environmental impacts and pressures on existing ecosystems, pollution etc.
- *Resource use and conflict*: Conflicting resource use of foreshore/waterway areas and facilities, and recreational pressures.
- *Natural hazards*: resulting in threats such as coastal erosion & inundation, cliff instability > both under present day conditions and increase over future timeframes due to climate change.
- *Public safety:* Those from natural hazards (flooding etc) but also others including degraded and failing structures etc.
- *Governance:* This may include governance ambiguity, lack of resources and funding, unclear or inadequate regulation and lack of compliance etc.
- *Information Gaps:* Are there any significant data gaps that may represent a risk to effectively managing the coastal zone?

During the workshop session, each issue was assigned a priority level (low, medium or high), and the timeframes over which the issues are occurring was discussed - being Short Term (S), Medium Term (M), Long Term (L) and Ongoing (O). Stakeholders provided a preliminary level of detail for each issue that is intended to provide a basis for further investigation during latter stages of the CMP.

Outcomes of the roundtable are discussed in Table 3-2 through to Table 3-7 below.

Table 3-2 Key Issues - Land use intensification & environmental impacts

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Land use intensification & environmental impacts	Water pollution on environmental values - urban stormwater discharge	H	O	This threat is identified as part of the Marine Estate Management Strategy state-wide threat and risk assessment (MEMS TARA), and the Coastal Management SEPP (CM SEPP)
Land use intensification & environmental impacts	Water pollution on environmental values - point source pollution and sewage overflows (such as outfalls, STPs, etc)	H	O	As above.
Land use intensification & environmental impacts	Water pollution on environmental values - Agricultural diffuse source runoff (ASS / pollutants)	H	S	Identified in MEMS. Hotspots include Cudgera Ck, Christies Ck and mid-upper Tweed River estuary
Land use intensification & environmental impacts	Clearing riparian and adjacent habitat including wetland drainage	M	O	Addressed in MEMS (partially), and the Biodiversity DCP. Aquatic vegetation under the Fisheries Management Act. Hot spots include Cobaki Lakes.
Land use intensification & environmental impacts	Clearing littoral rainforest habitat	L	O	Occurring incrementally via beach access incursions. Hotspots include Fingal Head and Kingscliff. SEPP Coastal Management area.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Land use intensification & environmental impacts	Past riparian clearing resulting in bank erosion.	L	M	One of the contributors to river bank erosion.
Land use intensification & environmental impacts	Clearing terrestrial habitat as a result of “legacy zoning”.	M to L	L	Addressed in the Vegetation SEPP, LEP and Biodiversity DCP.
Land use intensification & environmental impacts	Management of pest species	H	O S	Key issues include Foxes, Cats, Indian Myna, Cane Toads and Bitou Bush. Tilapia are an emerging pest species across the Tweed River and coastal estuary catchments.
Land use intensification & environmental impacts	Disturbance of contaminated land	M to L	M	Associated with dredging of Tweed Heads boat harbour (but is well understood and managed).
Land use intensification & environmental impacts	Wildlife disturbance and impacts to ecological health by recreational activities such as dog walkers, 4WD, marine vessels etc.	H	O S	Off-leash dogs (permitted and in on-leash & prohibited areas); 4WD (permitted and unauthorised); filming; events (med – large community); commercial horse / camel rides; horse riding; littering; illegal camping; vegetation vandalism; fishing comps; boating & other watercraft.
Land use intensification &	Increased sedimentation (e.g. infilling channels and changing flows)	M	O	Flood related movement

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
environmental impacts				Navigational access - needs to be addressed in conjunction with the Marine Infrastructure Delivery Office (MIDO).
Land use intensification & environmental impacts	Coastal Infrastructure, marina expansion, modifications, upgrades and associated dredging.	M	O	Issue needs to be addressed in conjunction with MIDO, particularly in relation to the Southern Boat Harbour. Coastal estuaries – consideration of appropriate levels of boating access and infrastructure.
Land use intensification & environmental impacts	Habitat Creation – including potential beneficial use of dredge spoil	M	M	Recent strategies include installation of bird islands, and osprey nests. Requires consideration of migratory bird agreements such as JAMBA, CAMBA, and ROKAMBA Requires management linkages to MIDO – with regards to dredging.
Land use intensification & environmental impacts	Legacy domestic foreshore structures	M	M	Coastal infrastructure such as breakwaters and training walls require delineation of ownership and management responsibilities. Private structures without approvals – removal.

Table 3-3 Key Issues - Natural hazards

Coastal hazard means the following:
(a) beach erosion,
(b) shoreline recession,
(c) coastal lake or watercourse entrance instability,
(d) coastal inundation,
(e) coastal cliff or slope instability,
(f) tidal inundation,
(g) erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Natural hazards (d)	Coastal inundation - flooding of low-lying land (storm surge)	H	S	Increased desire for drainage increases ASS. Need to manage blackwater events related to ICOLL openings,
Natural hazards (d) (f)	Coastal inundation – flooding & damage of stormwater, water and sewerage infrastructure	M	L	Ongoing and future issue for Bray Park Weir. Ongoing and future issue for sewerage infrastructure. Need to assess impacts of sea level rise on storm water outfalls & efficacy.
Natural hazards (c) (d) (f)	Coastal inundation – increase in frequency and severity of inundation due to sea level rise	M	M	Need to consider how estuary entrance management will address SLR, including assessment of trigger levels and flooding / ecological impacts.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Natural hazards (a)	Short term storm erosion - loss of beach amenity	L	S O	Storm erosion impacts represent an ongoing issues at Kingscliff, Fingal Head-
Natural hazards (a)	Short term storm erosion - loss of habitat	M	S	Impacts on birds and turtles – nesting on beach and in dunes. Dune vegetation loss.
Natural hazards (a) (g)	Short term storm erosion - risk to foreshore infrastructure	M	O S	Requires consideration of impacts on private vs public assets (Council or Crown). Particular hotspots at Fingal Head, Kingscliff, and Lower Tweed Estuary. Funding required for proactive works.
Natural hazards (f) (g)	Transition Planning - landwards migration and planned retreat	H	L	Tweed River Estuary CMP Strategic Mapping of coastal zone to allow for all communities to persist or retreat
Natural hazards (g)	Estuary foreshore erosion and bank instability	H	O	Historically cleared areas experience an increased rate of erosion and this generates a desire for hard protection solutions. Hot spots include significant stretches of the Tweed River Estuary (along Tweed Valley Way).
Natural hazards (e)	Cliff and slope instability	L	L	Some potentially affected areas include Tweed Heads, along Coral St. Slope instability has been considered in erosion hazard mapping.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Natural hazards (b)	Long term shoreline recession - loss of beach amenity and recreation space	M	M	Restriction of space creates conflict amongst users (commercial and recreational fishers, walkers etc)
Natural hazards (b)	Long term shoreline recession - risk to foreshore infrastructure	M	M	Potential future impacts include impacts to beach access, breakwaters, car parks and SLSCs.
Natural hazards (g)	Climate Change - Altered storm/cyclone activity	M	M	Emergency Planning informed by studies. Need an understanding of what modelling has and has not been done.
Natural hazards (f)	Climate Change - Altered salinity levels / profile within estuaries	L	ML	Need to identify sites exposed to the upstream migration of marine vegetation. Potential impacts at Bray Park Weir and effects on inundation of drinking water supply. Reference: Mitigation of Salt Water Contamination, Options Analysis
Natural hazards (d) (f)	Climate Change – Habitat squeeze	M	M L	Need to investigate and better understand potential impacts regarding habitat squeeze along open coast and estuaries due to rising sea levels and altered salinity profile.
Natural hazards (a) (b) (c) (d) (e) (f) (g)	Vulnerability mapping for all hazards	H	S	Determining the Vulnerability from hazards through assessment of Exposure & Sensitivity with Adaptive capacity.

Table 3-4 Key Issues - Public Safety

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Public Safety	Aging and/or degraded infrastructure such as seawalls, breakwaters and access infrastructure	H M	S	Lack of clarity around the ownership and maintenance responsibilities of breakwaters along the LGA coastal estuaries. Requires a management strategy in conjunction with Crown Lands & MIDO to define ownership and assess maintenance requirements and refurbishment of redundant coastal infrastructure. Some of the stormwater infrastructure around the LGA coastal zone is also reaching the limit of its design life is in need of maintenance / refurbishment.
Public Safety	Water pollution/contamination affecting human health and safety	H	L	Increased nutrient loads into estuaries due to increased development & urban intensity across the catchment (as resultant algal growth). Plastic pollution in estuaries needs to be addressed higher up the catchment. Increased risk of sewerage overflows with increasing tidal inundation due to sea level rise. Increased risk of contamination from On-Site Sewage Management (OSSM). Potential health impacts in poorly flushed estuaries and from ASS runoff in small catchments (e.g. Christies / Cudgera Creek)

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Public Safety	Public safety risk from coastal and estuary processes (rip currents, hazardous surf conditions)	H	O	Energetic coastal processes represent a significant safety risk to local users, particularly in the form of rip currents. Dreamtime Beach (south ofFingal Head), which is an unpatrolled beach, has had a number of safety incidents from 2015-2019 including 5 deaths of swimmers and rock fishers.
Public Safety	Public safety risk from coastal hazards such as inundation & erosion	M	S	Wave overtopping at breakwater heads, and headland rock formations can affect recreational fishers. Perhaps a need for better signage to alert community to the risks.
Public Safety	Estuary Entrance Management	H	S	Entrance Management Plans are required for coastal estuary entrances.
Public Safety	Radioactivity along those areas historically used for sand mining (storage and stockpiling).	L	L	Affected areas need to be identified and a plan of management developed to address this issue. As part of this a public health risk assessment should be undertaken.
Public Safety	Ongoing hazards associated with bushfires affecting residential development adjacent to fire-prone areas of parkland.	H	L O	Bushfire hazard awareness is an issue. Greater liaison with RFS could generate better outcomes.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Public Safety	Increase in recreational boating and other watercraft activities resulting in potential impact on public safety along the waterways.	M?	O	Boating numbers along the waterways have increased in recent years, largely due to an influx of users from SE QLD. This has led to an increase in the number of collisions, and a general increase in the incidence of high risk behaviour on the water. Greater liaison needed between water police, Maritime Services and Volunteer Marine Rescue NSW across the LGA.

Table 3-5 Key Issues - Resource use and conflict

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Resource use and conflict	Anti-social behaviour and unsafe practices	M	O	Dangerous behaviour by watercraft users along the Tweed River and other estuaries, particularly PWC use. Coordinate messaging with Maritime Services.
Resource use and conflict	Overcrowding / congestion of waterways	M	S	Some of the boat ramps around the LGA experience excessive congestion during peak season, including Kingscliff (Cudgen Creek) and Riverside Dr (Tumbulgum). During peak season waterways congestion occurs across both downstream areas around Tweed Heads and areas farther upstream at Tumbulgum. Boating restrictions in QLD have resulted in an increase in the number of QLD registered vessels operating along the Tweed Estuaries, contributing to congestion during peak periods.
Resource use and conflict	Overcrowding / congestion of beaches	M	M	The LGA beaches experience high levels of congestion during the peak summer period, which can generate user conflict between recreational users.
Resource use and conflict	Increasing commercial use of beaches creating user conflict with public and affecting social and environmental values of the beach.	M	S	There needs to be an effective plan for managing the increasing use of beaches for commercial purposes. Examples includes filming on the beach, and other uses such as Camel Tour Operators. Reference: Commercial

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
				Recreation Activities on Public Open Space Policy.
Resource use and conflict	Navigation problems from sedimentation at estuary entrances.	M	O	Current dredging program in place at the Tweed River Entrance. Acknowledgement that coastal estuary entrances are not managed for powered craft with requirement for navigable entrances.
Resource use and conflict	Increasing groundwater use.	M	M L	Increasing groundwater use is placing a strain on the local water table. Need to consider future groundwater use compared to other options such as raising the Bray Park Weir.
Resource use and conflict	Car park management	M/L	M	Very high demand for local carparking across the LGA coastal zone during peak summer season.
Resource use and conflict	Erosion of beach access paths due to high pedestrian traffic represents a risk to users	M	S to M	Fingal Head beach access and Fingal Headland walkway.
Resource use and conflict	Mangrove progradation along the various estuaries encroaching on community & recreational use, and creating amenity issues.	M	S	Natural mangrove progradation along the estuary is affecting access points, such as at boat ramps. Mangrove encroachment near sports fields and parks is also creating odour and mosquito issues affecting recreational amenity.

Table 3-6 Key Issues - Governance

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Governance	Ambiguity or lack of understanding / agreement on governance (e.g. coastal protection structures ownership and maintenance)	H	S	There is a present lack of understanding regarding the ownership and management responsibilities of Council and other organisations regarding: • Breakwaters (Crown Lands) • Training walls (Crown Lands / Council) • Protection Zones (Fisheries) A clear understanding needs to be obtained so that management can be more effectively coordinated.
Governance	Lack of compliance with regulations (by users) or lack of regulation effort (by agencies)	H	S	Issues include illegal dumping, prohibited use of vehicles on beaches, vegetation clearing to improve sight lines, and creation of unauthorised private boat ramps and jetties.
Governance	Inadequate, inefficient regulation, or over-regulation (agencies)	M	M	The roles and responsibilities of the various agencies across the coastal zone create inefficiencies with regards to management and approvals processes. Greater coordination is required by the various agencies across the coastal zone in order to streamline management responsibilities and processes / approvals for projects.
Governance	Lack of funding for investigation and action implementation	H	O	Funding from the state government typically does not sufficiently cover preliminary work such as licencing, DA's, and design.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
				Too much funding emphasis is placed on "Shovel Ready Projects" and preliminary investigations / permits & approvals need to be included in scheme funding.
Governance	Revolving door of state government jurisdiction.	H	S	Periodic reshuffling of roles and responsibilities of various state government agencies with the election cycle creates confusion across the relevant authorities responsible of managing the coastal zone.

Table 3-7 Key Issues - Information Gaps

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Information Gaps	Inadequate environmental information	H	S	There remains an incomplete understanding of climate change impacts on biodiversity. Local SLR benchmarks Valuation (economic and social) of ecosystem services to enable full inclusion of natural resources in CBAs
Information Gaps	Inadequate social and economic information	M	S	There remains a lack of understanding of the extent of Queensland based (that is, cross border) recreational use of the local waterways & coastline, and how this contributes to peak season congestion.

Issue Category	Issue / Threat	Priority	Timeframe	Specifics & Details
Information Gaps	Inadequate information regarding ownership / tenure of coastal infrastructure such a boat ramps and breakwaters	H	S	Greater clarity is required regarding ownership and management roles & responsibilities - and then a coordinated pan of management can be developed.
Information Gaps	Inadequate and/or incomplete European and Indigenous Heritage information	H	S	There is a lack of understanding of the processing regarding how to respond to indigenous and European heritage issues. Sufficient plans need to be develop so that these issues can be managed effectively as they arise. Reference: Tweed Aboriginal Cultural Heritage Management Plan
Information Gaps	Impact of Climate Change on agricultural viability	M	M	Specifically relates to cane farming and other floodplain agricultural uses. Also climate impacts on agriculture generally. Reference: Tweed Sustainable Agriculture Strategy.

4 FINAL RESPONSES

Thankyou again for your participation at the workshop. It is clear that all of the attendees are passionate about the management of the Tweed Shire coastal zone and the body of knowledge gathered on the day will be a great help to the project.

If you have any follow up questions or comments, or suggestions for how the workshop process could be improved, please contact Jane Lofthouse at Tweed Shire Council.

Kind Regards,

Christopher Beadle
Senior Engineer

Water Technology

APPENDIX E
EXISTING COASTAL HAZARD MAPPING

Coastal Vulnerability Area

9/2/2019, 3:19:15 PM

1:72,224

0 0.5 1 2 mi

0 0.75 1.5 3 km

DCP B25 - Coastal Hazard Lines (2014)

- Immediate
- Max 2050
- Max 2100

Coastal Vulnerability Area

9/2/2019, 3:20:42 PM

1:72,224

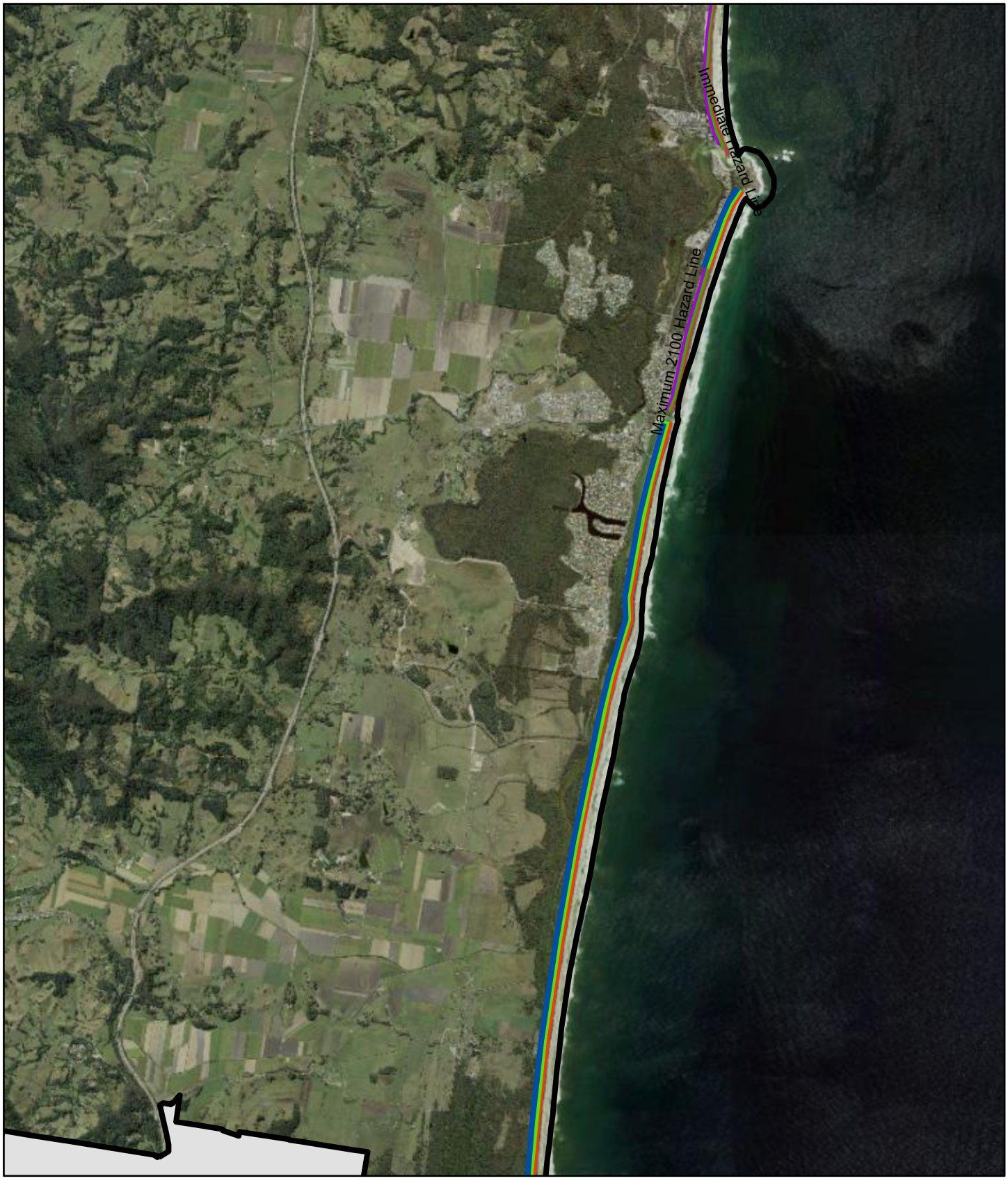
0 0.5 1 2 mi

0 0.75 1.5 3 km

DCP B25 - Coastal Hazard Lines (2014)

- Immediate
- Max 2050
- Max 2100

Coastal Vulnerability Area



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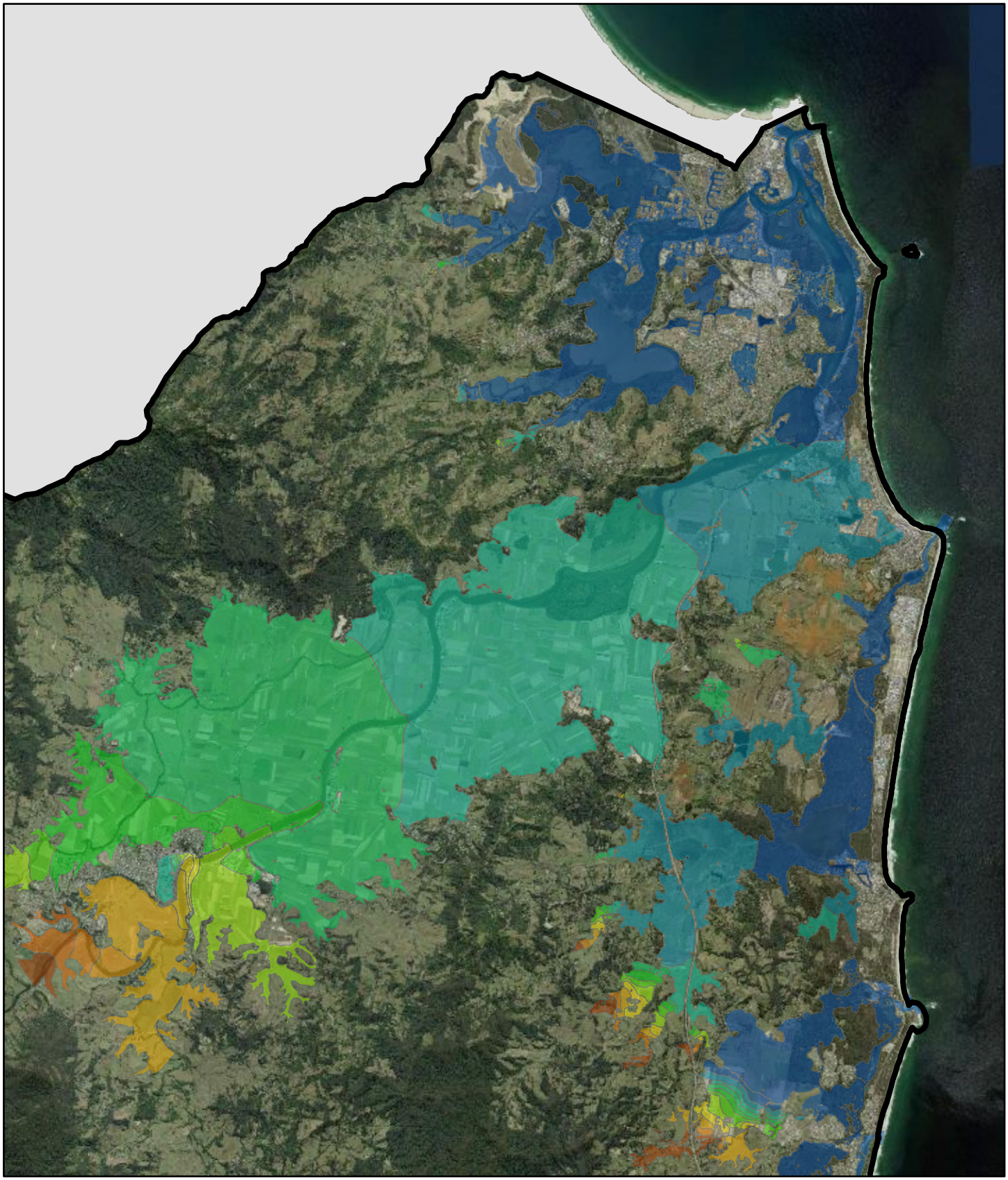
DCP B25 - Coastal Hazard Lines (2010)

- Immediate Hazard Line
- Maximum 2050 Hazard Line
- Maximum 2100 Hazard Line

DCP B25 - Coastal Hazard Lines (2014)

- Immediate
- Max 2050
- Max 2100

Coastal Vulnerability Area Flooding 1



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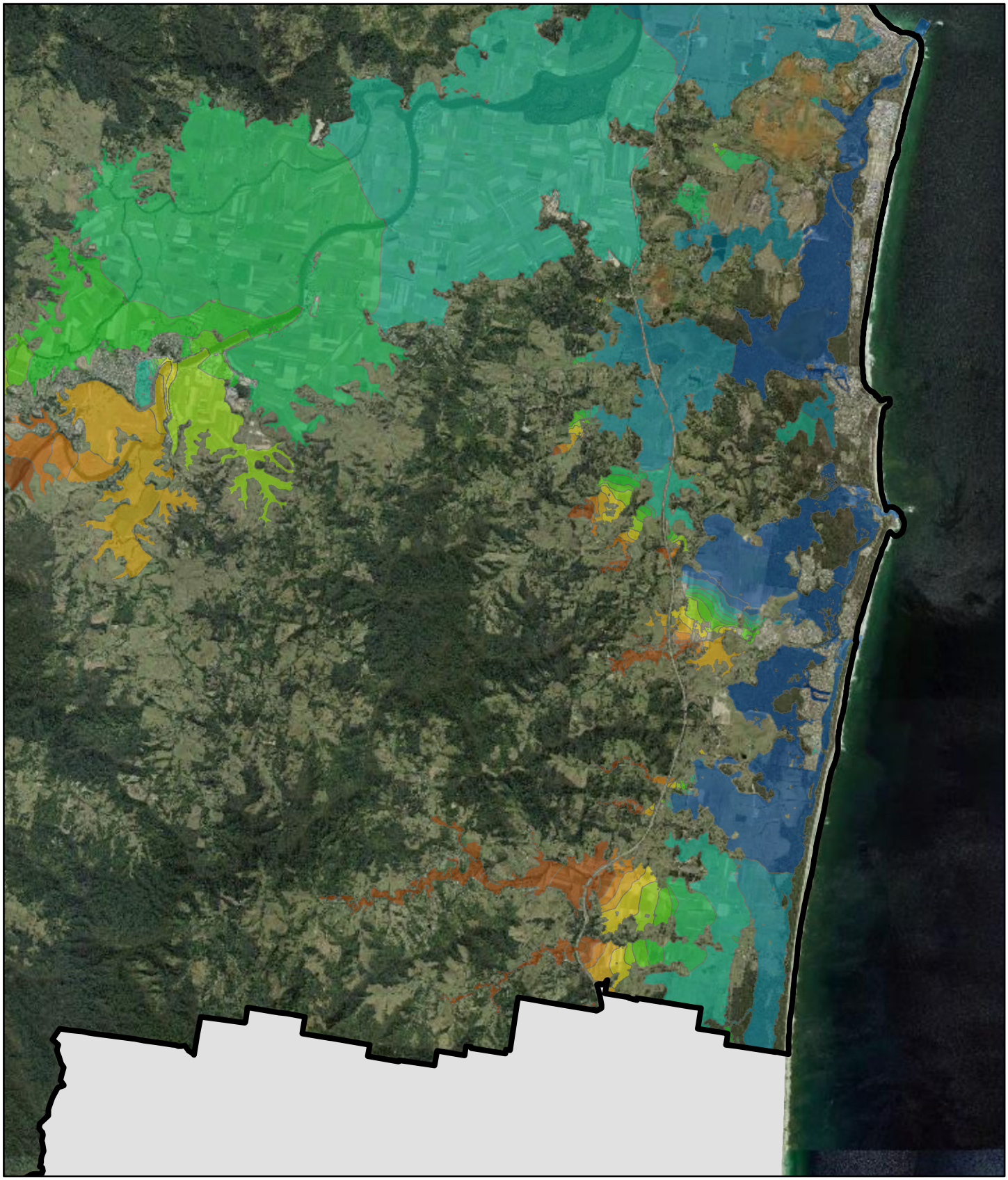
0 1 2 4 mi

0 1.75 3.5 7 km

Design Flood - Inundation Areas

- 0.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- 4.5 to 5.0
- 5.0 to 5.5
- 5.5 to 6.0
- 6.0 to 6.5
- 6.5 to 7.0
- 7.0 to 7.5
- 7.5 to 8.0
- 8.0 to 8.5
- 8.5 to 9.0
- 9.0 to 9.5
- > 9.5

Coastal Vulnerability Area Flooding 2



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1:144,448

0 1 2 4 mi

0 1.75 3.5 7 km

Design Flood - Inundation Areas

- 0.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- 4.5 to 5.0
- 5.0 to 5.5
- 5.5 to 6.0
- 6.0 to 6.5
- 6.5 to 7.0
- 7.0 to 7.5
- 7.5 to 8.0
- 8.0 to 8.5
- 8.5 to 9.0
- 9.0 to 9.5
- > 9.5

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