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Kingscliff-Dreamtime Beach
Coastal Zone Management Plan
Appendices

March 2016

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BMT WBM Pty Ltd
Level 8, 200 Creek Street
Brisbane Qld 4000
Australia
PO Box 203, Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.bmtwbm.com.au

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Author:	Verity Rollason, Philip Haines
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Synopsis: **This report documents the Appendices to the Kingscliff – Dreamtime Beach Coastal Zone Management Plan.**

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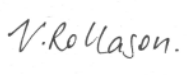
0	February 2016	PEH		VPR	
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Appendix A Kingscliff Coastal Risk Management Study

BMT WBM

Kingscliff Coastal Risk Management Study

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Kingscliff Coastal Risk Management Study

Prepared for:	Tweed Shire Council
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BMT WBM Pty Ltd
Level 8, 200 Creek Street
Brisbane Qld 4000
Australia
PO Box 203, Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.bmtwbm.com.au

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Project Manager:	Philip Haines
Author:	Philip Haines , Joris Jörissen, Sophie Hipkin
Client:	Tweed Shire Council
Client Contact:	Jane Lofthouse
Client Reference:	

Synopsis: **This report documents the key coastal processes affecting the coastal zone of Kingscliff and provides a summary of options previously investigated for management of this coastal zone. It also provides the results of a multi-criteria assessment on short-listed options for the Kingscliff foreshore.**

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1 Introduction

1.1 Background

The Kingscliff foreshore has a history of severe coastal erosion events and active shoreline management to protect and preserve land and assets affected by coastal erosion.

In 1999, Tweed Shire Council commenced development of a coastline management plan in accordance with the NSW Government's Coastline Management Manual (1990). The Tweed Coastline Hazard Definition Study was completed and adopted by Council in 2001 (WBM, 2001). This study identified the individual coastline hazards including short and long term erosion, shoreline recession oceanic inundation and coastal entrance instability. The Study defined the Immediate, 2050 and 2100 coastal erosion hazard areas within the Shire and identified various public and community assets at Kingscliff that were at risk from coastal erosion hazards. These assets included the Cudgen Headland Surf Life Saving Club (SLSC), Kingscliff Amenities Hall and Kingscliff Beach Holiday Park.

A number of studies were then undertaken to identify an appropriate risk management approach, and a Tweed Shire Coastline Management Plan developed (Umwelt, 2005b). The Tweed Shire Coastline Management Plan describes a protection strategy in the form of a 500m long rock seawall combined with beach nourishment as the primary management action for Kingscliff Beach. The Plan notes that, based on the costs calculated at the time, the capital cost of the seawall was comparable to the cost of planned retreat, but community feedback provided through public workshops and direct correspondence demonstrated a general preference for the protection option. This was caveated by the community on maintaining beach amenity as part of the protection option.

In 2008, the Plan was amended following completion of the Kingscliff Beach Foreshore Protection Works Environmental Impact Statement (WorleyParsons, 2008), which recommended the implementation of a modified set of works to achieve the adopted management strategy. The recommended protection works included:

- A vertical buried seawall of limited length protecting the Cudgen Headland SLSC only;
- Initial and ongoing nourishment generally in accordance with the Tweed Shire Coastline Management Plan; and
- Creation of a linear beach front reserve about 15m wide from the back dune to the proposed boundary of the redeveloped Kingscliff Beach Holiday Park.

Council commenced implementing the amended plan and constructed a buried vertically piled concrete seawall in front of the Cudgen Headland SLSC (completed August 2010).

During the period between 2009 and 2012, a number of severe erosion events were experienced at Kingscliff Beach, which resulted in a significant loss of foreshore land and impacted on public assets and infrastructure. During this period, Council assets were destroyed (Faulks Park access road and car park), relocated (cabins at Kingscliff Beach Holiday Park) or were at high risk of being affected (Kingscliff Beach Holiday Park amenities block). In response to the significant erosion, Council undertook a series of emergency foreshore protection works. This included constructing a

low rock revetment along Faulks Park, constructing a 4m high geotextile sandbag wall along the Kingscliff Beach Holiday Park and beach nourishment at the southern end of Kingscliff Beach using sand from Cudgen Creek.

Following the protracted erosion that commenced in 2009, the NSW Coastal Panel made a number of recommendations to the Minister for the Environment (NSW Government, 2011) including a revised Coastal Zone Management Plan be prepared for Kingscliff/Dreamtime Beach. The revised plan is to incorporate a short-term management strategy for the remaining unprotected sections of Kingscliff Beach; a plan for ongoing monitoring of beach erosion; an economic assessment of the relative costs and benefits of short and long-term options; and analysis and assessment of the technically feasible management options for the site (including groynes).

Council has been advancing the CZMP process and taking necessary steps that precede the CZMP update. The steps involved in the process of preparing the CZMP, including progress to date, are:

Completed steps:

- Development of feasible management options including those considered in the Tweed Shire Coastline Management Plan (Umwelt, 2005a);
- Investigations into seawall options and their characteristics (WRL, 2012);
- Investigations into a groyne field option (WRL, 2013);
- Preparation of a Draft EIS for sand extraction from the Tweed River and delivery by pipeline to Kingscliff Beach for the purposes of providing a source of sand for beach nourishment (KBR, 2012);
- Updated coastal hazards assessment adopted by Council in February 2014 (BMT WBM, 2013);
- Preparation of a Cost Benefit Assessment of seven management options (Griffith University, 2013); and
- Adoption by Council (21 November 2013) of proceeding with the two preferred options of a) terminal protection through seawall, sand nourishment and land use planning and b) planned retreat for management of coastal hazard risk at Kingscliff. The option of 'do nothing' is required to be considered as the 'business as usual' case for assessment purposes.

Current steps:

- Development of the Kingscliff Beach Foreshore – Coastal Risk Management Study
- Development of the Kingscliff - Dreamtime Beach Coastal Zone Management Plan.

1.2 Purpose of Report

This report has been prepared to fulfil the requirements of the Kingscliff Beach Foreshore Coastal Risk Management Study (CRMS).

The purpose of this document is to provide a summary of the key coastal processes affecting the coastal zone of Kingscliff and identify and discuss all previous hazard management options

considered for Kingscliff. This report describes the key aspects of each management option and provides a shortlist of potential management options, which are then assessed via a multi-criteria assessment. A final recommendation for a preferred risk management strategy is provided for subsequent adoption in the Kingscliff – Dreamtime Beach Coastal Zone Management Plan.

1.3 Description of Study Area

Kingscliff Beach is located immediately north of the headland at Sutherland Point and the Cudgen Creek training walls, forming the southern part of a 6 km long embayment with a continuous sandy beach which encompasses Kingscliff Beach and Dreamtime Beach.

The study area of the Foreshore Coastal Risk Management Study covers the coastal zone along Kingscliff Beach but focuses on the shoreline area between the Cudgen Headland SLSC and the Kingscliff Beach Bowls Club.

A number of shoreline protection works have been established within the study area, as shown on Figure 1-1, including:

- Two rock training walls at the Cudgen Creek river entrance (built in 1967) to alleviate flooding issues within Cudgen Lake and Cudgen Creek and to prevent meandering of the creek entrance along Kingscliff Beach;
- A rock seawall in front of the Kingscliff Bowls Club (initially built in 1967 and upgraded in 1995) to protect the club against erosion threats;
- A vertically piled concrete seawall in front of the Cudgen Headland SLSC (completed in August 2010);
- A low rock seawall along Faulks Park (completed in early 2011 as emergency protection works);
- A geotextile sand container wall to the immediate north and south of the piled concrete seawall (completed in October 2011 as emergency protection works); and
- A rock seawall along the Holiday Park, located immediately north of the geotextile sand container wall up to the Kingscliff Beach Bowls Club (built in December 2011 as emergency protection works).

LEGEND

Existing Foreshore Protection Works

Title:

Existing Foreshore Protection Works

Figure: 1-1

Rev: A

N

0 80 160m

Approx. Scale

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2 Coastal Processes and Erosion Hazards

2.1 Introduction

An understanding of the coastal processes affecting the shoreline at Kingscliff is essential in making an informed decision on the most appropriate future management strategy. In general terms, the behaviour of the beaches within the Tweed Shire is characterised by:

- Wave-induced longshore transport of sand, with a strong net transport to the north;
- Onshore/offshore movements of sand associated with relatively short term storm-related erosion and subsequent rebuilding of the beach and foredune;
- Wind-induced transport of sand from the beach to the back-beach dune system; and
- At some locations, effects of creek entrance movements and/or movements of beach sand into and from lower tidal estuary areas under the influence of tidal and flood flows.

Any or all of these processes may be occurring at any time, depending on prevailing wave, wind and tide conditions. The resultant beach behaviour is one of constant change with substantial movements of the beach and foredune in the short to medium term (days/weeks/years) but only gradual progressive movements of the mean shoreline alignment in the longer term (decades/centuries).

A detailed assessment of the key coastal processes at Kingscliff, including the geological context and their influence on coastal hazards, is provided in the Tweed Shire Coastal Hazards Assessment report (BMT WBM 2013a).

2.2 Coastal Processes

Regionally, the Kingscliff to Dreamtime Beach embayment is part of a long coastal unit that experiences a continuous alongshore transport of sand extending from around the Clarence River in the south to Moreton Bay in the north. This coastal unit has a series of major controlling headlands past which the sand is moved by the prevailing waves.

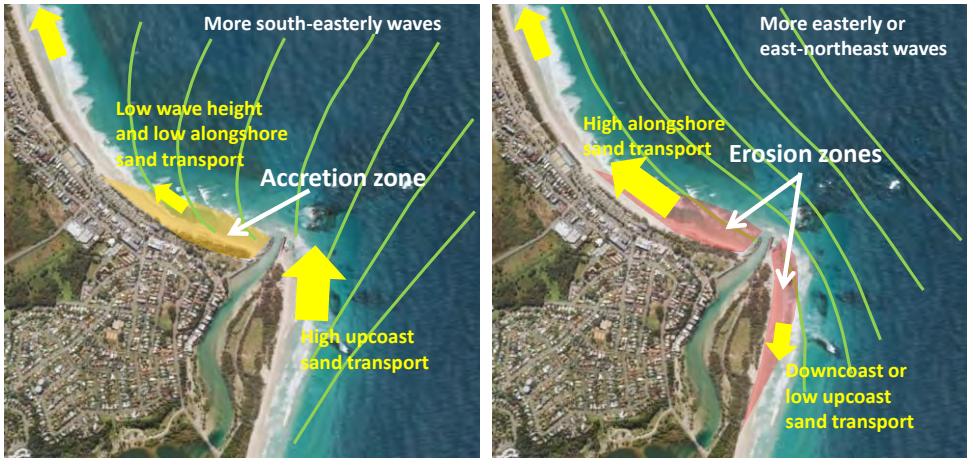
Sutherland Point has significant effect on sand transport and shoreline responses at Kingscliff, particularly in controlling the nature and rates of headland bypassing supply of sand into the embayment. The shoreline processes along the Kingscliff / Dreamtime Beach embayment are thus uniquely dependent on how the headland controls interact with the prevailing deep water wave climate.

The shoreline behaviour is thus sensitive to variability of the deep water wave conditions at both short (days to weeks) and longer term (months; years; decades) time-scales. Of particular relevance to Kingscliff, is the ‘sand slug’ effect around the headland in which the southern end of the beach is supplied through periodic sand pulses. These pulses manifest themselves as sand waves that eventually attach to the beach. Often a topographically controlled rip migrates in advance of these sand waves, which can cause localised beach erosion (Short, 1999).

Sand from Cudgen Beach will only travel around the headland when significant quantities of sand accumulate in a deposition area around the southern Cudgen Creek training wall and favourable wave conditions occur.

The deep water wave climate of the northern NSW coast comprises a highly variable wind wave climate superimposed on a persistent long period moderate to high energy south easterly swell. Two dominant types of storm wave generation, east coast low and tropical cyclone, determine the prevailing extreme wave climate.

Annual and medium term (decadal) variability in the wave climate is observed in the wave climate, at least in part associated with the El Niño Southern Oscillation (ENSO). Variability in wave height and direction that persists for years to decades may result in alternate cycles of erosion and accretion and potential rotation of the shoreline. This is related to variability in the alongshore sediment movement and the direction of intense storm waves. The data suggests an extended La Niña pattern prior to 1977 followed by predominantly El Niño through to about 2009. There have been several La Niña years both within that time and strongly so during 2010-12.



El Nino La Nina

Figure 2-1 Conceptual Response to ENSO Wave Climate at Kingscliff (From BMT WBM, 2013a)

Cyclone erosion events in the region have been recorded in surveys at the Gold Coast and are also indicated in the photogrammetry data for Tweed Shire, as analysed in (BMT WBM 2013a). Storm bite volumes up to 250m^3/m have been identified but are more typically around 150-200m^3/m. The larger volume losses may occur during multiple storm events or where there is significant alongshore net sand loss in addition to the removal of sand to nearshore (BMT WBM 2013a).

Superimposed on these short to medium term fluctuations, the shoreline is subject to ongoing shoreline recession. Recent research on a regional scale and the 2013 coastal hazard assessment show that there is a gradient in the net longshore sand transport rate from about 150,000-200,000m^3/yr at the Clarence River to about 550,000m^3/yr at the Gold Coast. Additionally, recent research shows that there is a net shoreward sand supply into the shore-face from the inner continental shelf of about 0.5-1.0m^3/m/yr, partially offsetting shoreline recession that would otherwise result from the alongshore transport gradient.

The long term shoreline recession rate within the Kingscliff/Dreamtime Beach embayment has been assessed in the coastal hazard assessment at about 0.15m/year at the southern end (Kingscliff) reducing to about 0.05m/year towards the northern end, with an uncertainty provision of about ±20% incorporated in the recession hazard distances.

2.3 Coastal Hazards

The Kingscliff coastline is affected by a range of coastal hazards that will become potentially more acute or extensive in the future with climate change induced sea level rise. The key coastal hazards include:

- The erosion hazard, including components of immediate storm erosion, shoreline variability and future shoreline recession;
- Coastal inundation associated with wave run-up and overtopping of the dune barrier; and
- Dune zones of reduced foundation capacity.

These hazards have been assessed and mapped as part of the Tweed Shire Coastal Hazards Study (BMT WBM, 2013a). The definition of coastal hazards inherently involves uncertainty relating to not only how prevailing oceanic conditions will manifest in the future and how reliably their effects on the shoreline can be determined, but also the considerable unknown factors involved and limitations in the available measured data.

As such, the approach adopted was to provide a band of feasible erosion extents, defined on hazard maps by lines representing the 'best estimate', 'minimum' and 'maximum' likely limits for the immediate, 2050 and 2100 planning periods. The 'maximum' and 'minimum' extents of the erosion hazard represent the range within which the erosion hazard is most likely to apply, as allowance for uncertainty inherent in the data interpretation and modelling, as well as other factors that are difficult to quantify reliably.

2.3.1 Coastal Erosion Hazards

During severe storms or a series of storms in succession, increased wave heights and elevated water levels results in wave attack of the beach berm and foredune region. Storm events generate high rates of transport of sand both:

- Offshore, with sand eroded from the beach face and transported to the nearshore seabed to form a sand bar roughly parallel to the shoreline; and
- Alongshore (i.e., along the beach) either upcoast or downcoast depending on wave direction, with gradients in the transport rates leading to erosion or accretion.

The result is erosion on the beach face and dune that may pose a hazard to back beach land and assets. The short term storm related cross shore sand transport and longshore drift occur simultaneously, the latter commonly leading to a significant shoreline erosion component immediately downdrift of headlands in cases where the sand supply into the beach compartment is less than the transport away to the north. Their effects are additive, although the beach itself (above mean sea level) will be observed to erode predominantly during storm events.

The beaches along the Kingscliff embayment experience considerable fluctuation associated with storm erosion and variability due to changes in the prevailing wave conditions, as evidenced by the significant erosion experienced at Kingscliff in recent years (Refer to Figure 2-2). As well, there is a general regional trend of long term shoreline recession on which short to medium term variability is superimposed.

Thus, the 'immediate' erosion hazard extent represents the zone that could be affected by erosion in the immediate near future (e.g. over the next few years) in the event of one or more major erosion events, while the 2050 and 2100 extents incorporate a landward shift in the immediate hazard line in response to the long-term shoreline recession, including the effects of sea level rise.

Figure 2-3 presents the coastal erosion hazard extents mapping for Kingscliff. It should be noted that these erosion hazard lines are based on the Kingscliff seawalls not being in place and that there is a zone of reduced foundation capacity that extends landward of these erosion hazard lines.

Amongst other factors, the width of the zone of reduced foundation capacity behind the hazard lines is dependent upon the angle of repose of the dune sand and the height of the dune above mean sea level and would typically be about 8 to 12m along Kingscliff Beach.

2.3.2 Coastal Inundation Hazards

Where the crest height of a cliff, shoreline structure or dune is less than the wave run-up level, waves will overtop the shoreline and may cause inundation of the land behind. Consequently, this may present a hazard if the rate of overtopping can cause a significant impact to people or assets behind it.

BMT WBM (2013a) assessed the potential for wave runup and dune overtopping at Kingscliff Beach. The assessment was undertaken for high tide conditions, considering a 100 year ARI still water level and 100 year ARI incident significant wave height. Because of the variability of wave heights, the wave overtopping assessment was based on the 2% run-up levels ($R_{u2\%}$).

The design run-up level for natural beaches/dunes was found to be varying from approximately 4.1mAHD at the Surf Club to approximately 4.5mAHD, indicating that:

- No potential for overtopping north of the Bowls Club where dune heights are in excess of 6mAHD;
- The dune crest levels along the Kingscliff Holiday Park are typically at 4.0 to 4.5mAHD and are approximately at the design run-up limit, with some minor overtopping feasible in the lower parts;
- Generally sufficient dune heights along the Surf Club area to prevent overtopping; and
- A clear potential for overtopping adjacent to Faulks Park where dune levels are generally at 3.5mAHD.

It is likely that Kingscliff will experience enhanced wave run-up and overtopping in the future, as sea level rise.

It is important to note that the design wave run-up levels were based on the assumption that the shoreline comprises a natural beach/dune system. Where waves impact on shoreline protection

structures (in particular vertical or steeply sloping surface such as seawalls), substantially higher wave run-up levels can be experienced. Therefore, wave overtopping is typically a key consideration in the design of such protection structures.

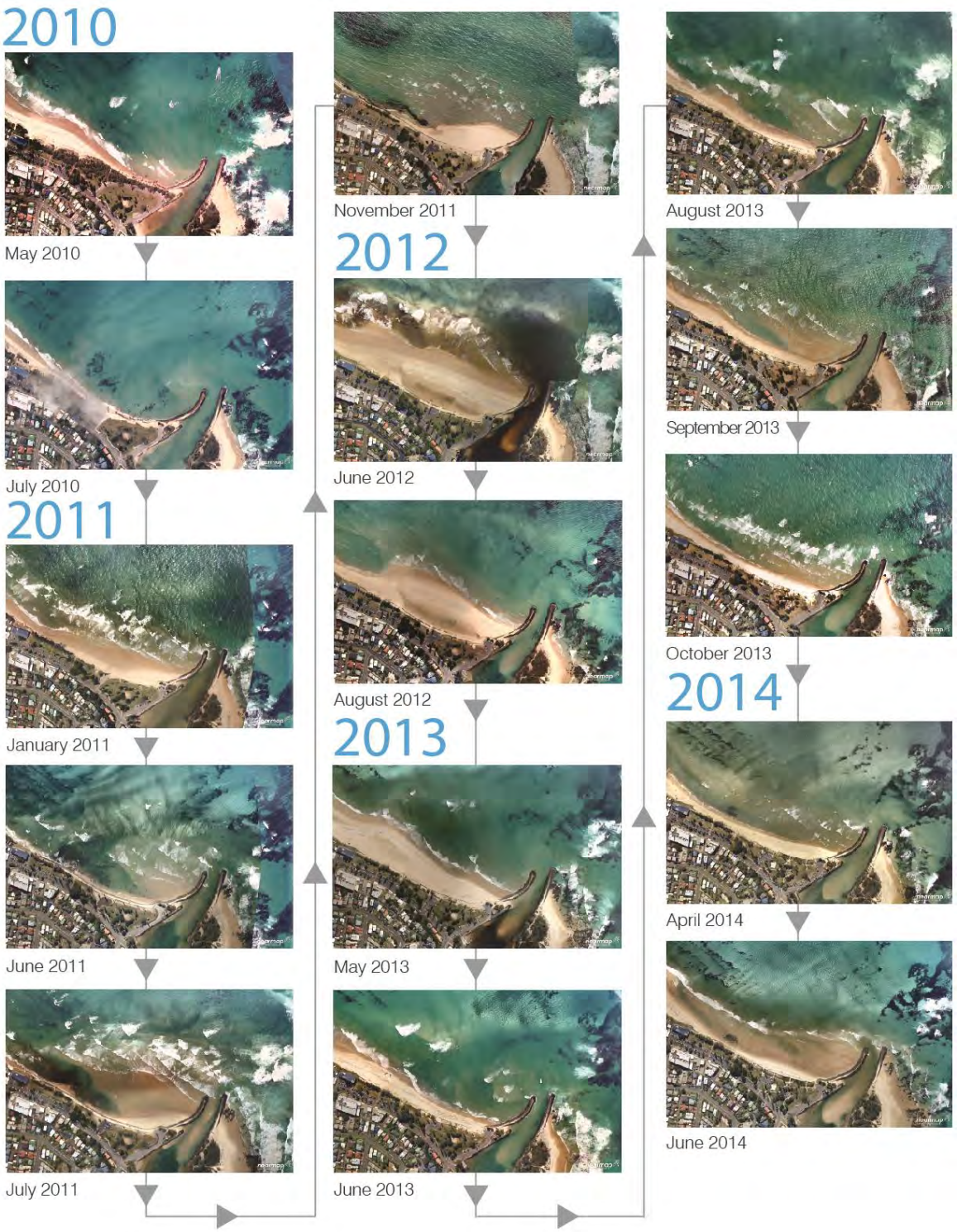


Figure 2-2 Kingscliff Foreshore Recent History

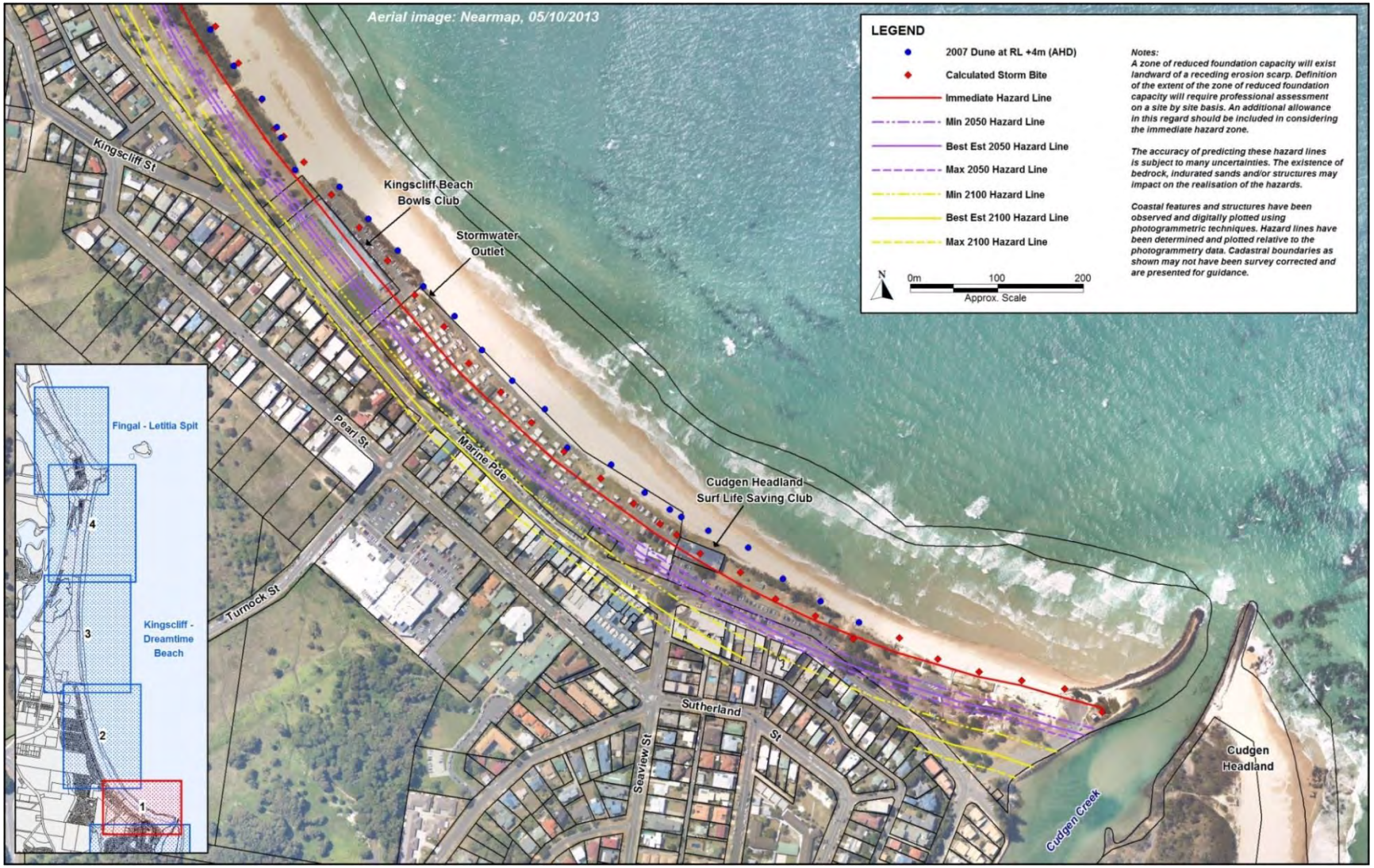


Figure 2-3 Erosion Hazard Zones: Kingscliff

3 Beach Management Options for Consideration

3.1 Key Objectives

The main coastal management issue at Kingscliff is determining a suitable strategy for dealing with assets that are or may become subject to erosion threats. The Kingscliff Beach Holiday Park, Cudgen Headland SLSC building, the Kingscliff Bowls Club and various foreshore park facilities in Faulks Park (e.g. toilet blocks and picnic shelters) are located within the immediate erosion hazards zone. The Kingscliff Amenities Hall, Marine Parade and numerous properties along the parade lie within the projected erosion hazards zones.

Many of the assets within the erosion prone areas are key tourist facilities and important to the local economy of Kingscliff. It is also recognised that the beach itself is a central focus of the local and tourist amenity of the town and must be preserved in the long term.

As such, the key objectives for management of Kingscliff Beach are:

- To preserve the beach as a recreational asset, with appropriate access and land management provisions; and
- To continue to provide public facilities in a cost effective manner that support the local economy of Kingscliff and have appropriate risk levels.

3.2 Generic Option Considerations

A range of generic erosion management options are available for consideration, which may be classified in terms of their consistency with natural coastal and environmental processes and the natural character and values of the coastline as follows:

"Soft" Options: Options which restore and/or preserve the natural character, behaviour and values of the coastal system. These will ensure the sustainable existence and natural character of the sandy beaches and dunes such that future erosion, both during short term storms and over the longer term, can be accommodated in a coastal buffer zone without threat to development requiring engineering works.

Soft options may include works such as beach nourishment with sand or planning solutions that require all future development to be outside the zone of potential erosion (buffer zone), including:

- Regulatory controls on building in undeveloped areas;
- Opportunistic removal or relocation of public assets; and
- Works aimed at restoration of the beach/dune system seaward of the development to provide an adequate buffer width to accommodate erosion.

"Hard" Options: Options that involve construction of works either to form a barrier to natural coastal erosion to protect development (seawalls) or to alter the natural processes to change the way in which the beach behaves (groynes and breakwaters).

Combinations of options or "hybrid" management approaches are often the most suitable where existing development lies within the erosion prone area. For example, works options such as

terminal protection (seawalls) are sometimes combined with partial set-back of development, or may be augmented with ongoing beach nourishment to offset associated deleterious environmental and recreational amenity impacts. In addition, most options need to be supplemented with relevant amendments to local planning controls.

Thus, engineering works options for the shoreline may include 'soft' or 'hard' solutions, or a combination of both. The most common feasible works options for overcoming shoreline erosion problems include the following and are discussed in more detail below:

- Beach nourishment with sand to restore the beach and dune system;
- Seawalls to protect coastal infrastructure;
- Groynes to capture and control the longshore movements of sand; and
- Offshore breakwaters or submerged reefs to modify wave processes which cause erosion of the beach.

Such works options are generally costly, and the 'hard' structural options typically may have adverse side effects on the beach system. Ongoing maintenance requirements must be considered in both the design and financing. Experience indicates that careful design in full cognisance of the prevailing coastal and ocean processes and the short and longer term effects is essential for success and cost-effectiveness of such works.

For example, it is known that seawalls constructed on retreating shorelines may give protection to land based assets, but will eventually cause loss of the adjacent beach. There is a need to ensure that the foundations of the seawall are sufficiently deep for stability to cater for the loss of the beach, typically requiring deeper foundations the more seaward the seawall is located. Similarly, beach nourishment must be designed and implemented to provide for the cross-shore and longshore movements of sand affecting the area for long term effectiveness in providing property protection while maintaining the recreational amenity of sandy beach systems.

3.2.1 Decision Matrix

It is convenient to consider beach protection options in the broad terms of the matrix illustrated in Table 3-1. This matrix, in effect, represents a decision tool based on criteria relating to:

- 'Natural' versus 'Altered' character; and
- 'Non-works' (planning) versus 'Works' options.

Table 3-1 Matrix of Beach System Management Options

	Preserve Natural Beach System Character	Accept Change to Natural Beach System Character
Non-Works Options (planning, management and regulation)	Development free buffer zones via planning or land use regulation; Resumptions of erosion prone development; Relocation or set-back of assets; Land use and building guidelines and controls; Management including dune care activities.	Accept development on vulnerable erosion prone land, but prevent any protection works (allow loss of buildings and facilities as erosion occurs).
Works Options	Beach nourishment with sand to restore the beach and dune system; Submerged reefs for shore protection.	Seawalls to protect assets; Groynes to control the longshore movements of sand; Offshore breakwaters to modify beach shape and sand transport.

To be consistent with coastal management policy guidelines and the priorities generally adopted by the community in areas where beach amenity and ecological integrity is important, the options in the column headed 'Preserve Natural Beach System Character' would normally have highest ranking in any assessment criteria. Consideration may also be given to other low cost temporary works options and hybrid options that combine the beneficial characteristics and offset deleterious characteristics of specific individual options.

The likelihood of success (or the risk of failure) is a key consideration in the selection of possible solution options. The options adopted involving expenditure of public funds should preferably be tried and proven techniques for dealing with beach erosion problems. There are a number of other (generally lower cost) options that are commonly put forward, covering a wide range of operational modes and with various claims of success. Most of these options typically have limited theoretical backing, have limited potential for providing significant long term benefits and/or have generally not been proven as an effective means of beach stabilisation. Such options would be ranked as low feasibility of success and would not be recommended.

3.2.2 Retreat Options

The intent of retreat options is to progressively remove the development under threat and allow the beach and dune to behave in the natural manner, thus restoring and retaining the natural character and amenity of the beach as the shoreline recedes. The planned retreat option acknowledges that erosion is an ongoing phenomenon and seeks to address the issue by opportunistic removal of threatened facilities rather than trying to protect them. Retreat would allow a quantity of sand currently retained in the foreshore to become engaged in the active beach zone, thus accommodating natural beach movements.

Where retreat of developed erosion prone land is adopted, there is often a need for alternative land on which the development may be relocated. This could be immediately landward of the erosion

hazard zone, retaining the 'beach front' position, or completely removed from the beach/dune environment away from future threat.

3.2.3 Protections Options

Options to hold the present coastal alignment generally fall into the following sub categories:

- Beach nourishment to rebuild the beach with sand imported from outside the active beach system to make up the deficit, either alone or with other control structures to improve the longevity and give added protection;
- Beach relocation through the redistribution of the existing sand on the beach; and
- Structural measures such as seawalls, groynes or offshore breakwaters/reefs to either directly protect assets or trap sand to rebuild the beach in front.

These protection options are discussed in detail below.

3.2.3.1 Beach Nourishment

Beach nourishment refers to the direct placement of sand imported from outside the active beach system onto the beach by pumping or by conventional earthmoving techniques. The primary intent of beach nourishment is to increase the volume of sand in the active beach system. With sufficient sand, recreational beach amenity can be maintained and provide protection to the development by building an adequate buffer zone width to accommodate natural beach fluctuations.

The quantity of sand required will be dependent on the design philosophy with respect to the level of initial and ongoing protection, the prevailing coastal processes and the use of structures to enhance the longevity of the works. Sufficient sand should ideally be provided to be able to accommodate short term (storm) erosion and a period of long term recession associated with longshore sediment transport differentials and sea level rise.

Beach nourishment is not considered a permanent long-term solution to beach erosion where there is an ongoing progressive net loss of sand and/or there will be future sea level rise, such as at Kingscliff, but rather, is an option that 'buys time' while planning is done for more permanent solutions and aspects of uncertainty in future shoreline change are confirmed (e.g. through on-going monitoring of recession and storm responses).

Should nourishment be implemented, provision should be made for the nourished sand to extend across the full beach profile to include depleted nearshore areas as well as the upper beach profile, the total quantity of sand being determined accordingly. If the sand is placed only on the upper visible portion of the beach, cross-shore redistribution will quickly occur to establish an equilibrium beach profile giving the impression that the sand is 'lost' and the nourishment campaign is a failure. In such a case, the sand is, in fact, not 'lost' but remains in the active system providing an overall net gain commensurate with the quantity placed after cross-shore distribution.

Dune construction and stabilisation works to prevent sand loss due to wind erosion usually needs to form part of any substantial beach nourishment scheme aimed at restoring the beach and dune system. In that case, it would incorporate design provisions to prevent dune overtopping and oceanic inundation as well as to accommodate the effects of climate change including sea level

rise. Where the aim of the nourishment is to re-establish a beach in front of an existing seawall without provision of a dune, the need for stabilisation works such as establishment of native dune vegetation would depend on the potential for wind erosion resulting from the works.

While beach nourishment may affect the ecological values of the beach and nearshore areas, it needs to be recognised that the nourishment sand would be placed in the active zone where the natural environment is one of substantial fluctuations and disturbances to which the ecological communities adapt naturally. The nourishment would effectively rebuild the beach. As such, while there may be some short term ecological impacts due to beach nourishment, in the longer term the environment will generally adapt and recolonise to behave as a natural beach system.

One of the inherent advantages of beach nourishment is that it maintains the natural character and recreational amenity of a beach while also providing protection to coastal assets. As such, where the beach is severely depleted of sand, it provides many intangible benefits to the general community, as well as a direct economic benefit to those businesses that rely on tourism and the presence of a usable beach.

A disadvantage of beach nourishment with respect to protection of development is that the nourished beach will continue to erode if the natural shoreline recession is progressive and significant redistribution of sand can be experienced, particularly in areas with substantial longshore transport. Ongoing maintenance nourishment is often required to maintain the beach, which may be seen by some as a temporary solution and a waste of resources.

Furthermore, identification and access to sources of suitable nourishment sand is often a key issue, as is the ongoing cost to maintain this protection and amenity. Unlike the adjacent Gold Coast area, sourcing of sand from offshore reserves is not favoured by government. Other sources, including dredging of the Tweed River, have therefore been considered for nourishment of Kingscliff Beach. Transport of sand to the beach is generally most cost-effectively achieved by dredging procedures. The use of trucks to import large volumes of sand is usually slow and costly, with adverse impacts on the local community and road infrastructure.

3.2.3.2 Sand Relocation

Sand relocation refers to moving sand within the beach system. Sand relocation differs from beach nourishment as no additional sand is added to system, rather the sand is simply redistributed within the beach system to help maintain beach amenity or strengthen the dune at a section of shoreline susceptible to storm erosion.

There are two types of sand relocation works, depending on the nature of the redistribution, namely beach recycling and beach re-profiling.

Beach recycling involves the collection of material from a downdrift location and transporting it to an updrift end of a beach on a regular basis. Recycling may be undertaken using land or seaborne transport depending on access, tidal range, beach levels and quantity to be relocated.

Beach re-profiling, or “beach scraping”, generally involves relocating sand from the lower part of the beach to the upper beach and dune system using mechanical equipment (refer Figure 3-1). The action is assumed to mimic natural beach recovery processes, albeit at an increased rate. TSC currently undertakes beach scraping at Kingscliff as part of ongoing beach maintenance.

Beach scraping can be used successfully to restore beach amenity, widen the upper beach and rebuild dunes. On developed shorelines these actions will temporarily improve the protection of adjacent assets by increasing the upper beach width using sand from the lower beach which may be partially infilled with sand moved alongshore by wave processes. Such works are relatively inexpensive, can be implemented quickly and are often undertaken in response to a significant beach erosion event. The main short coming of beach scraping as an erosion control measure is that it does not increase the overall beach system volume of sand, needs to be repeated frequently and will only offer limited and short term shoreline protection.

Beach relocation works are often undertaken in conjunction with active dune building and stabilisation through revegetation. Additional recovery/stabilisation can be achieved through the use of accretion fencing that acts to trap windblown sand during onshore wind conditions.

Figure 3-1 Beach Re-profiling using Mechanical Equipment (Souce: Carley et al., 2010)

3.2.4 Structural Protection Options

Structural options provide protection to assets against erosion either directly through the construction of a physical barrier separating the erodible material immediately behind the structure from wave and current forces (i.e. terminal protection) or by rebuilding of the beach through the construction of groynes. They are options that could be considered in the event that sufficient beach nourishment sand is not available and/or retreat options are not viable. However, there are always some adverse impacts of such an approach where no additional sand is provided, as outlined below.

Such structures would typically be of flexible rubble mound design with rock being sourced and trucked to the site from quarries in the region. While they may be effective in protecting property or providing a localized wider beach, they are generally accompanied by associated costs related to adverse impacts on the adjacent beaches. This cost is typically made up of direct costs associated with lost income from the tourist industry and other intangible costs associated with the natural coastal amenity, beach access, loss of recreational beach area and degradation of ecological values.

3.2.4.1 Seawalls

Seawalls or rock revetments are commonly built along the back of the beach with the intent of providing terminal protection against shoreline erosion. Seawalls are robust structures constructed along the shoreline which provide a physical barrier separating the erodible material immediately behind the structure from wave and current forces acting on the beach itself. They are typically constructed of loosely placed rock or as concrete (vertical or stepped) modular units.

Where possible, seawalls should be continuous to prevent end effects and/or discontinuities that could threaten the overall integrity of the wall. They also have to be suitably founded for stability against scour at the toe of the structure, particularly on a receding shoreline. Haphazardly placed rock and/or the use of inappropriate materials intended to provide shoreline erosion protection can have the opposite affect by accelerating the erosion problem.

Positioning a seawall on a natural beach requires consideration of both the cross-shore location and the longshore alignment of the structure. These need to be considered from both structural and coastal process viewpoints (i.e. the effect of hydrodynamics and coastal processes on structural integrity and the effect of the structure on beach processes). The cross-shore positioning of a seawall influences the interaction of the natural beach system and seawall structure. To minimise disrupting littoral transport processes, seawalls are ideally positioned as far landward as possible.

On a receding shoreline, the beach profile migrates progressively further landward relative to the seawall over time. This leads to a gradual decrease in the quantity of sand within the beach system, with:

- Lowering and eventual loss of the beach in front of the wall (refer to Figure 3-2); and
- Exacerbation of the erosion on the downdrift end of the wall where the losses are transferred and concentrated (refer to Figure 3-3).

Scour and lowering of the beach in front of the wall ultimately exposes it to higher wave attack and can lead to slumping and the need for increased maintenance. Such maintenance is typically in the form of topping up of the wall with additional rock. However, where the seawall is not adequately designed or constructed, complete reconstruction may be needed.

Figure 3-2 Seawalls on Eroding Shorelines Cause Loss of Usable Beach

Figure 3-3 End Effects at Geotextile Sand Container Wall at Kingscliff Beach Holiday Park (from NSW Government, 2011)

3.2.4.2 Groynes and Artificial Headlands

Groynes and artificial headlands are impermeable structures constructed approximately perpendicular to the shoreline and extend across the beach and the nearshore surf zone. Their function is to trap sand moving along the shoreline under longshore transport processes to build up and stabilise the alignment of the beach on the updrift side. By necessity they affect sand supply to the shoreline on the downdrift side, causing erosion there until such time as sand bypassing around the groyne occurs, restoring longshore sand transport to the downdrift side.

The intent of groynes and artificial headlands is to provide a buffer of sand on their updrift side that can accommodate the effects of a storm or fluctuation in sand supply, while maintaining a recreational beach. The shoreline alignment will also change providing greater stability and reduced long term erosion immediately updrift of the structure. The extent of accretion and length of shoreline affected is dependent on the length of the structure as well as the characteristics of the longshore transport processes. Generally, the longer the groyne, the more sand it will trap over a longer distance with decreasing influence away from the structure.

However, there is a physical limit to the length of shoreline affected and therefore a number of structures may be needed if substantial benefit or protection is required over a long stretch of shoreline. In such a case, there is a balance between the length and spacing of groynes that needs to be optimised as part of a detailed design process.

An artificial headland is a groyne type structure that has a substantial shore-parallel width at its head in comparison to a conventional narrow groyne. It is believed that this width alters the mechanisms of sand transport past the end of the structure and may allow a wider/longer beach to be retained on the updrift side for the same protrusion offshore. This could have the benefit of minimising the need for, or maximising the spacing of, additional structures to provide protection for a long stretch of coastline. However, such headland type structures would be larger and more expensive to construct.

Groynes or artificial headlands can thus be used to rebuild a beach and stabilise the shoreline against ongoing recession on the updrift side. However, in the absence of other works such as beach nourishment, this comes at the cost of exacerbated erosion on the downdrift side to where the erosion trend is transferred.

Another important consideration associated with these structures is their potential visual intrusion to the vista of a long sweeping beach and interruption to direct access along the beach.

3.3 Management Options Previously Investigated for Kingscliff

TSC has been working actively to understand and manage the impacts of coastal hazards within its local government area. Specifically, a Coastal Hazard Definition Study was undertaken in 2001 (WBM Oceanics, 2001), a Coastline Management Study was completed in 2005 (Umwelt, 2005a) and a Coastline Management Plan was developed in 2005 (Umwelt, 2005b). More recently, the Coastal Hazard Definition Study was updated (BMT WBM, 2013a) and a number of option analysis studies were undertaken (Worley Parsons, 2008, WRL, 2012, 2013, KBR, 2012).

This section provides a summary of the options previously considered within the Tweed Shire Coastline Management Plan (CMP) and supporting studies, as well as studies and assessments completed subsequently.

3.3.1 Coastline Management Plan (2005)

The 2005 CMP and supporting studies considered the following five shortlisted management options for Kingscliff:

- Do Nothing option;
- Terminal protection with beach nourishment option;
- Construction of a groyne at the Bowls Club with beach nourishment option;
- Construction of a groyne at Murphys Road with beach nourishment option; and
- Planned Retreat option.

3.3.1.1 Option 1: Do Nothing

The 'Do Nothing' option involves Council taking no strategic action to manage the risks associated with existing and future coastal hazards. This option does not represent the status quo, as present management efforts, including beach scraping works and the management and maintenance of existing shoreline protection structures (both the emergency works as well as the permanent structures) would be ceased.

If nothing is done to manage the adverse impacts of coastal processes, the beach is likely to deteriorate further as the erosion process continues. This would almost certainly result in further shoreline recession and would progressively put more assets under threat of erosion.

The lack of maintenance would result in progressive deterioration of existing shoreline protection structures and a reduction in their structural capacity. In the short to medium term, the Cudgen Headland SLSC building, the Kingscliff Bowls Club, the Holiday Park, the Kingscliff Amenities Hall and several foreshore park facilities (e.g. toilet blocks and picnic shelters) would be at risk of being damaged or destroyed by coastal processes. The deterioration of protection infrastructure would have a detrimental impact on beach amenity and lead to unpredictable erosion of the foreshore.

Although there are no direct capital costs under the 'Do Nothing' option, there may be substantial costs involved. The costs of this option relate mostly to the dollar value of assets and foreshore land lost to coastal processes (when this occurs) and the impacts of the option on the local economy, which are likely to be substantial. Tourism is a particularly important industry for Kingscliff, and the beach is one of the main tourist attractions to the area.

3.3.1.2 Option 2: Terminal protection with beach nourishment

The terminal protection with beach nourishment option was adopted as Council's preferred management strategy at the time of completion of the CMP in 2005.

This option involves the construction of a 500m long rock wall extending from the Cudgen Headland SLSC to the existing rock wall in front of the Bowls Club (Refer to Figure 3-4). The CMP

recommended that the rock wall was placed as far landward as possible. Community support for this option was provided on the provision that beach amenity was maintained and that there were no adverse impacts.

Following adoption of the CMP by Council in 2005, Worley Parsons was commissioned to prepare an Environmental Impact Statement (EIS) for implementation of the seawall strategy (Worley Parsons, 2008). The EIS made recommendations regarding the length, material and design of the seawall and recommended the following works:

- A vertical buried seawall of approx. 100m long protecting the Cudgen Headland SLSC only;
- Initial and ongoing nourishment generally in accordance with the Tweed Shire Coastline Management Plan (i.e. an initial nourishment volume of 250,000 plus 5,000 m^3 per year ongoing); and
- Creation of a linear beach front reserve about 15m wide from the back dune to the proposed boundary of the redeveloped Kingscliff Beach Holiday Park.

Council commenced implementing the amended plan and completed the construction of the buried seawall (a secant piled vertical concrete wall) in front of the Cudgen Headland SLSC in August 2010 as the first step of the long term management strategy.

Shortly after completion, severe erosion was experienced near the Surf Club and the wall became exposed. To date, the piled concrete wall has successfully protected the surf club against erosion. However, strong vibrations are experienced from time to time due to wave impacts during high water levels and significant wave events. This raises concerns about the capacity of the wall to provide appropriate protection during severe erosion events.

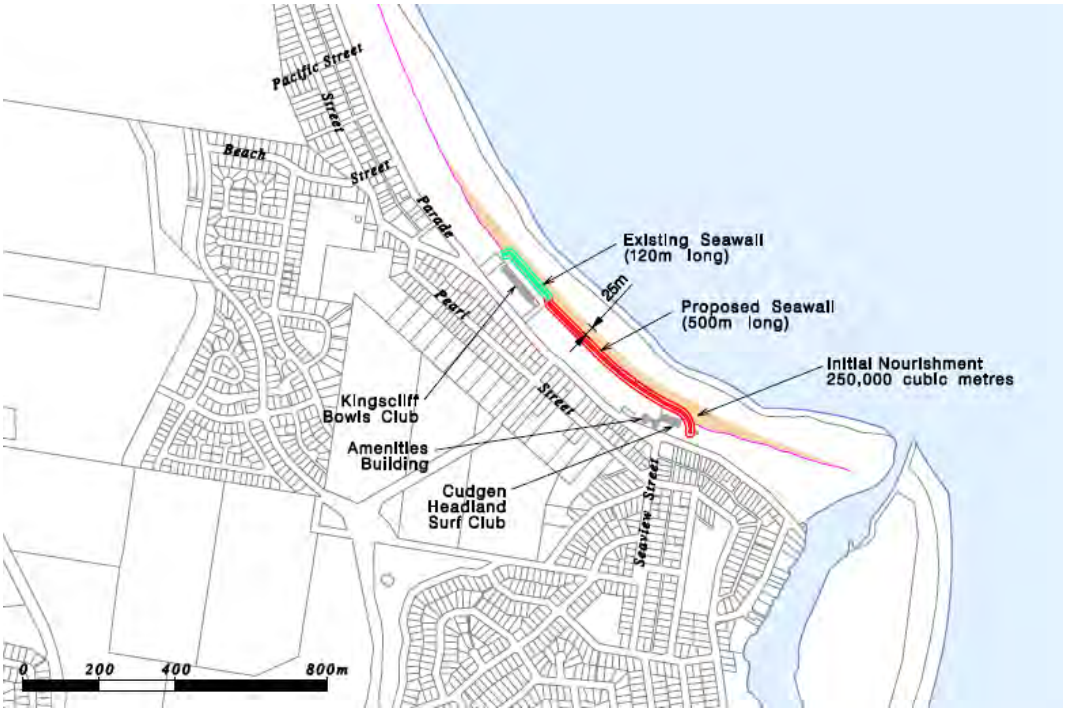


Figure 3-4 Terminal Protection with Beach Nourishment Option as Proposed in Umwelt (2005a)

3.3.1.3 Option 3: Groyne at Bowls Club with beach nourishment

In the CMP, this option is described as the construction of a large (250m long) groyne at the northern end of the Bowls Club in combination with beach nourishment (Refer to Figure 3-5). The groyne would be built approximately perpendicular to the shoreline with the intended purpose to trap sand that moves along the beach (littoral drift), thereby controlling the width of the beach on its southern end. The groyne construction was to be accompanied by an initial beach nourishment volume of approximately 1 million m^3 of which 700,000m^3 was to be placed on the beach to the south of the groyne and 300,000m^3 to the north. It was envisaged that the groyne would be constructed from quarry rock.

Umwelt (2005a) estimated that the capital cost for the groyne would be approximately $1.6M with an annual maintenance allowance of $30,000. The capital cost of nourishment was estimated to be $15.0M with a maintenance budget of $30,000 per annum.

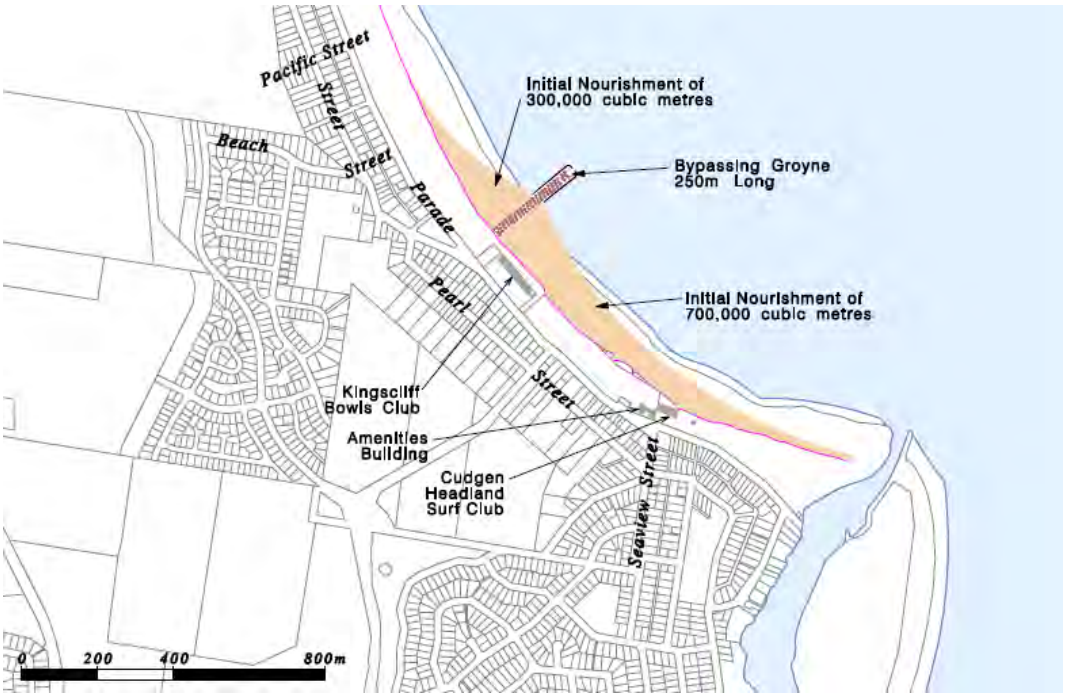


Figure 3-5 Groyne at Bowls Club with Beach Nourishment Option as Proposed in Umwelt (2005a)

3.3.1.4 Option 4: Groyne at Murphys Road with beach nourishment

In the CMP, this option is described as the construction of a 350m long groyne at Murphy Road, approximately 1.8 km north of the Bowls Club in combination with beach nourishment (refer to Figure 3-6). The construction of this groyne was to be accompanied by an initial beach nourishment volume of approximately 2.2 million m^3 of which approximately 1.8 million m^3 was to be placed on the beach to the south of the groyne and 400,000m^3 to the north.

Umwelt (2005a) estimated that the capital cost for the groyne would be approximately $3.8M with an annual maintenance allowance of $80,000. The capital cost of nourishment was estimated to be $33.0M with a maintenance budget of $90,000 per annum.

This option is not considered viable due to lack of a sufficient quantity of sand for the initial nourishment of this option.

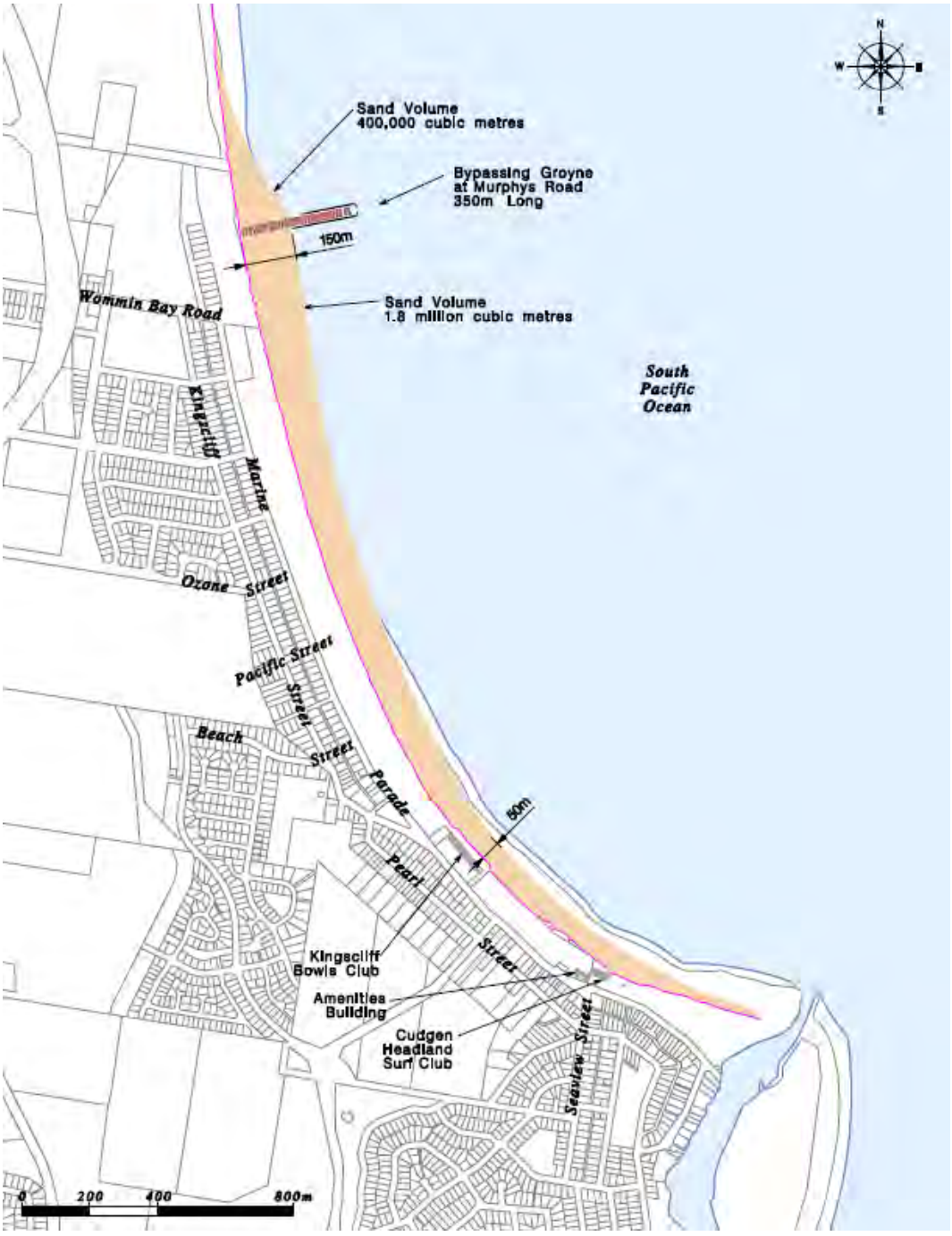


Figure 3-6 Groyne at Murphys Road with Beach Nourishment Option as Proposed in Umwelt (2005a)

3.3.1.5 Option 5: Planned Retreat

In the CMP, this option is described as the removal and/or relocation of all structures under threat in the immediate hazard zone, up to the 50 year hazard line over time, which included the Holiday Park, Cudgen Headland SLSC building, parkland toilet blocks and picnic shelters and the Kingscliff Amenities Hall in the longer term. The planned retreat option specifically excluded the Kingscliff Bowls Club building and its associated bowling greens and, car parks, because these assets benefit from the existing rock wall, which had been upgraded to an appropriate engineering standard.

As part of the CMP development, the viability of partial retreat of the Holiday Park (i.e. retreat from the immediate coast hazard zone) was examined (Umwelt, 2005a). It was concluded that "*due to there being a critical size below which the park would not remain viable as a business entity, it proved not to be viable.*"

Umwelt (2005a) estimated that the capital costs for the planned retreat option that provides for relocation of the Holiday Park to Cudgen Headland, the relocation of the Amenities Hall, the Surf Club building and other infrastructure, would be approximately $9.9M. The capital cost for the planned retreat option that includes removal (and no relocation) of the Holiday Park was estimated in the order of $4.9M.

Maintenance cost for the planned retreat option was estimated by Umwelt to be in the order of $100,000 per annum. This includes costs associated with maintenance of the existing seawall, including either nourishment or beach scraping, and maintenance of the parkland.

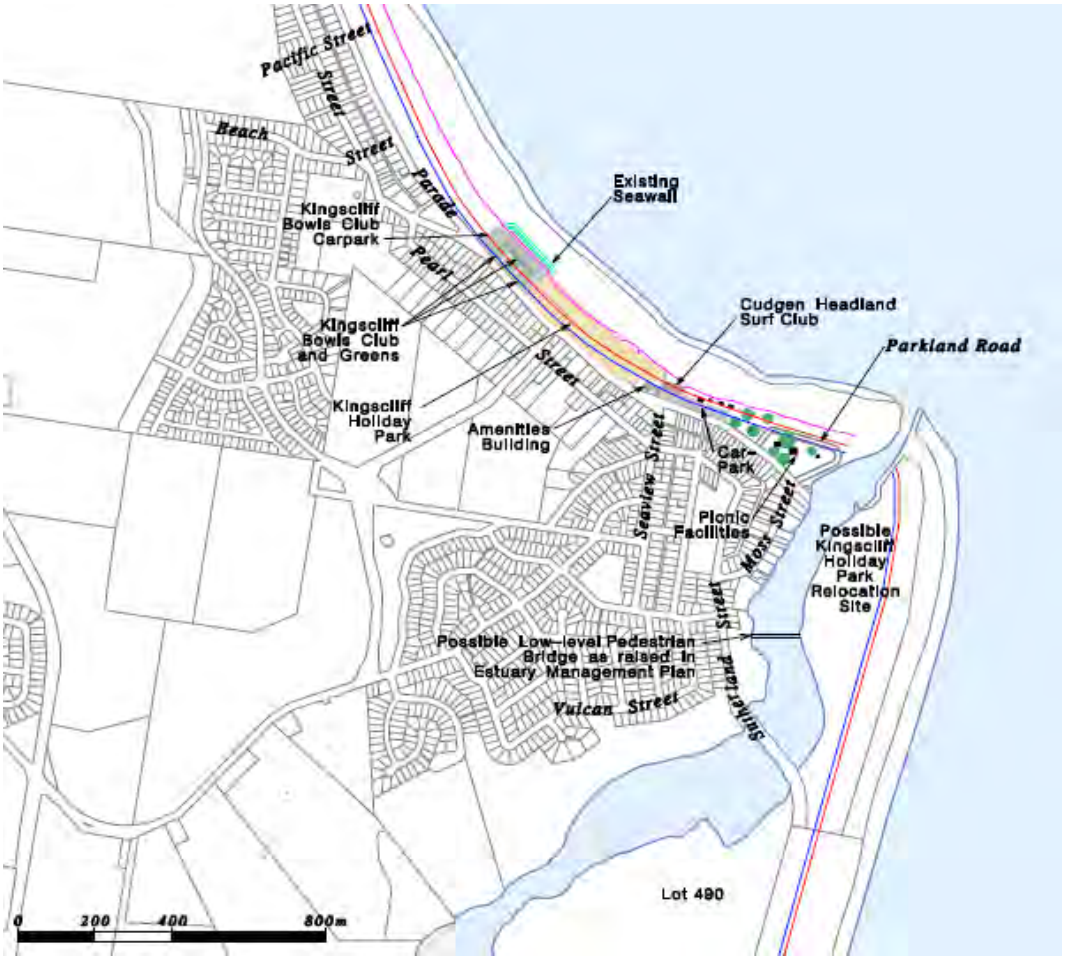


Figure 3-7 Planned Retreat Option as Proposed in Umwelt (2005a)

3.3.2 Alternative Terminal Seawall Designs

Following the erosion episodes between 2009 and 2012, WRL carried out a study that examined a range of options for implementing a long term seawall along the Holiday Park between the Surf Club and the Bowls Club (WRL, 2012).

The study considered two design scenarios for the seawall. In the first scenario Council would commit to ongoing monitoring and beach nourishment to maintain beach amenity. In the second scenario, beach amenity was allowed to be compromised and complete protection of development was provided only by a seawall.

The WRL study found that if beach amenity is to be maintained, any seawall construction that seeks to protect the Holiday Park without further reducing its size must be accompanied by beach nourishment. WRL determined that an initial sand volume of approximately 570,000 to 700,000 m^3 (depending on the adopted seawall design), followed by an ongoing beach nourishment volume requirement of about 3,900m^3 per year, would be required to maintain beach amenity and preserve public access to the beach.

The report notes that the estimates for ongoing nourishment volume do not include any allowance for mitigation of alongshore dispersion losses of nourishment sand. Alongshore spreading losses

following major beach nourishment work at Kingscliff are expected to be substantial (BMT WBM, 2013b), and consequently ongoing nourishment requirements are likely to be significantly underestimated. BMT WBM recommends that the alongshore losses be assessed to provide a better estimate of the maintenance requirements of any terminal protection option that includes major beach nourishment.

The initial capital cost estimate varied depending on the adopted armour material (rock, sand-filled geotextile containers or concrete elements), design philosophy and commitment to beach nourishment for amenity purposes. Cost estimates from the WRL study are summarised in Table 3-2.

The table shows that the initial capital costs for a rock wall foreshore protection strategy without commitment to beach nourishment for amenity purposes are estimated to be approx. $5.8M. If Council commits to beach nourishment for amenity purposes, large scale beach nourishment would be required and the total capital cost for implementation of a rock seawall protection strategy would increase to approximately $22.4M ($5.8M for the rock wall and $16.6M for the initial beach nourishment).

The WRL study indicates that concrete seawall options (including implementation of a stepped wall) would cost less than implementation of the rock wall option, should Council commit to ongoing beach nourishment for amenity purposes. This is due to the smaller beach nourishment volume requirements for these concrete options, compared to the rock wall option.

Table 3-2 Cost Estimates for Selected Terminal Protection Options (from WRL, 2012)

Option	Description	Capital Cost	Ongoing Maintenance Costs[1]	Beach amenity maintained ? (ie. acceptable beach width?)
Rock seawall with beach nourishment	Sloping greywacke revetment with wave return wall, plus beach nourishment along entire beach (initial volume ~700,000m3), plus ongoing maintenance)	$22.4M	$0.23M p.a.2	Yes
Rock seawall without beach nourishment	Sloping greywacke revetment with wave return wall	$5.8M	$0.09M p.a.	No
Concrete (Seabee) seawall with beach nourishment	Steep sloping revetment of concrete armour units with wave return wall, plus beach nourishment along entire beach (initial volume ~570,000m3, plus ongoing maintenance)	$19.7M	$0.21M p.a.2	Yes
Stepped concrete seawall without beach nourishment	Sloping revetment of concrete armour units with wave return wall, plus	$7.5M	$0.04M	No
Stepped concrete seawall with beach nourishment	Stepped monolithic seawall with wave return wall, plus beach nourishment along entire beach (initial volume ~600,000m3, plus ongoing maintenance)	$21.3M	$0.20 p.a.2	Yes
Stepped concrete seawall without beach nourishment	Sloping greywacke revetment with wave return wall	$8.8M	$0.02 p.a.	No

3.3.3 Beach Nourishment Alone Option

As part of the alternative terminal seawall design study, WRL also investigated the "Beach Nourishment Alone" option for Kingscliff Beach (WRL, 2012).

The study estimated that an initial nourishment volume of approx. 810,000m^3 (placed along a shoreline section of approx. 1,100m) would prevent erosion from extending landward of the existing foreshore protection alignment.

KBR (2012) indicates that Tweed River could be a source of beach nourishment sand and highlights a 660,000m^3 reserve of suitable sand in the lower Tweed River. The KBR report assumes the sand would be dredged from the river using a Cutter Suction Dredger and pumped to Kingscliff via a temporary pipeline at a rate of approximately 550m^3 per hour. WRL (2012) indicates that a number of alternative (terrestrial) sources exist, which can supply the remaining volume for the initial beach nourishment (approx. 150,000m^3).

Preliminary modelling by BMT WBM (2013b) demonstrated that such large scale beach nourishment operation would be subject to substantial alongshore dispersion following the

[1] excludes maintenance costs of existing shoreline protection structures
[2] Ongoing nourishment requirements based on estimates by WRL (2012), which do not include any allowance for mitigation of alongshore spreading losses of nourishment sand

nourishment. The results from the modelling (reproduced in Figure 3-8) indicate that without maintenance nourishment works or use of control structures, approx. 50% of the initial nourishment volume would have been lost from the nourished section along Kingscliff Beach and be transported to the beach further north within 8 years.

Based on this modelling, it is estimated that without use of control structures an ongoing maintenance volume in the order of 250,000m^3 of sand every 3 to 4 years may be required at Kingscliff to maintain a reasonable buffer in front of the existing foreshore protection alignment. The most cost effective source sand for maintenance nourishment is likely to be the recycling of sand. Such sand recycling operation would relocate sand that is transported northwards under longshore sand transport processes from Dreamtime Beach to Kingscliff Beach. These regular maintenance nourishment works would be supplemented with ad-hoc beach scraping and beach importation works as necessary.

The WRL (2012) estimates that the capital cost for initial beach nourishment of approximately 810,000m^3 would be about $21.9M.

In addition, there will be an ongoing cost associated with maintenance nourishment works.

The cost for ongoing maintenance nourishment, based on interpretation of preliminary modelling results by BMT WBM (2013b) and assuming that most ongoing nourishment sand can be sourced by recycling from Dreamtime Beach, is estimated to be in the order of $600,000 to $800,000 per annum.

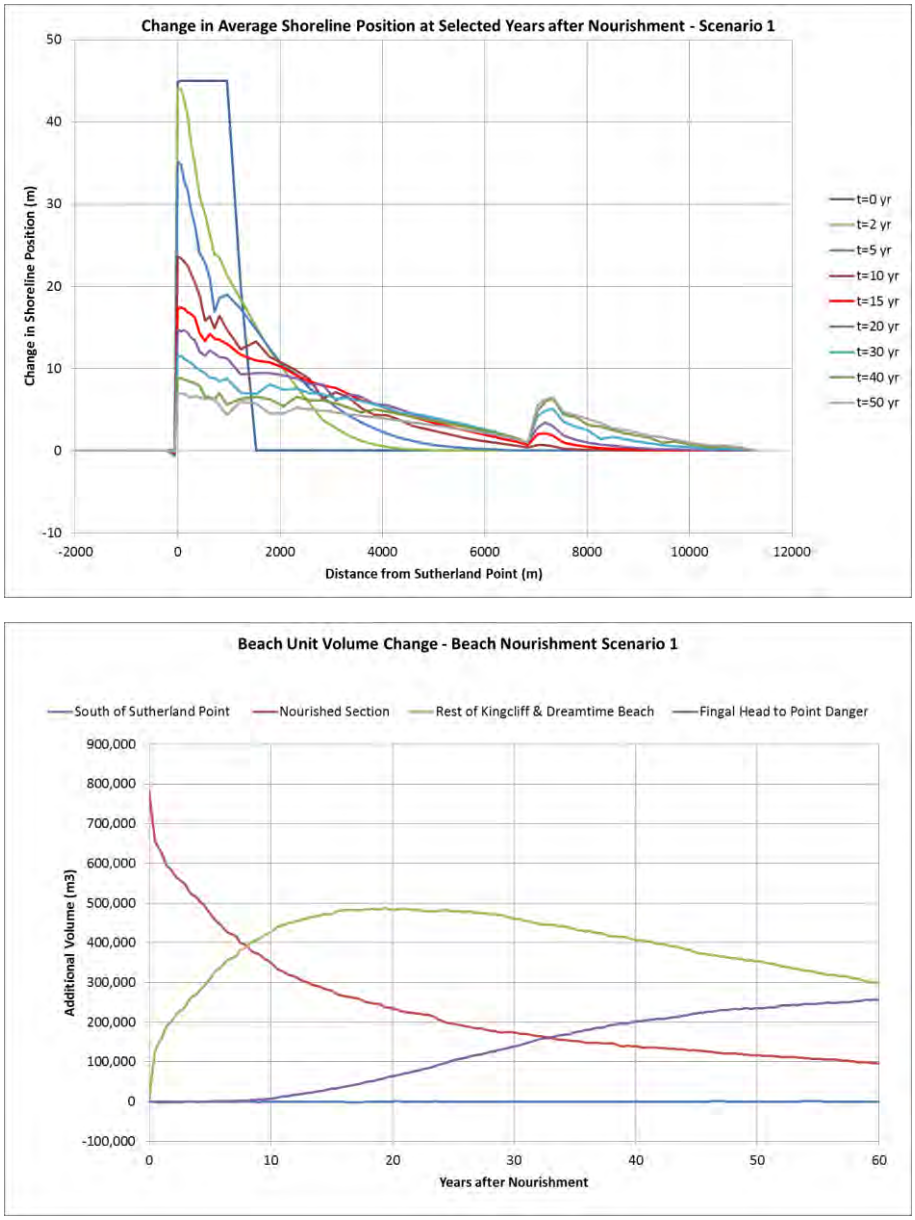


Figure 3-8 Modelled shoreline behaviour (top) and volume changes following a large scale beach nourishment campaign at Kingscliff (from BMT WBM, 2013b)

3.3.4 Groyne Field Concept Design

Following advice from the NSW Coastal Panel, Council commissioned WRL to prepare two different concept designs for a long term groyne field at Kingscliff (WRL, 2013). The first groyne field concept design assumed erosion protection would be provided by large scale beach nourishment in conjunction with the groynes. The second design assumed erosion protection would be provided by a terminal seawall along the Holiday Park in conjunction with the groynes. The study proposed a groyne field of two structures (one at the northern end of the KBBC rock revetment, 230m long in design 1 and 176m long in design 2, and one at the entrance road to Kingscliff Beach Holiday Park at the southern end of the park, 195m long in design 1 and 145m

long in design 2,), constructed using a combination of rock and concrete Hanbars (with the concrete Hanbars at the seaward end).

The capital cost for construction of the groynes was estimated to be approx. $15.3M for the option with large scale nourishment and $12.5M for the option of combining the groyne field with a seawall. The study does not provide specific cost estimates for the associated beach nourishment or seawall, nor for the likely ongoing costs of these options.

Based on the cost estimates from previous studies (Umwelt, 2005a, WRL, 2012), BMT WBM estimates that the capital cost for the initial nourishment to be approximately $27.6M and approximately $5.8M for the seawall (assuming a rock wall as described in WRL, 2012).

3.3.5 Summary of Options Previously Considered

After review of previous option investigations and assessment of the present local conditions, eight possible options were identified to manage current and future coastal hazard risks at Kingscliff Beach. The key aspects of these long term management options considered for Kingscliff are summarised in Table 3-3.

Capital and maintenance cost estimates were derived from previous studies, as detailed in the sections above.

Table 3-3 Summary of Management Options Previously Considered for Kingscliff Beach

Option	Description	Advantages	Disadvantages	Capital / Ongoing Maintenance Cost (2014$)	Comments
Do Nothing	Undertake no strategic action to manage coastal hazard risks	• No direct expenditure	• High risk to existing development • Loss of beach amenity (strewn debris, degraded beach access etc.) • Safety issues for beach and foreshore users • Likely to be perceived by community as abandonment	N/A / $0.2M p.a.	• Does not address risks • Unlikely to be acceptable by community
Planned Retreat (with retention of Bowling Club)	Planned retreat as per option 5 in CMP, but without relocation of Cudgen Headland SLSC	• Restores natural beach • Maintains beach amenity • New and improved Holiday Park is provided	• Dependency on suitable relocation site for Holiday Park • Uncertainty of timeframes for required actions • Does not provide a long term solution (Marine Parade and associates buildings become under threat in longer term ~50 years) • Potentially strong opposition from community	$10.2M / $0.13M p.a.	• Costing based on immediate relocation of key assets, including SLSC and assumes relocation of Holiday Park to Cudgen Headland site • Maintenance cost reduce when retreat is completed
Beach Nourishment Alone	Initial nourishment volume of approx. ~810,000m^3, plus 39,000m^3 every 10 years (MHL, 2009). As noted previously, this is considered to be significantly under-estimated.	• Enhances beach amenity (increased beach width) • Increases beach buffer and therefore increases land and infrastructure protection • Slows long-term shoreline recession	• High capital and maintenance cost • Uncertainty regarding the future sand sourcing for maintenance nourishment • Uncertainty regarding the reliability as an effective erosion defence method • Impacts during works (disruption of traffic and recreational use of beach)	$21.9M / $0.2M p.a.	• Option may be unfeasible due to sand sourcing issues • Ongoing maintenance cost may be larger
Rock seawall with beach nourishment	Sloping greywacke revetment along Holiday Park with beach nourishment along entire beach (initial volume	• Provides certain protection to key assets • Maintains beach amenity during	• High capital and maintenance cost • Uncertainty regarding the future sand sourcing for maintenance	$22.4M / $0.2M p.a.	• Option may be unfeasible due to sand sourcing issues • Ongoing maintenance cost

Beach Management Options for Consideration

Option	Description	Advantages	Disadvantages	Capital / Ongoing Maintenance Cost (2014$)	Comments
	~700,000m^3), plus 39,000m^3 every 10 years (MHL, 2009). As noted previously, this maintenance volume is considered to be significantly under-estimated.	most periods • Provides long term solution for Marine Parade	nourishment • Visual impacts of seawall on Holiday Park (crest height higher than foreshore land) • Loss of beach during severe storms • Loss of beach access following severe storms		may be larger
Rock seawall without beach nourishment	Sloping greywacke revetment along Holiday Park	• Provides certain protection to key assets in short to medium term • Lower cost	• Loss of beach amenity and access (progressive narrowing / loss of beach) • May cause accelerated erosion downdrift of seawall	$5.8M / $0.05M p.a.	
Stepped concrete seawall with beach nourishment	Stepped monolithic seawall along Holiday Park with beach nourishment along entire beach (initial volume ~600,000m^3, plus 39,000m^3 every 10 years (MHL, 2009). As noted previously, this maintenance volume is considered to be significantly under-estimated).	• Provides certain protection to key assets • Maintains beach amenity during most periods • Provides long term solution for Marine Parade • Smaller footprint compared to rock wall • Improved beach access compared to rock wall	• High capital and maintenance cost • Uncertainty regarding the future sand sourcing for maintenance nourishment • Visual impacts of seawall on Holiday Park (crest height higher than foreshore land) • Loss of beach during severe storms • Less adaptable than rock wall	$21.3M / $0.2M p.a.	• Option may be unfeasible due to sand sourcing issues • Ongoing maintenance cost may be larger
Stepped concrete seawall without beach nourishment	Sloping greywacke revetment along Holiday Park	• Provides certain protection to key assets in short to medium term • Smaller footprint compared to rock wall • Improved beach access compared to rock wall	• Loss of beach amenity and access (progressive narrowing / loss of beach) • May cause accelerated erosion downdrift of seawall • Less adaptable than rock wall	$8.8M / $0.05M p.a.	
Groyne field with beach nourishment	Two groynes with beach nourishment along entire beach (initial volume ~1,000,000m^3, plus 39,000m^3	• Enhances beach amenity (increased beach width) • Increases beach buffer and therefore increases land and	• High cost • Less certain protection than a seawall	$43.0M / $0.2M p.a.	

Beach Management Options for Consideration

Option	Description	Advantages	Disadvantages	Capital / Ongoing Maintenance Cost (2014$)	Comments
	every 10 years (MHL, 2009). As noted previously, this maintenance volume is considered to be significantly under-estimated)	infrastructure protection • Slows long-term shoreline recession	• Visual amenity of beach impacted • May cause accelerated shoreline fluctuation downdrift of groyne field		

3.4 Options for Further Consideration in Kingscliff Beach CRMS

Based on Council's preliminary evaluation of previously investigated options and assessment of the coastal processes and associated hazards, Council has selected three core management options for further consideration in the Kingscliff Beach Foreshore Coastal Risk Management Study (with two variants of one option), namely:

- Option 1: Do nothing;
- Option 2a: Planned retreat –*with retention* of the Cudgen Headland SLSC and Kingscliff Beach Bowls Club buildings;
- Option 2b: Planned retreat – *without retention* of the Cudgen Headland SLSC and Kingscliff Beach Bowls Club buildings; and
- Option 3: Terminal protection through seawall, sand nourishment and land use planning.

These four options, as described further below, are the subject of further assessment against a range of success criteria, which are detailed in the following chapter.

3.4.1 Option 1: Do nothing

Key points describing this option are as follows:

- No further works or expenditure;
- No beach nourishment;
- Existing facilities 'managed to fail' with removal once impacted and no replacement in the future;
- Temporary loss of beach access and amenity during periods of beach erosion – some recovery post erosion event;
- Gradual permanent loss of beach;
- Continuation of ad-hoc management of shoreline – different treatments in different sections;
- Visual concerns regarding existing ad-hoc structures;
- Community expectation that existing solution is temporary only;
- Limited longevity of existing solution (sand bags, low rock wall) due to temporary design, wave overtopping exposure etc;
- Rocks and bags potentially spread over beach in the future following erosive storm events – public safety concern; and
- Cost: Capital costs are minimal. Maintenance costs would involve repair of existing seawalls on an as-required basis – likely following significant coastal storm events (approx. $200,000/yr).

3.4.2 Option 2a: Planned retreat –*with retention* of the Cudgen Headland SLSC and Kingscliff Beach Bowls Club buildings

Key points describing this option are as follows:

- Gradual removal and relocation of Holiday Park structures/facilities and Park infrastructure (shelters, amenities, carparking) currently located within 50yr hazard zone [*indicatively over the next 30 years*];
- Holiday Park relocated/redeveloped elsewhere [possibly at Cudgen Headland or other location];
- Existing rock and sandbag wall in front of Holiday Park and parkland to be removed (once dilapidated or significantly affected by erosion);
- Possible works required to strengthen SLSC vertical piled seawall;
- Conversion of Holiday Park to open space parkland;
- Surf Club and Bowling Club become new 'headlands'. Additional protection required around sides to prevent outflanking. Financial investment required;
- No continuous access along beach around surf club and bowling club as beach retreats;
- New pocket beach between surf club and bowling club – impacts on sediment processes, waves;
- Accelerated erosion and retreat on northern side of Bowling Club; and
- Cost: Approximately $8 million covering relocation of Holiday Park and strengthening of existing seawall in front of SLSC. SLSC building is to be retained. Maintenance costs would be approximately $200,000/year.

3.4.3 Option 2b: Planned retreat – *without retention* of the Cudgen Headland SLSC and Kingscliff Beach Bowls Club buildings

Key points describing this option are as follows:

- Gradual removal and relocation of SLSC, Holiday Park, Bowling Club and Amenities Hall structures/facilities as well as Park infrastructure (shelters, amenities, carparking) currently located within 50yr hazard zone [*indicatively over the next 30 years as infrastructure becomes impacted*];
- Holiday Park relocated/redeveloped elsewhere [possibly at Cudgen Headland or other location];
- SLSC relocated (to south, and outside 50yr hazard area);
- Bowling Club relocated (subject to a suitable site being available);
- Existing seawalls to be removed (once dilapidated or significantly affected by erosion and impacting on beach amenity);
- Conversion of entire foreshore to open space parkland;
- Maintenance of full beach access and amenity;

- Limited impacts on coastal processes (allowing for natural processes);
- Potential exposure of Marine Parade to future erosion (longer term); and
- Cost: Approximately $15-20 million, covering relocation of Bowling Club, Holiday Park and SLSC (with removal of existing coastal structures). Maintenance costs would be less than $100,000 per year, mostly covering post-storm amenity repairs to dunes and access tracks etc.

3.4.4 Option 3: Terminal protection through seawall, sand nourishment and land use planning

Key points describing this option are as follows:

- Formalised and contiguous seawall protection from SLSC to Bowling Club (500m). Height of wall may have impacts on visual amenity / views from Park;
- Seawall to include opportunity for increased beach access / foreshore amenity (including pedestrian access along crest and onto beach at selected locations);
- Continuation of existing foreshore uses, including SLSC, Holiday Park and Bowling Club as well as future refurbishment and life-extension of uses;
- Scale-back/reconfigure Holiday Park to allow for open space recreation area that links with beach access over seawall structure;
- Beach nourishment will provide longshore demand and minimise detrimental impacts downdrift;
- No future intensification or material change of landuse behind structure beyond existing planning regime;
- Consider retreat in longer term once existing uses reach end of functional life and on-going beach nourishment becomes cost-prohibitive to maintain continuous beach access and amenity; and
- Cost: Approximately $20 – 25 million, covering the new wall in front of the Holiday Park and bulk beach nourishment. On-going maintenance costs are expected to be high, with 50% of bulk sand likely to be lost over an 8 year period (requiring on-going nourishment campaigns of approximately 250,000m^3 every 3-4 years, which is equivalent to a maintenance cost of about $800,000/yr).

4 Multi Criteria Analysis

4.1 Introduction

Multi Criteria Analysis (MCA) is an appraisal technique that aims to assist decision-making when a number of diverse attributes need to be considered without necessarily assigning monetary values to all of those interests (Department of Communities and Local Government, 2009). Hence, unlike pure economic analysis tools such as cost-benefit analysis, MCA allows decision-makers to work with both qualitative and quantitative information. In particular, MCA provides a framework within which social and environmental issues can be more explicitly included in the decision-making process and considered in tandem with economic issues.

MCA evaluates alternative management options by assessing options against a defined set of decision criteria that represent the range of values and interests of relevant stakeholders. Individual criteria can be assigned subjective weightings to increase or decrease the significance of criteria based upon their perceived degree of importance.

4.2 Adopted MCA Option Assessment Process

MCA was used to assess the short-listed options adopted for Kingscliff foreshore (refer Section 3.4). The adopted MCA process for Kingscliff involved the following stages:

(1) Identify and select criteria;

(2) Scoring each option against the selected criteria; and

(3) Weighting of criteria, sensitivity analysis and final assessment.

Stakeholders provided input to the process through interactive workshops. Four workshops were held to specifically capture feedback and input, with two workshops targeting relevant Council staff and two workshops with the Tweed Coastal Management Committee.

4.3 Stage 1: Identify and Select Criteria

The initial step in carrying out the MCA was to confirm stakeholder values of the Kingscliff foreshore that should be considered as part of the decision making process. A workshop activity was undertaken to capture relevant values and establish the likely influence on these values by the four options being considered. Consolidated results of the values assessment are provided in Table 4-1.

Table 4-1 Kingscliff Foreshore Values and Impacts of Short-listed Options

	Option 1 – Do nothing (business as usual)	Option 2a – Planned Retreat with Retention of SLSC and Bowls Club	Option 2b – Planned Retreat with no Retention of SLSC and Bowls Club	Option 3 – terminal seawall and beach nourishment
Presence of a sandy beach	substantially worsen	slightly worsen	improve	improve
Safe access to the beach	worsen	slightly improve	substantially improve	substantially improve
Continuous pedestrian access along the beach	substantially worsen	substantially worsen	improve	improve
Use of beach for recreation / beach lifestyle	worsen	slightly worsen	improve	improve
Visual amenity from the parkland	worsen	same	substantially improve	improve
Visual amenity from the beach	substantially worsen	slightly worsen	improve	worsen
SLSC	substantially worsen	slightly improve	substantially worsen	improve
Holiday Park	substantially worsen	substantially worsen	substantially worsen	substantially improve
Bowling Club	substantially worsen	slightly improve	substantially worsen	improve
Ecosystem services - Kingscliff	worsen	slightly worsen	improve	worsen
Ecosystem services - Dreamtime	slightly worsen	worsen	improve	worsen

Stakeholders were also asked if new values would be created as a result of adopting any of the options. Suggestions from stakeholders included:

- Employment and tourism (generated from investment by Option 3);
- Surfing conditions (generated from Option 2b);
- Provision of new community facilities (generated from Option 2b); and
- Provision of new public domain areas (generated from Option 3).

An initial list of possible criteria was compiled by BMT WBM in conjunction with Council. These possible criteria were presented to the stakeholders, who provided feedback on whether they considered them to be important or not. Stakeholders were also encouraged to document additional criteria that they considered to be important, which were not included in the initial list. As part of the stakeholder workshops, attendees also flagged their top eight criteria for assessment in

the MCA. The list of criteria initially identified, including suggestions from stakeholders, is outlined in Table 4-2 spanning the four dimensions of social/cultural, environmental, economic and governance criteria.

Table 4-2 Full Listing of Criteria Initially Considered

Social / Cultural Criteria	Environmental Criteria
Beach usage / maintain beach lifestyle Protection of critical infrastructure (e.g. Marine Parade) Access to the beach Access along the beach Visual amenity Access along the foreshore Community acceptability / expectation Preservation/protection of bowling club Preservation/protection of holiday park Preservation/protection of SLSC building and facilities Willingness of community to pay for or contribute towards works Family lifestyle Surf quality Negative social impacts from visitors Creation of central park for public use Provision of active open space / public domain (community opportunities) Employment	Rehabilitates / maintains coastal ecosystem values Minimises impact on coastal processes No (minimise) detrimental environmental impacts elsewhere Impacts on other environmental and physical processes (e.g. dredging / piping) Tourist / environmental reputation Carbon emissions Sustainability over the longer term Longer term (> 2100) solution and planning required for large scale investment Stormwater control and treatment Marine ecosystem values Resource demands for construction (quarrying, energy etc.)
Economic Criteria	**Governance Criteria**
Commercial benefits / impacts (e.g. business, tourism, relocation costs) Benefit / cost ratio Capital and Maintenance Costs (Net Present Value) Affordability (cost per user; $/m) Investment certainty Applicability of a special levy Falling values of Kingscliff residential property Employment retention / growth Opportunity costs Impacts on development potential	Technical feasibility / practicality Community safety Long-term effectiveness (+30 - 50yrs) Risk reduction priority approach (1. Risk avoidance 2. Risk mitigation/accommodation 3. Risk acceptance) Achieves multiple objectives Adaptive / flexible / reversible design Legal / approvability Duty of care Public interest Consistency with ESD principles

Based on stakeholder feedback of top eight criteria and amalgamation of like criteria, a final list of assessment criteria was developed, as presented in Table 4-3. This list was confirmed as part of the second round of workshops to ensure stakeholder acceptance of the assessment criteria.

Table 4-3 Final List of Selection Criteria

Social Criteria	Maintain existing beach lifestyle
	Protection of critical infrastructure on Marine Parade
	Provision of appropriate access to, and unimpeded along, the beach and foreshore
Environmental Criteria	Maintain coastal ecosystem values
	Minimise impact on natural coastal processes
	Minimise detrimental impacts on environmental and physical processes elsewhere along embayment foreshore
Economic Criteria	Commercial benefits / impacts (e.g. local business, tourism, events)
	Benefit / cost ratio
	Public cost
Governance Criteria	Provide for appropriate community safety and duty of care
	Ensure overall design is practical, feasible and adaptive
	Long term effectiveness

4.4 Stage 2: Scoring Each Option against Selected Criteria

Once the selection criteria was established, the next stage was to score the options with respect to each of the final 12 criteria. An initial criteria score was determined for the options using available background information and previous reports. This was then reviewed by stakeholders as part of the second round of workshops, who were able to suggest alternative scores providing there was fair justification for the score.

A five-point scoring scale as presented in Table 4-4 was used for this scoring. Positive values represent a favourable assessment of performance, while negative values indicate an unfavourable assessment of performance.

Table 4-4 Scoring Scale used in Assessment of Foreshore Options for Kingscliff

Score	Interpretation
+2	Highly favourable
+1	Moderately favourable
0	Neutral
-1	Moderately unfavourable
-2	Highly unfavourable

Within the scoring process, a timeframe of about 30 years was used. A neutral position (score – 0) was adopted as 'no change' from the present (2014) conditions. Table 4-5 presents the results of the scoring process.

Table 4-5 Management Option Scoring for MCA

	INITIAL SCORING BY BMT WBM					FINAL SCORING FOLLOWING STAKEHOLDER REVIEW *(italics means numbers changed from initial scoring)*			
	DO NOTHING	RETREAT WITH RETENTION	RETREAT WITHOUT RETENTION	TERMINAL PROTECTION	Principal Source of Information / Assumptions used in determining initial scoring	DO NOTHING	RETREAT WITH RETENTION	RETREAT WITHOUT RETENTION	TERMINAL PROTECTION
SOCIAL CRITERIA									
Maintain existing beach lifestyle	-2	1	2	2	Interpreted from Griffith University (2013), Workshop 1 values responses	-2	*0*	*1*	2
Protection of critical infrastructure on Marine Parade	-1	0	-1	2	Interpreted from Griffith University (2013)	-1	0	-1	2
Provision of appropriate access to, and unimpeded along, the beach and foreshore	-2	-1	2	2	Interpreted from Griffith University (2013), Workshop 1 values responses	-2	-1	2	2
ENVIRONMENTAL CRITERIA									
Maintain coastal ecosystem values	-1	-1	1	-1	Interpreted from Griffith University (2013), Workshop 1 values responses	-1	-1	1	-1
Minimise impact on natural coastal processes	-2	-2	2	1	Interpreted from Umwelt (2005a, 2005b)	-2	-2	2	1
Minimise detrimental impacts on environmental and physical processes elsewhere along embayment foreshore	-2	-2	2	1	Interpreted from Umwelt (2005a, 2005b)	-2	-2	2	1
ECONOMIC CRITERIA									
Commercial benefits / impacts (e.g. local business, tourism, events)	-2	0	0	2	Interpreted from Griffith University (2013), Workshop 1 values responses	-2	0	0	2
Benefit / cost ratio	2	1	0	-1	Interpreted from Griffith University (2013)	2	1	0	-1
Public cost	2	0	-1	-2	Interpreted from Umwelt (2005a, 2005b), WRL (2012)	2	0	-1	-2

	INITIAL SCORING BY BMT WBM					FINAL SCORING FOLLOWING STAKEHOLDER REVIEW *(italics means numbers changed from initial scoring)*				
	DO NOTHING	RETREAT WITH RETENTION	RETREAT WITHOUT RETENTION	TERMINAL PROTECTION	Principal Source of Information / Assumptions used in determining initial scoring	DO NOTHING	RETREAT WITH RETENTION	RETREAT WITHOUT RETENTION	TERMINAL PROTECTION
GOVERNANCE CRITERIA									
Provide for appropriate community safety and duty of care	-2	0	2	1	Interpreted from Griffith University (2013)	-2	0	*1*	*2*
Ensure overall design is practical, feasible and adaptive	-2	-1	2	0	Professional judgement	-2	-1	2	*1*
Long term effectiveness	-2	0	2	1	Professional judgement	-2	0	2	*2*

4.5 Stage 3: Weighting of criteria, sensitivity analysis and final assessment

Relative weightings of the assessment criteria were established through consultation with the stakeholders. In this regard, a final workshop activity was carried out wherein participants distributed 24 'points' between the 12 criteria in order to define the relative importance of each criteria and how much emphasis each has on the overall assessment. Unsurprisingly, there was considerable variability in stakeholder responses to this activity. A summary of the results of the weightings exercise is given in Table 4-6.

Table 4-6 Relative Weightings and Variability

	Weighting	Variability between responses
SOCIAL CRITERIA		
Maintain existing beach lifestyle	2.5	High
Protection of critical infrastructure on Marine Parade	2.0	High
Provision of appropriate access to, and unimpeded along, the beach and foreshore	2.0	Medium
ENVIRONMENTAL CRITERIA		
Maintain coastal ecosystem values	1.5	Medium
Minimise impact on natural coastal processes	2.0	Medium
Minimise detrimental impacts on environmental and physical processes elsewhere along embayment foreshore	2.0	Low
ECONOMIC CRITERIA		
Commercial benefits / impacts (e.g. local business, tourism, events)	2.5	High
Benefit / cost ratio	3.0	Medium
Public cost	2.0	Medium
GOVERNANCE CRITERIA		
Provide for appropriate community safety and duty of care	1.5	High
Ensure overall design is practical, feasible and adaptive	3.0	High
Long term effectiveness	1.5	High

Using the weightings as outlined above, a first pass assessment of the options has been carried out, the results of which are presented in Table 4-7. The first pass assessment shows that the Do Nothing and Planned Retreat with Retention of the SLSC and Bowling Club options both result in a net detrimental impact compared to the present day conditions and values.

Retreat without Retention and Terminal Protection with Nourishment both yielded positive results compared to present day conditions, with no clear advantage to either of these options.

Table 4-7 First Pass Results for MCA

		Weighted Scores			
	Weighting	DO NOTHING	RETREAT WITH RETENTION	RETREAT WITHOUT RETENTION	TERMINAL PROTECTION
SOCIAL CRITERIA					
Maintain existing beach lifestyle	2.5	-5	0	2.5	5
Protection of critical infrastructure on Marine Parade	2.0	-2	0	-2	4
Provision of appropriate access to, and unimpeded along, the beach and foreshore	2.0	-4	-2	4	4
ENVIRONMENTAL CRITERIA					
Maintain coastal ecosystem values	1.5	-1.5	-1.5	1.5	-1.5
Minimise impact on natural coastal processes	2.0	-4	-4	4	2
Minimise detrimental impacts on environmental and physical processes elsewhere along embayment foreshore	2.0	-4	-4	4	2
ECONOMIC CRITERIA					
Commercial benefits / impacts (e.g. local business, tourism, events)	2.5	-5	0	0	5
Benefit / cost ratio	3.0	6	3	0	-3
Public cost	2.0	4	0	-2	-4
GOVERNANCE CRITERIA					
Provide for appropriate community safety and duty of care	1.5	-3	0	1.5	3
Ensure overall design is practical, feasible and adaptive	3.0	-6	-3	6	3
Long term effectiveness	1.5	-3	0	3	3
RELATIVE TOTAL SCORE		**-27.5**	**-11.5**	**22.5**	**22.5**

The sensitivity of the results to the variability in the weightings was explored to determine if alternative weightings would provide a clear distinction between the top two options. All criteria that had a high degree of variability in stakeholder weighting responses was reviewed and tested for sensitivity. For each of these criteria, an alternative weighting was determined (generally giving consideration to alternative stakeholder views). The outcomes of this sensitivity testing are provided in Table 4-8. In general, the results of the sensitivity to alternative stakeholder views did not affect the overall scores to a large degree. Where the weighting of protection of critical infrastructure on Marine Parade was increased, the Terminal Protection option emerged as

preferable. Meanwhile, where the weighting given to the commercial benefits to local businesses and operators was lowered, the Planned Retreat option became slightly favourable.

Further, the scoring is dependent on the reliability of the technical effectiveness and cost assessment of the nourishment works accompanying terminal protection. More rapid than expected loss of the nourished sand or higher than expected cost of the works would lead to a lower score for that option. It is likely that the uncertainty associated with those factors would be greater than that associated with effectiveness and costs for the retreat option. Nevertheless, the assessment made by WRL (2012) is adopted herein as the best available.

Table 4-8 Sensitivity of results based on alternative stakeholder weightings

	Initial Weighting	Alternative Weighting	TOTAL SCORE for RETREAT WITHOUT RETENTION	TOTAL SCORE for TERMINAL PROTECTION
SOCIAL CRITERIA				
Maintain existing beach lifestyle	2.5	2.0	**22.0**	**21.5**
Protection of critical infrastructure on Marine Parade	2.0	2.5	**22.0**	**23.5**
Provision of appropriate access to, and unimpeded along, the beach and foreshore	2.0	-	*22.5*	*22.5*
ENVIRONMENTAL CRITERIA				
Maintain coastal ecosystem values	1.5	-	*22.5*	*22.5*
Minimise impact on natural coastal processes	2.0	-	*22.5*	*22.5*
Minimise detrimental impacts on environmental and physical processes elsewhere along embayment foreshore	2.0	-	*22.5*	*22.5*
ECONOMIC CRITERIA				
Commercial benefits / impacts (e.g. local business, tourism, events)	2.5	2.0	**22.5**	**21.5**
Benefit / cost ratio	3.0	-	*22.5*	*22.5*
Public cost	2.0	-	*22.5*	*22.5*
GOVERNANCE CRITERIA				
Provide for appropriate community safety and duty of care	1.5	2.0	**23.0**	**23.5**
Ensure overall design is practical, feasible and adaptive	3.0	2.5	**21.5**	**22.0**
Long term effectiveness	1.5	2.0	**23.5**	**23.5**

To assist with the assessment further, sensitivity of the results were also considered based on generally increasing weightings of whole criteria groups. The results of this sensitivity testing are given in Table 4-9. Overall, if the social dimension is considered to be of higher consideration, then the Terminal Protection option is favourable. However, if the environmental dimension is to be considered more important, then the Planned Retreat option is a better outcome. Interestingly, there was no sensitivity of results to emphasis of the economic dimension. In essence, the cost factor for both the Planned Retreat and Terminal Protection options remains about the same.

Table 4-9 Sensitivity of results based on general criteria group weightings

	TOTAL SCORE for RETREAT WITHOUT RETENTION	TOTAL SCORE for TERMINAL PROTECTION
Social emphasis	*27*	***35.5***
Environmental emphasis	***32***	*25*
Economic emphasis	*20.5*	*20.5*

4.6 Confidence in Results

The coastal zone is a highly dynamic environment subject to short-term and long-term events and climatic cycles. This means that confidence in accurately predicting future shoreline responses to such events and climatic cycles is relatively low. In particular, shoreline response to future storm events in combination with higher sea levels is not well understood. The recent update to the Tweed Coastal Hazards Assessment (BMT WBM, 2013a) provides a good indication of potential variability in future beach alignment, however, the actual shoreline response will be driven by many factors including individual storms and sustained stormy periods that cause beach recession. Similarly, the expected response of the shoreline to bulk nourishment is not well appreciated. Longshore sediment transport rates within this coastal compartment are very high. Interaction of the nourished sand with the longshore transport processes will see the sand dispersed to the north. The rate of loss of nourished sand, however, will again be dependent on a range of factors, many of which are difficult to quantify.

In terms of the MCA, many of the values maintained or enhanced in Option 3 are due to beach nourishment. If this nourishment was to be ill-effective, or if it becomes prohibitively costly to sustain (e.g. given a high loss rate from the coastal compartment), then some of the scores for the MCA would change. Similarly, for the planned retreat options, the extent of retreat due to future sea level rise is somewhat unknown, although within a reasonable planning timeframe of 30 – 50 years it is expected that the extent of shoreline retreat due to sea level rise would be modest (compared to a longer timeframe of 100+ years).

5 Coastal Management Strategy for Kingscliff

5.1 Financial Considerations

The MCA, as described in the preceding chapter, highlights there is no single management option that provides a clear benefit over other alternatives for addressing coastal management at Kingscliff in the near term. All options have advantages and disadvantages that need to be carefully considered as part of a decision making process. Therefore, given sufficient funding to support any option, either Planned Retreat without retention or Terminal Protection with nourishment would likely provide an acceptable outcome in the short to medium term (up to 50 years say) if certain limitations are overcome.

From a practical perspective, however, it is expected that funding from the State Government for coastal management at Kingscliff will be limited, as there are several coastal risk hot-spots along the entire NSW coast all competing for monetary support. Thus available finances, rather than technical or socio-economic analysis, may ultimately dictate the most appropriate course of action for Council.

5.2 Timeframes for Considerations

The coastal management strategy for Kingscliff should be based on a timeframe of 30 – 50 years. The rationale for adopting this timeframe is that it approximately accords with the lifespan of existing assets located along the shoreline (e.g. SLSC, bowling club, seawalls), and is unlikely to experience significant shoreline response to projected sea level rise (although there will still be variable shoreline response to a range of climatic cycles).

Notwithstanding the above, careful consideration of implications beyond this timeframe are still necessary. In 50+ years, if seawalls remain in place at Kingscliff (in their current location), the projected rise in sea level will likely result in:

(1) Increasing volumes of sand required to nourish the beach in front of the seawalls to maintain acceptable amenity as the seawalls become more proud of the natural shoreline alignment – this will result in an increasing cost burden for maintaining sand nourishment; or

(2) The amount of the sand in front of the seawalls is permitted to diminish, thus reducing future beach amenity.

While options in this study still consider maintaining and enhancing existing coastal structures, a likely future outcome will be that relocation of assets and planned retreat along the Kingscliff foreshore will ultimately be required. The timeframe for this is not known, however, it is recognised that the pressures driving the need for planned retreat will intensify in the future as sea level rises and the natural beach profile in front of the structures deepens.

5.3 Recommended Strategy

5.3.1 Principles

The principles that underpin the most appropriate management solution for addressing current and future coastal hazards at Kingscliff are as follows:

(1) Works are affordable to both Council and State Government. This would most likely be best achieved through staging of works over a number of years and integrating works with broader asset management programs;

(2) Works do not inhibit or preclude the potential for a full suite of options to be re-considered in the future. The approach needs to remain adaptive and flexible in order to meet future needs and demands that are not yet realised;

(3) Impacts of the existing seawalls on beach amenity need to be mitigated;

(4) Public access along the beach and/or foreshore needs to be maintained;

(5) Capitalise on the remaining functional life (and significant prior financial investment) of shoreline assets in providing amenity and value to the community;

(6) Nourishment should target opportunities for adding new sand to the coastal compartment rather than just recycling sand already within the active coastal zone; and

(7) Accommodate the potential to successfully secure funding for one-off large scale works, such as river dredging.

5.3.2 Approach

It is recommended that the Kingscliff foreshore be managed on a precinct basis (refer Figure 5-1) as follows:

Faulks Park / Lions Park Precinct: Focus is providing natural foreshores/dunal system and maintaining a sandy beach for amenity purposes;

Cudgen Headland SLSC to Kingscliff Beach Bowling Club Precinct: Focus is on a hardened foreshore that provides protection to foreshore assets of high amenity value. Limited beach amenity is accepted in this precinct; and

Jack Bayliss Park (south) Precinct: Focus is to allow a buffer for future on-going erosion in response to the hardened foreshore to the south. Any future nourishment would reduce the extent and severity of erosion in this precinct.

For the area between Cudgen Headland and Kingscliff Beach Bowling Club, a significant amount of foreshore protection works have been constructed over the past 5 years. There is also a general desire by the community to maximise the use of existing foreshore development. A 'protection' strategy has therefore been recommended for this precinct covering the short to medium term (up to 2050), after which time a range of options should be reconsidered, including retreat and relocation. 2050 becomes an approximate trigger timeframe as it will generally reflect the end of life for existing and potential new foreshore development, and will provide sufficient time to enable a better appreciation of actual shoreline response to expected sea level rise and the associated impacts on beach amenity at Kingscliff.

The beach in front of the hardened foreshore will continue to respond to coastal processes, including a variable wave climate and increasing sea level rise. In the absence of a formal and substantial beach nourishment program, there will be periods of diminished beach amenity between Cudgen Headland SLSC and Kingscliff Beach Bowling Club. Future sea level rise will

exacerbate this, although up to 2050, the extent of sea level rise and associated shoreline response is expected to be limited. A small scale nourishment program could be established with the aim of redressing temporarily lost beach amenity rather than maintaining a suitable sand buffer for protection purposes. A large scale nourishment program could also be considered on an opportunity basis, and may extend the trigger point timeframe for reconsidering options in the future (potentially beyond 2050).

Figure 5-1 Kingscliff Foreshore Management Precincts

Potential wave overtopping of the existing foreshore and coastal structures would need to be managed in order to limit inundation and mitigate risks to existing and future assets behind, including the Holiday Park, the SLSC and the general parkland of Faulks Park and any new open space recreation areas established along the foreshore.

Specific steps involved in implementing the recommended strategy are presented graphically in Figure 5-2 and outlined in more detail in Table 5-2.

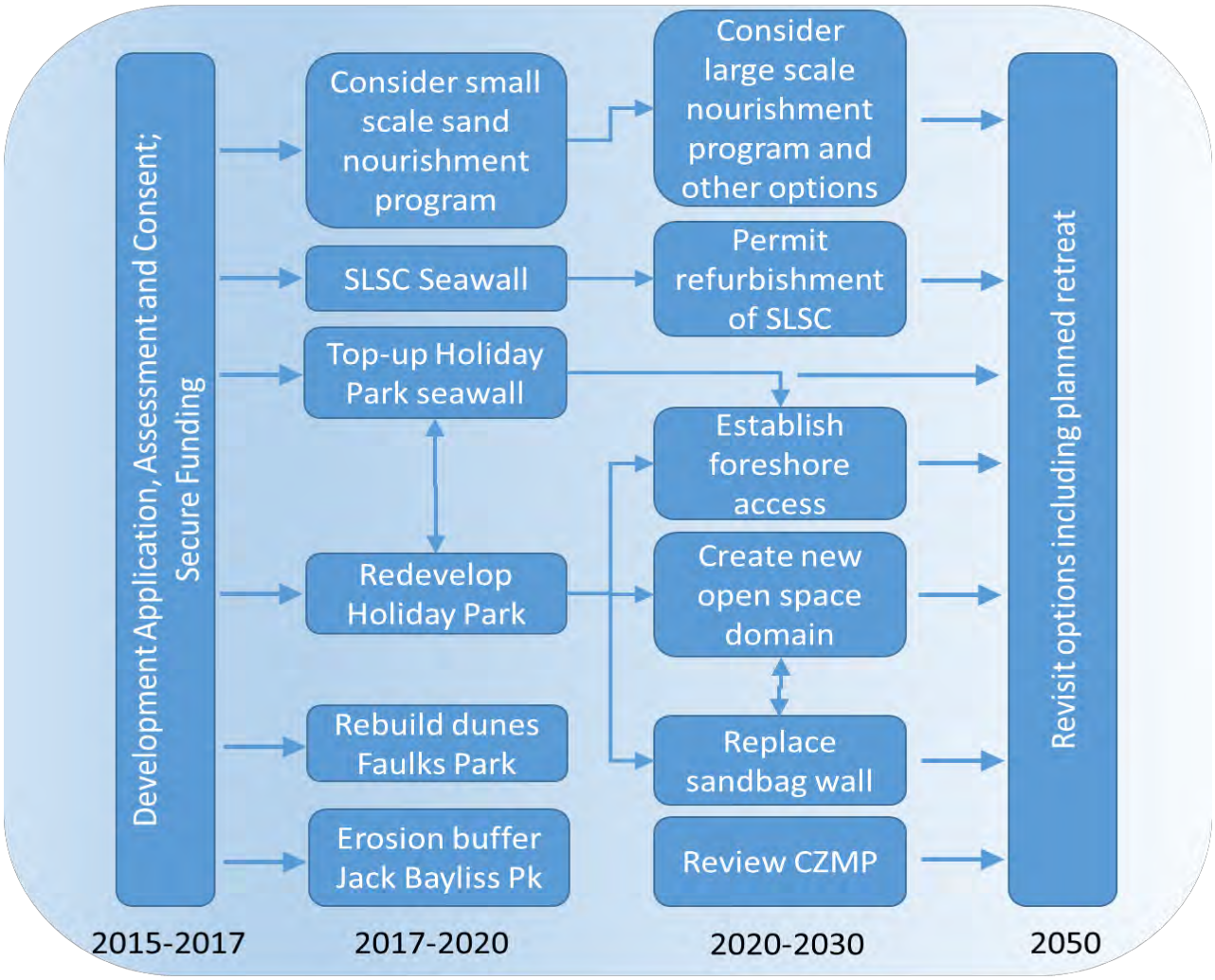


Figure 5-2 Recommended Strategy for Coastal Management (2015 – 2050)

A cost summary for the recommended strategy is presented in Table 5-1.

Table 5-1 Cost Summary for Recommended Strategy

Activities	Approximate Cost	Timeframe for expense
Coastal structures	$3.25m*	2017 - 2030
Dune rehab and foreshore access	$0.9m*	2017 - 2030
Investigations / assessments	$0.1m*	2015 – 2017
Nourishment	Depends on quantity and sand source*	2017 - 2030
Holiday Park redevelopment	$5m+ (Council to pay)	2020 - 2025
Open Space Domain Facilities	Unknown (Council to pay)	2020 - 2030
Cudgen Headland SLSC refurbishment	Unknown (Owner to pay)	2020 - 2030

* Eligible for part funding through the NSW Coastal Management Program.

Table 5-2 Recommended Steps for Coastal Management at Kingscliff (2015 – 2050)

Action	Timeframe	Indicative Cost	Rationale / Comment
Undertake all necessary investigations, and gain appropriate consents for undertaking works within the coastal management strategy	2015 - 2017	~$100,000	There are a number of works that would likely require development consent. A development application would therefore be required (or exemption under Part 5 of the EP&A Act), which would need to be supported by an appropriate environmental assessment document (i.e. EIS or REF). It is expected that the coastal management works could essentially be packaged into one application with integrated approval requirements.
Provide for erosion of foreshore and roll-back of coastal dunes in Jack Bayliss Park (south). Will involve re-establishment of fencing and vegetation at back of existing dunes to accommodate future landward migration.	2017 - 2020	~$100,000	The foreshore north of the Kingscliff Beach Bowling Club is already retreating. The objective of this step is to allow the erosion processes to continue without reactive pressure from the community for installing more emergency protection works. The roadway (Marine Parade) is the only major asset at risk that would require protection in the future (other parkland assets should be relocated as the dunes roll-back).
Re-establish a coastal dune along the foreshore of Faulks Park and Lions Park. Volume of sand required is approximately 20,000m^3. Source of sand can be terrestrial or marine (e.g. Tweed River or Cudgen Creek). Dunes to be vegetated and protected.	2017 – 2020	~$700,000	A new dune would be constructed on top of the existing foreshore. Seaward encroachment of the new dune should be limited to avoid short-term erosion response. Dune would be approximately two metres higher than the existing parkland levels and vegetated. The objectives of dune are to prevent overtopping and ocean inundation of the parkland, provide a barrier for sand drift off the beach, and to restore a more natural amenity where a sandy beach is backed by an established dunal system. Future sea level rise will likely result in landward migration of the shoreline. Re-establishment of a dune system allows for controlled shoreline retreat within a buffer that does not potentially compromise the amenity of the parkland behind.
Modify/protect vertical seawall in front of Cudgen Headland SLSC with an engineered wall that maximises access and amenity to the beach	2017 - 2020	$1,000,000	The existing vertical piled seawall may not be designed to withstand long periods of exposure to direct wave forces and continued exposure may compromise its structural integrity. Subject to the outcomes of an initial engineering assessment determining the structure's integrity and future resilience, this action would be to re-design and modify the wall to incorporate improved amenity and beach access from the SLSC (e.g. stepped wall or combination of rock and concrete steps) as well as a mechanism for limiting wave overtopping of the structure.
Allow refurbishment of Cudgen Headland SLSC to extend life of development to about 2050.	2020+ (following SLSC seawall	Not costed as part of coastal management	Being exposed to a harsh coastal environment, the SLSC will require refurbishment in the short-medium term. Life expectancy of building works in this location would be relatively short (~30 years or so). Rather than a completely new

Action	Timeframe	Indicative Cost	Rationale / Comment
	works)	works	building, which will have a longer lifespan, refurbishment will allow for controlled life extension of the existing building so that options can be reviewed again in the future without being constrained by newer development (circa 2050).
Top-up and repair existing rock wall in front of Holiday Park (approx. 250m long).	2017 – 2020	$750,000	Rock wall is flexible and more suitable for top-up and repair. Rather than removing the existing wall and replacing it with a fully engineered structure that will have a substantial design life, the existing structure can be strengthened through placement of additional (larger) rock. While it would still be prone to failure more than a new engineered wall, the expected design life for the top-up would be in the same order as the strategy horizon. Top-up of the wall can incorporate an increased crest height to address short-medium term wave overtopping risks (for 2050 design conditions only). Risks associated with significant failure of the wall due to extreme events can be managed through other management actions, including an emergency evacuation plan for the Holiday Park and relocation of some assets – see below.
Reconfigure and redevelop Holiday Park to allow for large public space area at southern end adjacent to SLSC and Amenities Hall.	2017 – 2020	Not costed as part of coastal management works (estimate ~ $5m+)	The open space area is consistent with the Kingscliff Foreshore Masterplan and will provide community access to the beach and significant amenity to the foreshore area within the location of highest demand. The level of investment in refurbishment would be based on the economic return to Council and the demand for accommodation by future tourists. Design of works should have a design life of approximately 30 years so that options can be reviewed again in the future without being constrained by such development. Any new development such as cabins that are within close proximity (say 20 metres) of the existing seawall should be relocatable if there is a risk of foreshore erosion.
Establish pedestrian walkway along the foreshore behind the existing wall crest between the SLSC and Bowling Club	2020 – 2030	$100,000	Extreme conditions may periodically damage the walkway (through wave overtopping of the wall or localised failure of the wall). Path should therefore be flexible and easily repairable. An easement of approximately 5 metres behind the top of the wall would be appropriate to locate the walkway.
Construct parkland amenities associated with the Kingscliff Foreshore Masterplan.	2020 - 2030	Not costed as part of coastal management works	Location of community infrastructure development should avoid the area immediately behind the sandbag seawall (say within 20 metres) as this would be replaced in the future (see below). Pedestrian walkway to be continued behind sand bag wall to provide continuous foreshore access between Bowling Club and SLSC.

Action	Timeframe	Indicative Cost	Rationale / Comment
Replace existing sandbag seawall with an engineered wall, extending from the new wall in front of the SLSC (see above). The new wall could include additional community amenity facilities, such as beach access, viewing platforms etc, and tie into the open space area developed behind.	2020 – 2030 (or earlier if the sandbag seawall suffers significant failure)	$1,500,000	The trigger for undertaking this action would be the structural failure of the existing wall in one or more sections, most likely from localised undermining and settlement of bags. On-going beach nourishment will reduce the likelihood of this occurring. As the sandbag wall was temporary only, and is difficult to repair once damaged, it would be more practical to replace the wall in its entirety when required. This would also provide a good opportunity to enhance community amenity and access, and should integrate with the modified SLSC seawall. It is possible that the sandbag wall could be replaced at the same time as modifying the SLSC seawall and or topping up the existing rock wall in front of the Holiday Park, however, this would require larger costs in the shorter term and would not deliver effective use of design life of the sandbag wall.
Consider small scale sand nourishment program	2017 – 2020	$1,000,000 per year	Options for small scale sand nourishment would be to use terrestrial sources of sand, such as from local building excavation, or extraction from beach hind dunes at Sutherland Point in areas dedicated for future replenishment (see below large scale option). Small scale dredging of marine sands from Cudgen Creek could also be considered providing that nourishment does not coincide with an erosive period and that sand is placed on the subaerial beach profile primarily for beach amenity purposes. It is recognised that this sand would naturally re-profile, however, the nourishment would be considered a short-term solution until sand moves back onto the beach under natural processes following erosion.
Consider large scale nourishment program and other options	2020 - 2030	$20,000,000 capital and $200,000 per year	Options for large scale exercise could be to extract sand from Area 5 (Tweed River) and temporarily store sand at Sutherland Point. Sand can then be transferred to Kingscliff Beach on an as-required basis via a dedicated sand pumping system directly onto the beach. Other options could involve offshore sand supplies, although a change to government policy would be required to access this for beach nourishment.
Reconsider need for retreat and relocation of assets and infrastructure	~2050	$100,000 (2015 costs) Excludes cost of monitoring.	Will need to consider the actual shoreline change in response to sea level rise and other coastal processes between 2015 and 2050. This will require monitoring of beach profiles on a regular basis through the coastal compartment. All infrastructure and assets along foreshore should be close to the end of their design life and therefore opportune for relocation to alternative sites if considered appropriate.

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Appendix A Legislative Framework

A.1 NSW Coastal Management Framework

Coastal management in NSW is guided by the following legislation:

- *NSW Coastal Protection Act 1979*;
- NSW Coastal Policy (1997);
- *State Environment Planning Policy No. 71 – Coastal Protection*; and
- Amendments relating to coastal protection within the *Coastal Protection Act, Local Government Act 1993 and Environmental Planning and Assessment Act 1979.*

Other guidance for land use planning in the coastal zone is given by the *Coastal Design Guidelines for NSW* (DP, 2003) and the *NSW Coastal Planning Guideline: Adapting to Sea Level Rise* (DP, 2010).

The *Coastal Protection Act 1979* and *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010) (the CZMP Guidelines) outlines the requirements for the preparation of CZMPs.

A.2 Key Legislation, Policies and Guidelines

A summary of the key local, state and federal legislation, policies and guidelines pertaining to management of this study's coastal zone is provided below.

The consideration of other legislation in managing the coastal zone is vital and consideration should be given to the following legislation where relevant: *Environment Protection and Biodiversity Conservation Act 1999*, the *Threatened Species Conservation Act 1995*, the *Fisheries Management Act 1994*, the *National Parks and Wildlife Act 1974*, and the *Water Management Act 2000*.

A.2.1 Coastal Protection Act 1979

The NSW *Coastal Protection Act 1979* (the CP Act) provides guidance on the use, occupation and development of the coastal zone in NSW while promoting sustainable use of the areas. The CP Act also facilitates the execution of emergency and permanent coastal protection works.

The objects of the CP Act are to provide for the protection of the coastal environment of the State for the benefit of both present and future generations and, in particular:

- To protect, enhance, maintain and restore the environment of the coastal region, its associated ecosystems, ecological processes and biological diversity, and its water quality;
- To encourage, promote and secure the orderly and balanced utilisation and conservation of the coastal region and its natural and man-made resources, having regard to the principles of ecologically sustainable development;
- To recognise and foster the significant social and economic benefits to the State that result from a sustainable coastal environment, including:
    - Benefits to the environment, and

- Benefits to urban communities, fisheries, industry and recreation, and
- Benefits to culture and heritage, and
- Benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water;

- To promote public pedestrian access to the coastal region and recognise the public's right to access;
- To provide for the acquisition of land in the coastal region to promote the protection, enhancement, maintenance and restoration of the environment of the coastal region;
- To recognise the role of the community, as a partner with government, in resolving issues relating to the protection of the coastal environment; and
- To ensure co-ordination of the policies and activities of the Government and public authorities relating to the coastal region and to facilitate the proper integration of their management activities.

The CP Act allows the Minister for the Environment to direct a council with land within the coastal zone to prepare a Coastal Zone Management Plan, and gives directions as to how such Plans shall be prepared, approved, gazetted and amended where necessary. This Coastal Zone Management Plan is being prepared in accordance with the CP Act.

Recent media announcements by the Office of Environment and Heritage (OEH) in November 2014 has indicated that the CP Act will be replaced by a new coastal management Act that is "less complex and a better fit with land use planning and local government legislation". The new act will "put coastal management needs at the core of councils' planning responsibilities". The new legislation is expected to come before Parliament by the end of 2015.

A.2.1.1 Changes to the Coastal Protection Act and other legislation Amendment Bill 2010

Amendments were made in Section 55M of the CP Act and SEPP (Infrastructure) 2007 (Clause 129A) that permit any person, including private landholders, to erect long term coastal protection works with development consent, with consent contingent on the application demonstrating that potential offsite impacts can be managed (for example, with beach nourishment). The private landholders who submit such applications would fully fund the coastal protection works, with no requirement for councils or the state to assist with funding.

Amendments were made to Part 79C of the *Environmental Planning and Assessment Act 1979* (EPA Act) and SEPP (Infrastructure) 2007 (Clause 129A) that require a consent authority, in determining a development application for coastal protection works, to take into consideration the provisions of any coastal zone management plan that applies to the land to which the development application relates (in addition to matters given in Clause 8 of SEPP 71). In this case, development applications may be refused where such works are not stated to be an action in the adopted CZMP. If there is no CZMP in place, the NSW Coastal Panel shall determine the development.

For public authorities (e.g. Council), new coastal protection works (excluding seawalls or beach nourishment) are permitted without consent under SEPP (Infrastructure) 2007 (Clause 129) on the

open coast or entrance to a coastal lake, provided they consider the provisions of any CZMP relating to the land, or where there is no CZMP, notify the NSW Coastal Panel and take into consideration any response received from them within 21 days of notification. The definition of new coastal protection works excluded temporary coastal protection works. Under Clause 129, seawalls or beach nourishment are permitted with consent.

Amendments were made to Section 553B of the *Local Government Act 1993* (LG Act) to allow local councils to levy a Coastal Protection Service Charge to maintain and repair coastal protection works or to manage the impacts of coastal protection works. The charge covers Council's costs for maintaining the works and restoring the beach if the works cause erosion (which may include beach nourishment). Eligible coastal protection works for the Coastal Protection Service Charge (CPSC) include:

- Works voluntarily constructed by a benefiting landowner (or landowners);
- Works constructed jointly by a public authority (e.g. Council) with voluntary contributions from benefiting landowners;
- Works that existed before section 496B of the LG Act commenced, where the landowner or a previous landowner voluntarily agree (in writing) to pay the CPSC; and
- Works that existed before section 496B of the LG Act commenced, where the landowner has voluntarily agreed to upgrade the works. A pro-rata CPSC then applies based on the incremental additional costs of maintaining the works and managing their off-site impacts.

Where works are implemented by a Council, and the Council chooses to contribute to the cost of the works, then the Council also must accept liability for a portion of the future coastal protection service charge for maintenance for the life of the works.

The annual charge is attached to the land title and becomes the responsibility of all future land owners for the life of the protection works. The amount of the charge is regularly reviewed depending on the cost of maintaining the works and in ameliorating any adverse impacts. The CPSC Guidelines provide further guidance, including how it can be used to fund the protection of private property by those property owners deemed to benefit from the works and how the amount of the rate should be calculated over the design life of the works.

Amendments were made under Part 4C of the CP Act outlining emergency coastal protection works that landholders or public authorities are permitted to carry out. The *Coastal Protection Amendment Act 2012* has now modified the allowances for such works, as detailed below.

All of the above changes provide a mechanism for Councils to allow the construction of protection works on private land to protect private property, and defer the responsibility and costs for construction to the land owners. Further, Councils can ensure that maintenance and amelioration of any adverse impacts is also borne by the land owners into the future, through the Coastal Protection Service Charge. There is no responsibility on local government or State Government to bear any of the cost for protecting private property.

A.2.1.2 Coastal Protection Amendment Act 2012

This act permitted modifications to Part 4C of the CP Act relating to coastal protection works. The key change was renaming such works from 'emergency' to 'temporary' protection works, to enable authorised landholders to erect such works regardless of the impending occurrence of a storm, in response to coastal erosion. The works are not permitted on estuarine foreshores.

A Code of Practise is associated with the placement of temporary coastal protection works, revised in 2013. The Code of Practise outlines the height, materials and form for the placement of temporary coastal protection works, and the procedure for removal and remediation of such works. The Code of Practise contains a Schedule listing those locations at which temporary works are authorised. It is assumed that temporary works are not permitted at locations not listed in the Schedule.

The Amendment Act 2012 also simplified the process for landholders to gain approval to erect such works. Private landowners are now permitted to place temporary coastal protection works on their land without approval or a certificate from the local council or state government. Private landowners are also permitted to place these works on public land, provided they obtain a certificate for these works, and may keep such works in place for up to 2 years.

The fines for inappropriate placement of sand or sandbags (such as associated with the erection of temporary coastal protection works) have been halved, to reflect the lesser nature of such incidences. The heavy fines for placement of other non-beach materials (e.g. rocks, car bodies, bricks etc.) remain as per the 2010 CP Act amendments.

The Office of Environment and Heritage (OEH) or Councils (if they have authorised officers for this task) may order the removal of the temporary protection works where it is evident that such works are having detrimental impacts upon adjacent land or on beach amenity.

A.2.2 Crown Lands Act 1989

The *Crown Lands Act 1989* (CL Act) provides for the administration and management of Crown land for the benefit of the people of NSW. The CL Act provides principles for the proper assessment, development, reservation or dedication and conservation of Crown Lands.

Waterbodies such as beaches and foreshores and estuaries / creeks / lagoons below the mean high water mark are designated as Crown Land and managed by the Department of Primary Industries Crown Lands Division (CLD). In addition to this, there are other Crown reserves in the Kingscliff coastal zone for which Council is the reserve trust manager or trustee appointed by the Minister for Lands to care, control and manage the land in accordance with its public purpose and the principles of Crown Lands management (Section 11 of the Act).

The principles of Crown Land management as defined in Section 11 of the Act are: environmental protection principles be observed in relation to the management and administration of Crown land; natural resources of Crown Land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible; public use and enjoyment of Crown lands be encouraged; where appropriate, multiple uses of Crown land be encouraged; and where appropriate, Crown Land be used and managed in such a manner that the land and its resources are sustained in perpetuity.

In addition to these principles, the objectives of the Coastal Crown Lands Policy 1991 apply to Crown lands within the coastal zone. The policy sets specific objectives for conserving the environmental and cultural qualities of coastal Crown Land, retaining in public ownership coastal lands that are environmentally sensitive and / or required for public purpose, and providing use of coastal crown lands for recreation, tourism, residential and commercial development with due regard to the nature and consequences of coastal processes.

On direction from the Minister, a Crown Lands Plan of Management (POM) is required to be prepared and adopted (in accordance with Division 6 of the *Crown Lands Act 1989*). The POM shall identify the key attributes and values of the area, general physical improvements to enhance the values and specify the permissible uses for the reserve, as outlines in Section 122 (7) of the CL Act.

A.2.2.1 Tweed Coast Regional Crown Reserve Plan of Management

The Plan of Management (POM) provides the strategic framework for the Regional Crown Reserve. The POM is a statutory plan under Division 6, Sections 112-116 of the *Crown Lands Act 1989*, where provisions are made for referral and consultation, public exhibition and formal adoption. The POM combines information about the reserve, its values, current and proposed future use and management issues.

The POM was developed through the establishment of a Project Reference Group (the PRG) who worked together to develop a vision, objectives and management strategies for the desired future state of the Reserve. The POM designates coastal management precincts within the Tweed Shire. The study area is located within two coastal management precincts: Kingscliff and Fingal–Tweed Heads. Key management issues for the Kingscliff precinct is the combined impacts of coastal processes of coastal erosion and long term coastal recession; coastal buffers to development; and vegetation management. Key management issues for the Fingal–Tweed Heads management precinct (Fingal Peninsula section) are the degradation of sand dunes and riverbanks.

A.2.3 Local Government Act 1993

The *Local Government Act 1993* (the LG Act) creates local governments and grants them the power to perform their functions, which involve management, development, protection, restoration, enhancement and conservation of the environment for the local government area. The functions of the local government are to be performed in a manner that are consistent with and promote the principles of ecologically sustainable development. Section 8 of the LG Act defines Councils charter and functions.

Under Section 733 of the LG Act, Council has a duty of care to inform its local constituents of known risks in order to receive an exemption from liability for acting in good faith with respect to known hazards (including coastal hazards). Under Section 733(4) of the LG Act, Council is considered to have acted in good faith where decisions are based substantially in accordance with the relevant manual for the hazard, in this case, the CZMP Guidelines.

The assessment of sea level rise is a requirement of the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013), upon which the LG Act exemption from liability is based. Similarly, object (h) of the *Coastal Protection Act 1979* is “to encourage and promote plans and

strategies for adaptation to coastal climate change impacts, including projected sea level rise". In this case, incorporation of projections for sea level rise based upon the best available information is a required component for the Kingscliff CZMP, with or without state prescribed sea level rise benchmarks.

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

Plans of Management (POM) for community land must be prepared under Section 35 of the LG Act. Section 35 of the LG Act provides that community land only be used in accordance with the Plan of Management applying to the parcel of community land; any law permitting the use of the land for a specified purpose or otherwise regulating the use of the land; and the provisions of Division 2 Chapter 6 of the LG Act.

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

A.2.4 Environmental Planning and Assessment Act 1979

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

- State Environmental Planning Policies (SEPP);
- Regional Environmental Plans (REP); and
- Local Environmental Plans (LEP).

Approval processes for "development" and "works" in NSW are provided for in Part 3A (now repealed), Part 4, Part 5 and Part 5A of the EPA Act.

The relevant SEPPs are discussed below. The Tweed LEP outlines land use zones across the entire LGA and permitted development (with and without consent) within those zones, including the coastal zone. There are no former REPs that are considered specifically relevant to management of the coastline within the study area.

A.2.4.1 State Environmental Planning Policy No. 71 – Coastal Protection

The NSW Government is currently revising the planning system in NSW (refer A New Planning System for NSW White Paper, NSW Government, 2013), which will involve the repeal of all State Environmental Planning Policies (SEPPs), with the new planning legislation expected to come into force 2014/2015. The SEPPs are expected to be rolled into all local planning provisions (i.e. LEPs) as relevant. Until that time, however, the SEPPs remain in force.

State Environmental Planning Policy No. 71 – Coastal Protection (SEPP 71) aims to protect and manage the natural, cultural, recreational and economic attributes of the NSW coast. SEPP 71 aims for development in the NSW coastal zone to be appropriate and suitably located, in accordance with the principles of the Ecologically Sustainable Development (ESD). The policy provides for: the protection of and improvement to public access compatible with the natural attributes coastal foreshores; and protects and preserves Aboriginal cultural heritage, visual amenities of the coast, the beach environment and amenity, native coastal vegetation, marine environment of New South Wales, and rocky platforms.

SEPP 71 applies to all lands within the coastal zone of NSW, which is defined on gazetted maps under the SEPP, therefore, all of the land in the study area will be included in the Kingscliff CZMP. SEPP 71 provides matters for consideration in Clause 8 that are to be taken into account: by a council when preparing its LEP for land within the coastal zone; and by a consent authority (e.g. Council) when determining a development application on land within the coastal zone.

SEPP 71 also outlines the conditions for which the Minister for Planning becomes the consent authority for 'significant coastal development', that is, development on land within 100 m of and below mean high water mark of the sea, a bay or an estuary. Development applications received by Council on such lands must be sent to the Director-General of Planning, and Council is required to take any additional matters specified by the Director-General into account when determining the application (in addition to the 'matters for consideration' given in Clause 8).

SEPP 71 also outlines development controls in Part 4 for which consent cannot be granted to applications that, in the opinion of the consent authority:

- Will or is likely to impede or diminish to any extent the physical, land based right of access of the public to or along the coastal foreshore;
- Where effluent is proposed to be disposed of by means of a non-reticulated system, will or is likely to have a negative effect on the water of the sea or any nearby beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or a rock platform; or
- Will or is likely to, discharge untreated stormwater into the sea, a beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or onto a rock platform.

A master plan is to be adopted by Minister for Planning (or otherwise waived the need for a master plan as per Clause 18), prior to Council granting consent for subdivision of land:

- Within a residential zone or rural residential zone if part or all of the land is in a 'sensitive coastal location'; or
- Within a residential zone that is not within a 'sensitive coastal location' into more than 25 lots, or 25 lots or less, if the land proposed to be subdivided and any adjoining or neighbouring land in the same ownership could be subdivided into more than 25 lots; or
- Within a rural residential zone that is not identified as a sensitive coastal location into more than 5 lots.

SEPP 71 defines 'sensitive coastal location' to mean land within:

- 100 m above mean high water mark of the sea, a bay or an estuary;

- A coastal lake, or within 100 m of the water's edge of a coastal lake;
- A declared Ramsar Wetland, or within 100 m of a declared Ramsar Wetland;
- A declared World Heritage Property, or within 100 m of a declared World Heritage Property;
- A declared aquatic reserves under the *Fisheries Management Act 1994*, or within 100 m of such;
- A declared marine park under the *Marine Parks Act 1997*, or within 100 m of a marine park;
- Coastal lakes (which includes all four of Gosford's Coastal lagoons), Ramsar wetlands and World Heritage areas;
- Marine parks and aquatic reserves under the *Fisheries Management Act*; land within 100 metres of any of the above;
- Within 100 m of land reserved under the *National Parks and Wildlife Act 1974*;
- Within 100 m of SEPP 14 Coastal Wetlands; and
- Residential land within 100 m of SEPP 26 Littoral Rainforests.

A.2.4.2 SEPP No. 14 – Coastal Wetlands

SEPP Coastal Wetlands aims to protect wetlands and wetland species by limiting the development of wetlands along the NSW coast. Wetlands listed under SEPP 14 are of close proximity to the study area. Wetlands associated with Cudgen Creek lie south of the study area while the several SEPP 14 wetlands are located around the southern half of Wommin Lake, inland of Dreamtime Beach, and extend further south adjacent to Fingal Road, the Pacific Highway and north east of Chinderah Bay Drive. All areas are outside of Crown Land.

A.2.4.3 SEPP No. 26 – Littoral Rainforest

SEPP Littoral Rainforest aims to conserve areas of Littoral rainforest species that are in their natural state by restricting new development within a 100 m buffer zone. Littoral rainforest species listed under SEPP 26 are mapped to the south of Fingal Head at the northern end of Dreamtime Beach.

A.2.4.4 SEPP (Infrastructure) 2007

SEPP (Infrastructure) 2007 provides a consistent planning regime for infrastructure and the provision of services across NSW, including consultation with relevant public authorities during the assessment process. The intent of the SEPP is to support greater flexibility in the location of infrastructure and service facilities along with improved regulatory certainty and efficiency for the State.

Division 25 of the SEPP outlines development permitted with and without consent for the purpose of 'waterway or foreshore management activities', which are defined as:

(a) Riparian corridor and bank management, including erosion control, bank stabilisation, resnagging, weed management, revegetation and the creation of foreshore access ways;

(b) Instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes;

(c) Coastal management and beach nourishment, including erosion control, dune or foreshore stabilisation works, headland management, weed management, revegetation activities and foreshore access ways;

(d) Coastal protection works;

(e) Salt interception schemes to improve water quality in surface freshwater systems; and

(f) Installation or upgrade of waterway gauging stations for water accounting purposes.

Development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority (e.g. Council) without consent on any land, which may include:

- Construction works;
- Routine maintenance works;
- Emergency works, including works required as a result of flooding, storms or coastal erosion (noting that this excludes emergency coastal protection works within the meaning of the *Coastal Protection Act 1979*);
- Environmental management works; and
- New coastal protection works on the open coast or entrance to a coastal lake (despite Clause 129A, see below), provided the public authority considers the provisions of any CZMP relating to the land on which the works are proposed, or where there is no CZMP, notify the NSW Coastal Panel and take into consideration any response received from them within 21 days of notification. The 'new coastal protection works' excludes beach nourishment or sand placement, presumably so that councils can undertake beach nourishment without requiring such action to be a stated action in the CZMP or gaining approval from the Coastal Panel.

Thus in the study area, Council is permitted to undertake activities such as beach nourishment, environmental rehabilitation, seawalls (provided this is consistent with the CZMP) etc., provided they undertake a Review of Environmental Factors (REF) (under Part 5 of the EPA Act) and gain any approvals / licences required under any other Acts relating to the land or works (e.g. *Crown Lands Act 19*89, *Fisheries Management Act 1994*, *Water Management Act 2000* etc.).

Under Clause 129A, development for the purposes of a seawall or beach nourishment may be carried out by any person with consent on the open coast or entrance to a coastal lake. In determining the application, the consent authority must consider the provisions of any CZMP relating to the land on which the works are proposed, the matters stated in Clause 8 of SEPP 71, and any guidelines for assessing and managing the impacts of the works issued by the Director-General (noting that preconditions for granting consent for coastal protection works are stated in Section 55M of the *Coastal Protection Act 1979*).

A.2.5 NSW Coastal Policy 1997

The NSW Coastal Policy 1997 (the Policy) sets the strategic framework for coordinated, integrated and ecologically sustainable development of the coast. The Policy details nine goals and

associated objectives and strategic actions for achieving ecologically sustainable development in NSW. Preparation of coastal zone management plans is one of the strategic actions given by the Policy, with the plans to be consistent with the Policy's goals and objectives.

The nine goals of the NSW Coastal Policy (refer to policy for objectives associated with these goals) are:

(1) To protect, rehabilitate and improve the natural environment;

(2) To recognise and accommodate natural processes and climate change;

(3) To protect and enhance the aesthetic qualities of the coastal zone;

(4) To protect and conserve cultural heritage;

(5) To promote ecologically sustainable development and use of resources;

(6) To provide for ecologically sustainable human settlement;

(7) To provide for appropriate public access and use;

(8) To provide information to enable effective management; and

(9) To provide for integrated planning and management.

A.2.6 Tweed Local Environmental Plans

The Tweed Shire has three Local Environmental Plans:

- Tweed Local Environment Plan 2014;
- Tweed Local Environment Plan 2000; and
- Tweed City Centre Local Environment Plan 2012.

The Tweed Local Environmental Plan (LEP) 2000 was gazetted in April 2000 and provides land use zonings and legal provisions for development and environmental protection throughout the Shire.

In April 2014, the Tweed Local Environment Plan 2014 came into effect and provides local environmental planning provisions for land in accordance with the requirements of the Standard Instrument (Local Environmental Plans) Order 2006. The LEP 2014 repeals the North Coast Regional Environmental Plan, SEPP 1: Development Standards and SEPP (Rural Lands) 2008 Clause 9 to the land to which the LEP 2014 applies. The intent of SEPP (Rural Lands) 2008 Clause 9 has been integrated into the LEP 2014 Clause 4.2.

The LEP 2014 excludes the following areas:

- The Tweed Central Business District which is subject to the Tweed City LEP 2012;
- The areas mapped as "Deferred Matters" in the LEP 2014, to which the LEP 2000 will continue to apply (see below); and
- Kings Forest and the Rise (Bilambil) development sites, which are subject to State Environmental Planning Policy (SEPP) Major Development 2005.

The Tweed Shire coastline encompassing Dreamtime Beach and Kingscliff Beach are areas mapped as “Deferred Matters” from the LEP 2014 (referred to in figures Land Zoning Map Sheets LZN022 and LZN023 of the LEP 2014); the LEP 2000 will therefore continue to apply to these areas. The Tweed City Centre Local Environment Plan 2012 is not applicable to the study area.

Both the LEP 2014 and 2000 set out specific aims for the use and development of land in the Tweed, including the coastline. The LEP establishes the zonings for all land in the LGA, and the objectives and permitted development (with or without consent) given for each land zone. Each zone identified by the LEP has an associated land use table which identifies the various types of development permitted with and without consent; or development prohibited. Most land along the Kingscliff coastline is zoned for public recreation (mostly public and some private) and Deferred Matter.

Part 7 of the LEP 2014 includes coastal risk planning (Part 7.5) as additional local provision and includes the study area. The objectives of this clause are:

(a) To avoid significant adverse impacts from coastal hazards,

(b) To ensure uses of land identified as coastal risk are compatible with the risks presented by coastal hazards,

(c) To enable the evacuation of land identified as coastal risk in an emergency,

(d) To avoid development that increases the severity of coastal hazards.

The clause states that development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

(a) Is not likely to cause detrimental increases in coastal risks to other development or properties, and

(b) Is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and

(c) Incorporates appropriate measures to manage risk to life from coastal risks, and

(d) Is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, particularly if the development is located seaward of the immediate hazard line, and

(e) Provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and

(f) Has regard to the impacts of sea level rise.

Similar to the above section, Part 5 of the LEP 2014 states that any proposed development will not:

(a) Be significantly affected by coastal hazards, or

(b) Have a significant impact on coastal hazards, or

(c) Increase the risk of coastal hazards in relation to any other land.

A.2.7 Tweed Development Control Plan 2008

The Tweed Development Control Plan 2008 (DCP) contains detailed guidelines that illustrate the controls that apply to a particular type of development or in a particular area. A DCP implements the Far North Coast Regional Strategy (see below) and supplements the LEPs. The DCP is made according to the *Environmental Planning and Assessment Act 1979*. The purpose of the DCP is to:

(1) Achieve development that is consistent with the social, economic and environmental values of the shire

(2) Promote ecologically sustainable development and aims to provide a safe living and working environment

(3) Form part of a range of documents that provides a guide towards a more sustainable future for the Tweed Shire

(4) Provide design issues, performance criteria and standards for development both on a shire wide basis and those that relate specifically to particular development areas.

Section B9 of the DCP, Tweed Coast Strategy, ensures that due consideration is given to all relevant physical, social and economic factors affecting the land and includes the study area. The section provides the framework for the essential planning for the coast to:

- Accommodate the anticipated development of the coast
- Meet the requirements of the current and future communities
- Protect the essential values of the coast
- Coordination of infrastructure provision
- Environmental Protection
- Sustainable development
- Integration of development.

Section B25 of the Tweed DCP, Coastal Hazards, was adopted by Council in November 2011 and applies to any development on land seaward of the Immediate Hazard Line (referred to on Figures 1.1 to 1.26 inclusive of the DCP). The aim of this section is to:

- Provide guidelines for the development of the land having regard to minimising the coastal hazards risks (a function of likelihood and consequence) to development on land in proximity to the Tweed Coast
- Establish if the proposed development or activity is appropriate to be carried out, and the conditions of development consent that should be applied if it is to be carried out, having regard to the coastal hazard lines established in the Tweed Coastline Hazard Definition Study 2001 (as amended)
- Minimise the risk to life and property from coastal hazards associated with development and building on land that is in proximity to the Tweed Coast
- Maintain public access to public land on the Tweed Coast.

Development Applications in different hazard zones require different types of supporting information in relation to coastal hazards risk. Supporting information may include:

- Specialist coastal engineering report
- Geotechnical report
- Structural engineering report
- Survey Plan
- Coastal Risk Management Report (all development on land that is seaward of the 2100 line).

Following the making of the LEP 2014, the Tweed DCP 2008 includes a number of references to the LEP 2000 and many definitions which may no longer apply, or may contradict the LEP 2014. The provisions of the LEP 2014 take precedence over any provisions of the Tweed DCP 2008.

A.2.8 Tweed Shire Coastline Management Plan 2005

The Tweed Shire Coastline Management Plan (Umwelt, 2005b) was adopted by Council in 2005 and provides an integrated management planning framework that aims for a balance between the long term use of the coastline and its conservation.

The plan was developed in three stages. Stage 1 identified the values that make the Tweed coastline important in a local, regional and national sense, and explored the issues that need to be addressed to maintain those values. Following the quantification of coastline hazards and values of the Tweed, Stage 2 involved the preparation of the Tweed Shire Coastline Management Study. The study focused on the development of management objectives and identification of management options.

Stage 3 included the development of the Coastline Management Plan which has provided strategic and practical guidance for future management of the Tweed coastline. The plan identifies the implementation of a protection strategy in the form of a 500 m long rock seawall combined with beach nourishment as the primary management action for Kingscliff Beach.

A.2.9 Tweed Community Strategic Plan 2013/2023

The Tweed Community Strategic Plan 2013/2023 (the TCS Plan) is the peak visionary document which identifies and documents the main priorities and aspirations for the future of Tweed Shire covering a 10-year period. The TCS Plan has been adapted from the Tweed Community Strategic Plan 2011/2021, which was produced with substantial active involvement by the community.

The State Government has required all NSW councils to implement the framework, to ensure local government operations and strategic planning are meeting the needs of the community. The plan is the visionary document at the highest level of a new integrated planning and reporting framework implemented by Council in late 2010 and early 2011. The new framework requires Tweed Shire Council to have in place: a 10-year Community Strategic Plan, a four-year Delivery Program and an annual Operational Plan.

During the engagement process of the 2011/2021 TCS Plan, the community informed Council of their highest rating priorities for their vision for the Tweed for the next 10 years. ‘Caring for the

Environment' was voted as one of the priorities and is a theme of the 2013/2023 TCS Plan. Key objectives set out in the TCS Plan in relation to the Tweed coastline include:

- Protect the environment and natural beauty of the Tweed (Objective 4.1):
  - Retain open space and greenbelts for conservation and for all people to enjoy
  - Protect, regulate and maintain natural assets (the coastline, coastal and inland waterways, biodiversity, bushland and scenic landscapes) for current and future generations
  - Manage and regulate the natural and built environments.
- Manage the Tweed coastline to ensure a balance between utilisation and conservation (Objective 4.4):
  - Recognise and accommodate natural processes and climate change
  - Protect and enhance the aesthetic qualities of the coastal zone
  - Provide for appropriate public access and use.

A.2.10 Guidelines for Preparing Coastal Zone Management Plans (2010)

Guidelines for preparing Coastal Zone Management Plans (CZMP Guidelines) were finalised by OEH in December 2010, and adopted in early 2011. The CZMP Guidelines specify the requirements for preparing a coastal zone management plan in accordance with the *Coastal Protection Act 1979*, including requirements additional to those specified in the CP Act. The guidelines specify the use of a risk based approach to preparation of a CZMP and actions for managing coastal hazards. The CZMP Guidelines documents the ISO 31000:2009 risk process which requires the likelihood and consequence of coastal risks to be analysed and combined to determine the level of risk. The highest risks are then treated as a priority over lower risks.

Under Section 733 of the *Local Government Act 1993*, councils are taken to have acted in 'good faith' and receive an exemption from liability where their actions were done substantially in accordance with the coastal management principles given in the CZMP Guidelines. Intended changes to the section 117 of the *Environmental Planning and Assessment Act 1979* will require the CZMP Guidelines be taken into consideration when councils prepare their local environment plans (LEPs).

The *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010) replace the Coastline Management Manual (and other documents).

A.2.11 Sea Level Rise Benchmarks

Previously, the NSW Sea Level Rise Policy Statement (DECCW, 2009) (the Policy Statement) set benchmarks of a 0.4 metre rise in sea level by 2050 and 0.9 metre rise by 2100 above 1990 sea mean sea level as the standard to be used in all forms of coastal assessment and planning, including coastal hazards definition studies. These values represent the best estimates for the NSW Coast at the present time, as they are based upon reports by the IPCC (2007) and CSIRO (2007).

The NSW Government repealed the NSW Sea Level Rise Policy Statement 2009 in September 2012, meaning that the state-wide sea level rise benchmarks no longer apply to coastal assessments. The NSW Government indicated that local councils "have the flexibility to determine their own sea level rise projections to suit their local conditions" (NSW Environment and Heritage, 2012). In lieu of sea level rise benchmarks, the OEH has suggested that Councils should adopt sea level rise values that are widely accepted by competent scientific opinion, or indeed, investigate a range of sea level rises (pers. comm., Mike Sharpin, OEH, 25th October, 2012).

As discussed previously in Section A.2.3, the *Local Government Act 1993* under Section 733(2), states Council has a duty of care to inform its local constituents of known risks in order to receive an exemption from liability for acting in good faith with respect to coastal hazards. Under Section 733(4) of that Act, Council is considered to have acted in good faith where decisions are based substantially in accordance with the relevant manual, in this case, the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013).

Tweed Shire Council therefore has a legal imperative to consider sea level rise, as it is a known and measured coastal process that will affect the likelihood of land being affected by coastal hazards. The assessment of sea level rise is a requirement of the Guidelines for Preparing Coastal Zone Management Plans (OEH, 2013), upon which the *Local Government Act* 1993 exemption from liability is based. Furthermore, it is a requirement of the CZMP Guidelines upon which the good faith exemption is based for the impacts of sea level rise upon risks from coastal hazards to be investigated (refer p 10, OEH, 2013). Similarly, object (h) of the *Coastal Protection Act 1979* is "to encourage and promote plans and strategies for adaptation to coastal climate change impacts, including projected sea level rise".

Appendix B Minimum Requirements for the Kingscliff CZMP

Table B-1 Objects of the Coastal Protection Act 1979 and How they are Addressed by this CZMP

Specific Objectives of the CP Act	Addressed by this CZMP
(a) to protect, enhance, maintain and restore the environment of the coastal region, its associated ecosystems, ecological processes and biological diversity, and its water quality	Environmental values have been considered and actions developed for restoration and rehabilitation of important habitats.
(b) to encourage, promote and secure the orderly and balanced utilisation and conservation of the coastal region and its natural and man-made resources, having regard to the principles of ecologically sustainable development	The CZMP balances natural and anthropogenic demands on the environment and resources. Sustainability and conservation of environmental, social and economic values is paramount in the development of actions and works.
(c) to recognise and foster the significant social and economic benefits to the State that result from a sustainable coastal environment, including: (i) benefits to the environment, (ii) benefits to urban communities, fisheries, industry and recreation, (iii) benefits to culture and heritage, (iv) benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water,	All relevant values have been considered as part of the risk assessment process, with consequences related to environmental, social and economic factors. Actions within the CZMP include protection and restoration of important habitat areas as well as preservation of social and cultural values.
(d) to promote public pedestrian access to the coastal region and recognise the public's right to access	Existing parklands along the foreshore are protected in the CZMP, with associated social values including pedestrian access maintained and improved in the future.
(e) to provide for the acquisition of land in the coastal region to promote the protection, enhancement, maintenance and restoration of the environment of the coastal region	Significant coastal habitat areas along Dreamtime Beach are partly in public ownership (Council and OEH), and private ownership (LALC). There are a number of proposed actions for preservation and restoration.
(f) to recognise the role of the community, as a partner with government, in resolving issues relating to the protection of the coastal environment	Community engagement is to be undertaken as part of the integrated CZMP process.
(g) to ensure co-ordination of the policies and activities of the Government and public authorities relating to the coastal region and to facilitate the proper integration of their management activities	The gazettal of the CZMP enables local planning instruments to become more aligned and integrated with the relevant State Government policies and directives, reflecting these policies and directives within applicable heads of consideration for future development assessment.
(h) to encourage and promote plans and strategies for adaptation in response to coastal climate change impacts, including projected sea level rise	Sea level rise has been included within relevant analyses to account for such changes in the future.
(i) to promote beach amenity	Maintenance and upgrades to existing amenity of Kingscliff - Dreamtime Beach is supported by this CZMP.

Table B-2 Coastal Protection Act 1979 Section 55C matters to be dealt with in CZMPs

Specific matters to be dealt with in CZMPs	Addressed by this CZMP
(a) protecting and preserving beach environments and beach amenity,	Foreshore amenity is to be maintained through protection of significant recreation areas.
(b) emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event,	Emergency works required before, during or after periods of beach erosion are detailed in the Kingscliff - Dreamtime Beach Emergency Action Sub Plan, appended to this CZMP. Specific beach access management actions are also contained in the CZMP.
(c) ensuring continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion,	Access within existing public lands is to be maintained and protected.
(d) where the plan relates to a part of the coastline, the management of risks arising from coastal hazards,	Coastal hazards were assessed by BMT WBM (2013) and a the Risk Assessment conducted for this study, to determine appropriate management actions to treat high priority coastal risks.
(e) where the plan relates to an estuary, the management of estuary health and any risks to the estuary arising from coastal hazards,	Not relevant to this CZMP.
(f) the impacts from climate change on risks arising from coastal hazards and on estuary health, as appropriate,	Climate change, in particular sea level rise, has been included in the assessment of coastal hazards (see BMT WBM, 2013) and the Risk Assessment conducted for this study.
(g) where the plan proposes the construction of coastal protection works (other than temporary coastal protection works) that are to be funded by the council or a private landowner or both, the proposed arrangements for the adequate maintenance of the works and for managing associated impacts of such works (such as changed or increased beach erosion elsewhere or a restriction of public access to beaches or headlands).	A major upgrade (replacement) of coastal protection works is proposed for the Kingscliff Tourist Park shoreline. These works have been properly designed, approvals sought and funding now approved from the Australian Government. The seawall design makes provision for improved public access and amenity particularly adjacent to the new parklands proposed as part of the beach upgrade.

Table B-3 Coastal Management Principles addressed by this CZMP

	Coastal Management Principles (OEH, 2013)	Addressed by this CZMP
Principle 1	Consider the objectives of the *Coastal Protection Act 1979* and the goals, objectives and principles of the NSW Coastal Policy 1997	Refer Section 1.1.1 of the main CZMP Document.
Principle 2	Optimise links between plans relating to the management of the coastal zone	For managing hazards, incorporation of existing controls, that is, actions already being undertaken in the coastal zone, is an intrinsic part of the risk assessment process. Existing controls are documented for each risk, in Section D.4
Principle 3	Involve the community in decision-making and make coastal information publicly available	As a revision of the original CMP 2005, targeted stakeholder and community consultation has been conducted, such as discussed for the Kingscliff CRMS (BMT WBM, 2015)
Principle 4	Base decisions on the best available information and reasonable practise; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach	The risk based approach is an internationally recognised framework for natural resource management because it incorporates the best available information and its uncertainty. Management options recognise the overlap between flooding and oceanic processes through estuaries, streamlining management into one approach. The adopted Risk Management Framework intrinsically requires ongoing monitoring of risks and review and tailoring of risk treatments (management options).
Principle 5	The priority for public expenditure is public benefit; public expenditure should cost effectively achieve the best practical long-term outcomes	High level cost benefit analysis for management options has recognised the public benefit as the priority for management options.
Principle 6	Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risk where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented	The CZMP has been prepared using the ISO 31000:2009 Risk Management Principles and Guidelines. Risks to public safety, assets (environmental and built) and social values and amenity have been assessed and evaluated (refer Appendix D). A trigger based approach to implementation has been applied.
Principle 7	Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions	The adaptability of management options to future circumstances was a consideration in selection of preferred options (see Appendix E). A trigger based approach has been applied that recognises risks that are expected to increase over time.
Principle 8	Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems	The CZMP includes actions for maintenance and rehabilitation of important coastal ecosystems.
Principle 9	Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy	Public access along foreshore reserves is maintained and upgraded via actions in this CZMP.

	Coastal Management Principles (OEH, 2013)	Addressed by this CZMP
Principle 10	Support recreational activities consistent with the goals of the NSW Coastal Policy	This CZMP supports the continued recreational use and enjoyment of the Kingscliff-Dreamtime Beach in a manner that is consistent with the sensitivity of each section of beach, via a precinct approach to coastal management (see Chapter 2 of the main CZMP Document).

Table B-4 CZMP minimum requirements

Minimum Requirement	Addressed by this CZMP
A description of how the relevant Coastal Management Principles have been considered in preparing the plan	Refer to Table B-3 of this document.
A description of the community and stakeholder consultation process, the key issues raised and how they have been considered	Community and stakeholder consultation was conducted in preparing this CZMP as detailed in the Kingscliff CRMS (BMT WBM, 2015). Outcomes of the consultation were used in developing risk priorities and refining recommended management actions in this document. Continued involvement and information sharing during the implementation of this CZMP is recommended in Action: Community Education (refer Section 3.1 of the main CZMP Document).
A description of how the proposed management options were identified, the process followed to evaluate management options, and the outcomes of the process	Refer to Appendix D of this document.
Proposed management actions over the CZMP's implementation period in a prioritised implementation schedule which contains: • proposed funding arrangements for all actions, including any private sector funding • actions to be implemented through other statutory plans and processes • actions to be carried out by a public authority or relating to land or other assets it owns or manages, where the authority has agreed to these actions (section 55C(2) (b) of the *Coastal Protection Act 1979*) • proposed actions to monitor and report to the community on the plan's implementation, and a review timetable	Refer to the Implementation Schedules in Chapter 3 of the main CZMP Document.

Minimum Requirement	Addressed by this CZMP
Plan to be prepared using a process that includes: • evaluating potential management options by considering social, economic and environmental factors, to identify realistic and affordable actions • consulting with the local community and other relevant stakeholders. The minimum consultation requirement is to publicly exhibit a draft plan for not less than 21 days, with notice of the exhibition arrangements included in a local newspaper (section 55E of the *Coastal Protection Act 1979*) • considering all submissions made during the consultation period. The draft plan may be amended as a result of these submissions (section 55F of the *Coastal Protection Act 1979*).	Refer to Appendix E of this document. Community and stakeholder consultation was conducted in preparing this CZMP as detailed in the Kingscliff CRMS (BMT WBM, 2015).

Appendix C Review of Tweed Coastline Management Plan (Umwelt, 2005)

Table C-1 Review of Relevant Actions from the CMP 2005

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
WC1	Prepare a Vegetation Management Plan for coastal vegetation and fauna habitat rehabilitation and management including recommendations from existing plans.	N	No, a whole of coast Vegetation Management Plan (VMP), nor a Fauna Habitat Rehabilitation Plan were not completed. However vegetation and ecological management plans for specific sites have been completed, such as for dunecare work area in Kingscliff (this does not extend up to Dreamtime); for dunecare work area at Fingal Head which covers Dreamtime Beach; and the Tweed Shire Bitou Bush Control Strategy (2003). Council assists with grants but does not do works on Dreamtime LALC land.	Yes, it would be helpful to have a broad based strategy and principles for whole of coast, then keep to specific VMPs for embayments, e.g. Kingscliff - Dreamtime. The existing site specific plans need periodic updating, and to be expanded to fill in the gaps between dunecare work areas. Individual VMPs would only cover Council (and Crown Lands), broad guidelines for LALC land only. As a new action, a rolling vegetation easement is required, to move dune vegetation into the parkland behind. The "easement" would extend between the Tweed River entrance to Jack Bayliss Park. This is aimed 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 not vegetated areas); and installation of facilities, e.g. play equipment. This action should be promoted within the community as part of education regarding dune vegetation values.
WC2	Implement the Vegetation Management Plan	N	See WC1	Yes, combine with WC1.
WC3	Develop and implement a feral animal control program.	N	No. No feral animal works in the Kingscliff - Dreamtime Beach area have been completed. Ad hoc works are completed based on availability of grants.	Yes - there is a high need for a Feral Animal Strategy for Kingscliff – Dreamtime Beach. There are many other pressures upon shorebird and turtle nesting sites, so foxes stealing eggs is an unnecessary additional impact. New action: domestic dogs in off-leash areas can be a large threat to shorebird and turtle nesting. The off-leash area (i.e. on Dreamtime Beach) needs to be reviewed.
WC4	Finalise Emergency Action Plan (EAP) for coastal erosion hazards.	N	No. Two Draft EAPs for Kingscliff have been compiled, but never adopted.	Yes, EASP was drafted as part of the preparation of the Kingscliff - Dreamtime Beach CZMP, and should be implemented as required.
WC5	Enforce development within hazard zones through adoption of a revised draft Development Control Plan (DCP) 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.	Y	Yes - Tweed DCP 2008 Section B25-Coastal Hazards (DCP B25). This has superseded DCP 8. DCP B25 was adopted by Council, with the most recent adoption in February 2014 after the DCP maps were updated with the most recent hazards mapping from the 2013 Tweed Coastal Hazards Study. Council expects DCP B25 to be sufficient to control development in coastal hazards areas, and has not pursued use of the optional Coastal Risk Planning Area clause in the LEP (which requires associated Coastal Risk Planning Area maps to be gazetted).	Yes, implementation and ongoing update of the DCP is required as new hazard information is compiled. The DCP is intended to apply to lands behind the proposed seawall at Kingscliff. This is because the seawall is intended to be a medium term strategy, so Council does not want to intensify development (and therefore risk) behind the wall. The 2013 Hazard Lines do not affect many houses in Kingscliff, therefore applying the DCP is not seen as a significant burden on future development.
WC6	Routine coastline monitoring	N	No / minimal surveying and not done routinely. Cross shore surveys have been done since erosion events in 2010. Some State Government marine LiDAR and one hydrosurvey has been completed since the 2010 erosion event.	Yes, it is seen as a high priority to develop and implement a 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.

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
WC7	Prepare a Vegetation Management Plan to confirm strategic principles and priorities for landscaping undertaken within the coastline corridor.	Y	Yes - A "Species Selection Guide for Parks" Council policy has been prepared, which mandates trimming of dune vegetation on accessways only. Council also has a Park Maintenance Levels of Services Policy that describes how pruning is managed for safety and access. There are also Council guidelines for managing street trees.	Yes, as implementation of the species selection guide at coastal parks to ensure use of species that are consistent with adjacent dune vegetation. A new action is required, to facilitate provision of maintenance activities in cross-over regions between the parks maintenance crew (managed by the Recreation Services Unit) and Council's dune and beach access management crew (managed by the NRM Unit - Coastal). This would allow the two different 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 access way 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.
WC8	Empower Council lifeguards with the authority to fine offenders of unauthorised activities.	N	No. Council contracts lifeguard services, and under the Local Government Act 1993, councils do not have authorisation to delegate powers. If Council were to employ lifeguards directly, then such powers could be bestowed upon the lifeguards, increasing the presence of compliance officers at the beach, such as for illegal dune pruning, dogs on beaches, etc.	Council currently employs rangers with these powers. While employing Council lifeguards would increase capacity for enforcement, Council does not currently have means, and this action is not considered a high priority for use of funding. Council is also unlikely to increase role of rangers (although there may be changes to the timing of compliance checks) as staff are already stretched.
WC9	A detailed management plan be compiled for the Aboriginal cultural heritage values along the coastline	Y	Yes, Aboriginal Cultural Heritage Study being done with mapping of all significant sites.	Yes, as implementation of outcomes of the study. A new action is required, to develop a procedure to be followed when sites are uncovered by erosion/recession. This would include notifying NPWS, which is the current procedure. It was also noted that the nourishment pipeline from the Tweed River proposed for Kingscliff Beach will use an existing track, to avoid impacts to heritage sites.
WC10	Produce interpretive/educational material, such as interpretive signs, to illustrate Aboriginal lifestyle and history and how the landscape was used.	Y	Interpretive signage has been ongoing particularly for ecological elements. In the Kingscliff - Dreamtime Beach study area, Aboriginal educational signage hasn't been done, but is also not considered appropriate. The land is both fairly inaccessible, as well as being managed independently by the LALC, in which case signage is likely to be inappropriate.	Use of signage should be included in educational actions generally, and cover other issues in addition to Aboriginal heritage.
WC11	Continue to provide financial assistance for the community-based Heritage Study.	Y	Yes, community-based heritage study finished, DCP was written based upon the study, a Heritage officer was employed, and implementation of study outcomes is ongoing	No, completed. CZMP could support implementation of study outcomes, if this is relevant to the CZMP.
WC12	Increase Council ranger presence to police residential encroachment onto public lands.	N	No. Ranger numbers have not increased. Council officers remove dumped items periodically. The NRM Unit manages illegal dune "pruning" by erecting fences in front of damaged/destroyed vegetation.	Yes, amending the action to the funding of a specific Coastal Ranger in the Coastal team of the NRM Unit. The ranger can then cover additional actions requiring better compliance, e.g. shorebird nesting sites in off-leash areas, vegetation vandalism etc.
WC13	Remove all encroachments onto public land	Y	There is good control for asset protection zones, not so much for other encroachments. In Kingscliff – Dreamtime Beach, only Murphys Rd backs to public land. Issues relate more to clearing than encroachment onto public land.	Yes, as implementation of the Vegetation Vandalism on Public Land policy.

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
WC14	Remove and/or reuse elsewhere redundant infrastructure, fences, signage etc and replace with consistent design (or theme) infrastructure	Y	Yes. Don't re-use because removed when no longer usable. Have Design Guidelines for recreational infrastructure (in DCP #15).	Yes, implement the Design Guidelines.
WC15	View preservation from public and private lands should be investigated as part of any master plan compiled	Y	Yes, existing views are acknowledged through the Scenic Visual Landscape Strategy that notes regional significant views (all views, including coastal). The Strategy outlines building in the view field, issues to look out for and requirements for visual impact statements.	Yes, continue with the proposed Scenic View Landscape Strategy, with site specifics to be covered by the Kingscliff Locality Plan.
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	Y	Parks are required to use local species (see above policy). Council also has a coastal theme, i.e. - coastal furniture range, coastal village range.	No. No longer relevant.
WC17	Construct coastline cycleway/walkway as currently programmed by Council	Y	Completed	No, no longer relevant, noting that a cycleway/walkway is considered as part of the design of coastal protection works.
WC18	Continue to support regional Coastcare facilitator	Y	Yes, until Coastcare was disbanded. The dunecare role of Coastcare was taken on by Council, with a partially dedicated officer. The other elements of Coastcare were taken over by Local Land Services.	Outcomes of this action are to be continued via the ongoing support for volunteer Dunecare groups and Council's Dune Crew.
WC19	Assist Coastcare in promotion of their rock platform/intertidal areas education program, via Council media	N	No longer relevant	No. No longer relevant.
WC20	Maintain bus stops installed, as programmed	Y	Yes, but no longer relevant to coastal plan	No. No longer relevant.
WC21	Greater enforcement of regulations and development conditions by relevant agencies, Council, DEC, Department of Lands and DIPNR including DIPNR including protection of coastal vegetation.	Y	A Vegetation Vandalism on Public Land Policy was adopted in 2014. Allows officers to put up signs for removed dune vegetation. Enforcement of other issues is ongoing.	Yes, as implementation of the Vegetation Vandalism on Public Land Policy. NRM still has a compliance role for development conditions of consent (e.g. protection, restoration of vegetation), which should be included with other coastal compliance actions (see WC12 amended).
WC22	Develop and implement a strategy to combat illegal clearing of coastal vegetation	Y	Yes, see WC21 above.	Yes, implement policy. Education regarding the value of dunes should be conducted as part of a whole Coastal Community Education Strategy (see WC36 amended).
WC23	Install new and upgrade existing signs regarding use of companion animals on beaches, in relation to Companion Animal Act	Y	Signs being reviewed, new being installed as required.	Yes, upgrades to signage to better define boundaries of the off-leash area are still required. Signage could additionally provide some education regarding nesting shorebirds and turtles and the impacts of dogs.
WC24	Regular maintenance program of access infrastructure	Y	Yes, for beach accesses via the NRM coastal assets supervisor and works crew. They check, maintain, cordon off after erosion and repair / replace. The Dune crew has trialled a range of methods to discourage people continuing to use closed accessways, such as using extended construction fencing, with varying success.	Yes, as continued support for the Dune Crew. The Dune Crew is also encouraged to stay up to date with latest materials and techniques for building accessways that are subject to erosion.

Review of Tweed Coastline Management Plan (Umwelt, 2005)

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
WC25	Install appropriate warning signage in areas where access may be dangerous	Y	Surf Life Saving Australia (SLSA) conducted a safety audit for beach accessways, with recommendations for which ones to be decommissioned / repaired etc. The SLSA audit also resulted in formalised signage and nomenclature (numbering) of accessways, with unique numbers given to every beach access in NSW for safety and emergency rescue purposes.	Yes, combine with WC24
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	Y	For beach access, see WC24 above. Reconfiguration of parking etc. falls within the Kingscliff Locality Plan (see WC48 amended).	Yes, combine with WC24
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	Y	An access and inclusion plan was adopted by council, which involve a review and audit of all coastal access structures to determine preferred locations for viewing platforms and access ways. SLSA conducted a safety audit for beach accesses and made recommendations for those to be decommissioned / repaired etc. The Tweed Coastal Reserves POM was completed in 2005, but does not cover beach access arrangements.	Yes, implement outcomes of the Council review and audit and SLSC Audit. Continue to replace and relocate accesses as and when required (due to wear and tear and / or erosion impacts). Combine action with WC24, 25 and 26 above.
WC28	Develop a policy with regard to future car parking requirements for beach access on the Tweed Coast (urban and non-urban)	Y	Yes, this has been considered as part of the Kingscliff Locality Plan. This has involved a carpark number count, population projections, then shortfalls worked out and recommendations made.	Yes, combine with WC48 to support implementation of the Kingscliff Locality Plan.
WC29	Physically restrict unauthorised access points e.g. bollards, rocks, and/or vegetation planting	Y	Yes, and ongoing. Digging pot holes has been one strategy resorted to for trying to stop 4WD access, in combination with gates.	Yes, combine with WC24-7.
WC30	Rationalise and standardise regulatory signage	Y	Have reviewed signs, rationalised in accordance with Australian Standard.	Ongoing, as part of beach access and safety management.
WC31	Increase enforcement of unauthorised vehicle use on beaches	Y	Yes, unauthorised activity has decreased. Council also has a Beach Vehicle Policy that regulates 4WD access.	There is no legal 4WD access on Kingscliff - Dreamtime Beach except for licenced commercial fishermen. Support ongoing implementation of Beach Vehicle Policy. Also recommend funding a Coastal compliance ranger (see WC12 amended).
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	Y	Yes, use most current materials, and maintain	Done for fishermen and emergency vehicle access.
WC34	Include cycleway linkages to commercial centres	Y	Done as part of cycleway construction.	
WC35	Include cycleway linkages to main beach access points	Y	As above	

Review of Tweed Coastline Management Plan (Umwelt, 2005)

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
WC36	Initiate targeted residential and broader community education program about residential encroachment onto public land, such as mowing, rubbish dumping etc	Y	Education is managed well for Asset Protection Zones. Otherwise, education is ad hoc, with periodic mail outs and media and signs.	Expand this strategy to cover community education on a range of issues, including the value of dune vegetation, species use in residential gardens next to native habitat, shorebird and turtle nesting seasons for beach users (including walkers, off-leash areas, 4WDers), and coastal processes and risk management.
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	N	No, not appropriate. Council has an after-hours number.	No, action not appropriate.
WC39	Initiate public awareness campaign about unauthorised companion animal usage, in conjunction with other actions	Y	Yes	Council's Compliance Unit covers education for companion animal owners (flyers, cheap micro-chipping). Education regarding shorebird and turtle nesting and other issues associated with off-leash dog areas is captured in WC36 amended.
WC40	Retain 7(f) Zone within Tweed LEP 2000 * on current alignment	Y	The zone was retained for the Tweed region as Environment Zone(s) in the new LEP 2014. Note, however, there were no 7(f) zones in the Kingscliff - Dreamtime Beach study area.	There have been changes to LEP Zones via the Standard Instrument that make this strategy no longer relevant.
WC41	Investigate rezoning other applicable coastal lands within the 100 year hazard line to 7(f) Coastal Erosion	Y	Yes, the new LEP 2014 contains Clause 7.5 Coastal Risk Planning area. However, some areas of Kingscliff - Dreamtime Beach remain as deferred matters, subject to Tweed LEP 2000.	Yes, as appropriate transfer of deferred matters land into the LEP coastal risk planning area in future, and appropriate transfer of 7(f) environment zones into an appropriate Environment Zoning in the new LEP.
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	Y	Yes, encompassed in LEP Coastal Risk Planning Area Clause 7.5 and DCP B25. Areas that are deferred matters are covered by the Tweed LEP 2000 Zone 7(f) coastal erosion.	Yes, as implementation of the LEP coastal risk planning area, and appropriate transfer of deferred matters land into the LEP coastal risk planning area in future.
WC44	Facilitate liaison between Council, Lands, DEC and TBLALC through the Tweed Coastal Committee regarding lands abutting reserves	Y	Yes, this is done through the Tweed Vegetation Committee (not the coastal committee).	Yes, maintain liaison through the Tweed Vegetation Committee (not coastal), and cover all native habitat issues (see below)
WC45	Continue liaison between Council and DEC Parks and Wildlife Rangers regarding policing of unauthorised activity	Y	Liaison is not formalised, it is done on an ad hoc basis.	Yes, combine with above strategy and liaise on all activities (e.g. weed programs etc).
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	Y	Council staff are aware of other activities. In particular, the Kingscliff Foreshore Management Group is a good conduit for information on adjoining beach programs.	Yes, maintain the Kingscliff Foreshore Management Group as long as necessary.
WC47	Undertake a Beach and Coastline Users Survey to collect and collate usage information	Y	Yes, one was completed for the whole of coast, with more specific surveys done as part of the Kingscliff Locality Plan.	

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
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	Y	The Kingscliff Locality Plan has been completed, and included landscape drawings for recreational areas (e.g. shade, shelter, plantings etc.), car parking, community consultation and more.	Yes, as implementation of the Kingscliff Locality Plan
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 - Detailed land use and master/locality plans according to priority § Adopt standards to ensure no overshadowing of beaches and reserves by buildings, § DPC 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	Y	Yes, being absorbed into the Kingscliff Locality Plan.	Combine with WC48
WC50	Prepare guidelines for the management and operation of facilities within the public reserves including appropriate leasing and licensing arrangements	Y	Yes. Commercial use of Council Managed Land Policy out for consultation which covers this. Also have generic POMs for community land. Also go via LG Act and CL Act - if it's a complementary use.	Yes, maintain framework for managing leases in Council reserves.
WC51	Maintain flexibility of control over uses in the coastline reserves by allowing only short to medium term leases	Y	See WC50	
WC52	Ensure flexibility to meet changing needs for industry and activities within the coastline corridor	Y	See WC50. Flexibility is in there as short term leases.	

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Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
WC53	Investigate opportunities for private supplier of transport	N	No, not relevant to a CZMP	
FH1	Enforce policing of NSW Fisheries bag limits for taking of individual species	Y	No, not relevant to a CZMP and is conducted by DPI Fisheries.	No, continues to be DPI Fisheries role.
FH2	Implement vegetation management actions in accordance with Action WC1- Vegetation Management Plan	N	See WC1	Action is already captured by WC1 (and which will be continued in new CZMP).
FH3	Establish close working relationship with DEC in designating and protecting threatened species habitat, such as shore bird and turtle sites	N	No formal process. Been ad hoc and dependent on staff interests.	Combine with WC44. Note, OEH is currently managing threatened species from Grafton, no local person on the ground for Tweed coast. This may be a barrier to successful integration.
FH4	Install relocatable signs and fencing to protect threatened species habitat sites	Y	Yes, Council now has this and does so on public land.	Combine with WC12, to make action the responsibility of Coastal Ranger, and with WC23 to be included with new signage at Off-leash Areas.
FH5	Install and maintain signage regarding unauthorised vehicular access to beach	Y	Yes, signs erected at entrances, SLSC.	Yes, continue to support the Dune Crew to install and maintain signage on beach vehicle access.
FH6	Physically restrict unauthorised vehicle access points	Y	Yes, see above.	Yes, combine with FH6 to continue to support the Dune Crew to close and remediate unauthorised access points.
FH8	Undertake routine coastline monitoring to assist in monitoring of 50 year hazard zone line affectation	N	The revised Tweed Coastal Hazards Assessment was completed in 2013, but there is no clear monitoring program (see WC6).	Yes, combine with WC6 to develop a monitoring program.
FH9	Detailed review of hazard lines in 20 year intervals	Y	Yes.	Regular review of hazard lines and coastal management is an underlying tenet of the coastal program. The review process is detailed in the CZMP.
FH10	Retain 7(f) Zone within Tweed LEP 2000 * on current alignment	Y	Yes, see WC40, WC41, WC43	Action is already captured by WC40.
FH14	Implement illegal clearing strategy in accordance with Action WC22	Y	Refer WC22 outcomes	Action is already captured by WC22 (and which will be continued in new CZMP).
FH20	Initiate adaptive education program to coincide with protection of threatened species habitat	Y	Ongoing and opportunistic. All threatened species.	Education regarding shorebirds, turtles and other threatened flora and fauna is required.
KC1	Implement vegetation management actions in accordance with Action WC1- Vegetation Management Plan	N	See WC1	Action is already captured by WC1 (and which will be continued in new CZMP).

Review of Tweed Coastline Management Plan (Umwelt, 2005)

Action Number	Action	Completion Status (discussion)		Continue the action in the CZMP (discussion)
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	N	Council has undertaken a detailed design of a seawall structure, conducted a multi-criteria analysis of options (as part of the Kingscliff CRMS, BMT WBM 2015) and has successfully applied for grant funding of the seawall between the Bowling Club and SLSC approved, via the Australian Government's National Stronger Regions program.	The construction of a permanent revetment is supported by the new CZMP.
KC3	Management of Cudgen Creek entrance in accordance with revised Estuary Management Plan	Y	Yes, see Cudgen Creek EMP.	
KC4	Retain 7(f) Zone within Tweed LEP 2000 on current alignment	Y	Yes, see WC40, WC41, WC43	Action is already captured by WC40.
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	Y	Yes, as part of seawall design and holiday park redesign.	KC6 to be combined with KC2, as part of upgrade of the seawall along the holiday park.
KC7	Implement illegal clearing strategy in accordance with Action WC22	Y	Refer WC22	Action is already captured by WC22 (and which will be continued in new CZMP).
KC9	New development is required to provide public parking spaces on development consent	Y	Parking is no longer considered a CZMP issue. Parking arrangements are considered in the Kingscliff Locality Plan.	No, no longer relevant.
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	Y	A review was conducted, but this did not account for issues relating to nesting shorebirds and turtles.	Off-leash areas should be reviewed in relation to shorebirds, turtles and migratory birds.
KC12	Implement recommendations from Beach Vehicle Permit Policy review (April/May 2005)	Y	A review was completed, however the action is not applicable to Kingscliff - Dreamtime Beach as only commercial fishermen are allowed 4WD permits, and the numbers are reducing over time.	No, no longer relevant.
KC13	Maintain existing restrictions on powered vessels and PWC movement in Cudgen Creek	Y	The Roads and Maritime Services polices vessel use in Cudgen Creek. The issue is no longer considered relevant to the CZMP, and is an estuary management issue.	No, no longer relevant.
KC14	Undertake public education program regarding the increase in clearing of vegetation to improve views from private property	Y	The Vegetation Vandalism on Public Land Policy manages illegal clearing.	Ongoing education promoting the values of dune vegetation is required.
KC16	Implement Kingscliff Vegetation Management Plan in accordance with the principles of this Plan	N	See WC1	Action is already captured by WC1 (and which will be continued in new CZMP).

Appendix D Coastal Risk Assessment

D.1 Introduction

This Appendix to the Kingscliff - Dreamtime Beach Coastal Zone Management Plan (CZMP), addresses risks to coastal values for the Kingscliff - Dreamtime Beach compartment. The CZMP Guidelines (OEH, 2013) outline the purpose of a CZMP as including management of issues relating to 'pressures on coastal ecosystems' and 'community uses of the coastal zone' (see Section 1.2 of the CZMP Guidelines).

The Dreamtime compartment has been included within the "Natural Beach and Habitat Precinct". The management intent for this precinct focuses on protection and enhancement of the largely undeveloped coastline views. Community uses such as public access and recreational activities are closely linked with coastal ecosystem health and are a key driver for the management of foreshore reserves and State controlled land in the public trust.

In contrast, the Kingscliff compartment is classified into both "Passive Community Use" and "Hazard Protection" precincts. These areas support a range of passive and commercial recreational activities, and are a focal point for the Kingscliff coastal village. Ecosystem health in these precincts is largely focussed on management of frontal dunes, which also support the protection of adjacent back beach areas from coastal hazards.

Actions in the Hazard Protection precinct were largely determined by the CRMS (BMT WBM, 2015). For the remainder of the beach and precincts, a risk assessment process has been used to:

- identify the risks associated with the various community uses, ecological values and conflicting issues on Kingscliff - Dreamtime Beach;
- determine the level of risk arising from these issues, based upon the likely occurrence / frequency, and potential consequence of the risks;
- document the existing management activities, then determine the residual level of risk after accounting for the existing controls; and
- identify additional actions (which may be a continuation of actions identified in the original Tweed CZMP 2005) that may eliminate, mitigate or otherwise reduce the level of risk to a more tolerable level.

The process used in the Risk Assessment, and the outcomes generated, are detailed herein.

D.2 Risk Assessment Methodology

The standard risk management approach defines the magnitude of risk as a combination of 1) the likelihood of a risk event occurring, and 2) the consequence if such an event does occur.

A slightly modified approach has been used for the ecological, social amenity and community use risks. This is because in some cases the objective is to address management of existing threats that already have a 'frequency' of occurrence, as opposed to future unrealised risks that have a 'likelihood' of occurrence. The frequency (or likelihood) scale in Table D-1 includes qualitative descriptors for both existing threats and also for future coastal hazards.

Due to the simplicity of the coastal risk assessment required for the remainder of the Kingscliff - Dreamtime coastline, only the "Best Estimate" hazard line for each of the immediate, 2050 and 2100 timescales has been used in the assessment, and categorised as an unlikely event.

The consequence scales used have been tied to the management intent by defining the degree to which the valued aspects are impacted and the potential for recovery. The consequence scale shown in Table D-2 is relevant to both the type of impact to coastal land and assets and its effect across the entire community and the timeframe (up to 100 years) for coastal risk planning. The consequence scale follows a triple bottom line approach. The consequences were identified and ranked based on experience elsewhere on the coast and consultation with relevant Council staff.

The risk matrix used to combine the likelihood (or frequency) and consequence to determine the level of risk to the coastal values is shown as Table D-3.

Table D-1 Frequency Scale used to assess Community Use and Amenity Issues

Frequency	Description	Frequency for Coastal Issues (10 yr timeframe)	Example Likelihood for Coastal Hazards (100yr timeframe)
Often / Continuous	There is a high possibility the event will occur as there is a history of frequent occurrence	Occurs frequently (e.g. weekly, monthly)	Almost Certain Roughly every 5 – 10 years
Occasionally	It is likely the event will occur as there is a history of casual occurrence	May occur once or twice a year	Likely Roughly every 20 years
Infrequent	There is a low possibility that the event will occur, however, there is a history of infrequent and isolated occurrence	May occur once every 5 years	Unlikely Roughly every 100 years
Rare	It is highly unlikely that the event will occur, except in extreme circumstances, which have not been recorded historically.	Occurs as a 'one off' issue or otherwise very infrequent (once every 10 years+)	Rare Less than every 100 years

Table D-2 Triple bottom line consequence scale

Consequence	Social / Community	Habitat / Threatened Species	Economic
Major	Irreversible, extreme and widespread long term impacts on the natural beach– e.g. complete change from natural landscape to developed / urban coastline or natural coastal processes unable to occur or complete loss of access, or extreme increase in access	Extreme and widespread devastating long term impacts to high value ecological habitats and threatened species. Recovery unlikely.	Extensive financial loss (>$1m) or ongoing funding costs of $100,000 per year

Consequence	Social / Community	Habitat / Threatened Species	Economic
Moderate	Moderate impact on the natural beach values mainly reversible through management efforts. No similar venue with comparable values available nearby	Significant habitat loss or impact to threatened species, isolated to a localized area. Recovery may take several years.	Significant financial loss ($50,000 - $500,000) or ongoing funding costs of $25,000- $100,000 per year
Minor	Minor impact to amenity/ heritage value, mainly reversible through management efforts. Access ways / beaches of a similar nature available nearby	Habitat damage or impacts to threatened species of a magnitude consistent with seasonal variability	Minor financial loss ($10,000 - $50,000) or ongoing funding costs of $5,000-$20,000 per year
Insignificant	Little to no change to amenity / heritage value	Little to no impact on terrestrial and or aquatic ecosystems	Little to no financial loss (<$10,000) or less than $5,000 ongoing funding costs per year

Table D-3 Risk Matrix

		CONSEQUENCE			
		Insignificant	Minor	Moderate	Major
FREQUENCY	Often / Continuous	Low	Medium	High	Extreme
	Occasionally	Low	Medium	High	High
	Infrequent	Low	Low	Medium	High
	Rare	Low	Low	Low	Medium

D.3 Identification of Risks

Along with threats due to erosion, recession and inundation, consideration has been given to other risks to the natural beach and habitat values (within the care and control of Council) of Kingscliff - Dreamtime Beach. The risks arise from conflicts between uses and values, and other issues. The list of risks given in Table D-4 was derived from an update of the list of issues given in the 2005 CZMP in consultation with relevant Council and OEH staff.

The level of risk was determined using the risk criteria given above in Section D.2, and is listed in Table D-4. A full description of how the level of risk was determined is given below. The CZMP includes a number of actions to address these risks.

Table D-4 Risks Identified for Kingscliff - Dreamtime Beach

No.	Risk	Level of Risk*	Category & Section
1	There is a risk that inappropriate development will occur in coastal hazard zones due to inadequate planning, which will result in social and financial hardship	Low	Inappropriate Development in Hazard Zones D.4.1
2	There is a risk that coastal erosion caused by storms will result in a loss of public land that will affect public access and amenity	Medium	Loss of public Land Due to Erosion D.4.2
3	There is a risk that a lack of community understanding about natural variability in beach width will result in community pressure on decision makers during periods of erosion, resulting in inappropriate, costly and/or obstructive management responses	High	Inappropriate Management of Coastal Processes D.4.3
4	There is a risk that feral animals will cause increased mortality of shorebirds, turtles, and other threatened species, resulting in reduced biodiversity values	High	Feral Animals D.4.4
5	There is a risk that existing recreational facilities will not satisfy demand created by nearby urban expansion and tourism, resulting in lost tourism potential and poor social amenity	Medium	Recreational Facilities D.4.5
6	There is a risk that off-road vehicle access will impacts on shorebirds, turtles, and natural areas resulting in reduced biodiversity value	Medium	Off-road Vehicle Access D.4.6
7	There is a risk that off-leash dogs will affect breeding outcomes for shorebirds and turtles, causing a reduction in their numbers	High	Dog Access D.4.7
8	There is a risk that loss of native vegetation caused by vandalism of trees and vegetation will result in reduced scenic and biodiversity values	Medium	Vegetation Vandalism D.4.8
9	There is a risk that native vegetation will be displaced by weed infestation, resulting in reduced habitat value	High	Weeds D.4.9
10	There is a risk that coastal erosion caused by storms will result in a loss of Aboriginal Heritage values	Unknown	Aboriginal Heritage D.4.10
11	There is a risk that illegal camping/sheltering in the dunes will result in damage to dune vegetation, littering and other waste disposal, and an increased risk of bushfires due to the lighting of camp fires	Medium	Homelessness in the Dunes D.4.11
12	There is a risk that water pollution caused by stormwater runoff will result in human and environmental health impacts	Low	Stormwater Runoff D.4.12
13	There is a risk that poor decision making as a consequence of unrecognised data gaps will result in future issues that will impact on social and environmental values	Medium	Data Gaps D.4.13
14	There is a risk that incompatible management regimes across multiple land managers will impact on social and environmental values	Low	Management Arrangements D.4.14
15	There is a risk that coastal erosion caused down drift of the Kingscliff hazard protection structures will impact upon ecological habitats, threatened species, public beach amenity and beachfront development	Medium	Edge Erosion Effects D.4.15

** The level of risk given is the residual risk, which accounts for the existing management activities that are already in place to reduce the impact of the risk.*

D.4 Assessment of Risks

D.4.1 Inappropriate Development in Coastal Hazard Zones

Risk	**There is a risk that inappropriate development will occur in coastal hazard zones due to inadequate planning, which will result in social and financial hardship**		
Description	This relates specifically to development on coastal land north of the Kingscliff Beach Bowls Club (coastal erosion management options for Kingscliff Beach have been assessed separately in the CRMS, see BMT WBM, 2015). Land north of the Kingscliff Beach Bowls Club is zoned as a mixture of: • Public Recreation (RE1); • Residential (R2), with private properties on Dune Street and Lagoon and Fingal Roads located partially within the 2100 coastal hazard zone; and • Deferred Matter (DM), which is land which is currently unzoned and subject to further negotiations with the owners and the NSW Government. This land is also vacant.		
Existing controls	• The Tweed Local Environmental Plan 2014 (LEP 2014) contains two clauses to manage development and use of the coastal zone, being a compulsory clause 5.5 that details heads of consideration; and Clause 7.5 Coastal Risk Planning that refers to the coastal risk planning area on maps gazetted with the LEP, which covers that area affected by coastal hazards to 2100. Clause 7.5 provides for additional considerations for development to manage coastal risks. • LEP 2014 does not apply to land mapped as “deferred matters”, for which Tweed LEP 2000 continues to apply. • Tweed LEP 2000 contains clause 26 Development in Zone 7 (f) Environmental Protection (Coastal Lands) and clause 36 Coastal erosion outside Zone 7 (f), both of which aim to protect land that may be susceptible to coastal erosion processes from inappropriate development. • The Tweed Development Control Plan Section B25 - Coastal Hazards (‘DCP B25’) applies to all land within the Tweed Shire located seaward of the 2100 Hazard line, as shown on figures associated with the DCP section, including the land listed above. • DCP B25 places controls on permissible development within the Immediate, 2050 and 2100 hazard zone, as defined by the hazard lines of the same name. • DCP B25 aims to: provide guidelines for the development of the land having regard to minimising the coastal hazards risks; establish if the proposed development or activity is appropriate to be carried out, and the conditions of development consent that should be applied; minimise the risk to life and property from coastal hazards; and maintain public access to public land.		
Additional Management Options	• When land that is deferred matters is transferred to the new Tweed LEP, use Environment Zones or other appropriate zone (e.g. Public Recreation) for undeveloped lands. • Continue to apply LEP 2000 coastal erosion provisions to deferred matters land. • Continue to apply the LEP Coastal Risk Planning area and DCP B25 provisions and update these (and future state-wide maps) with new coastal vulnerability information as it becomes available.		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Infrequent	Minor	**Low**

D.4.2 Loss of public land and access due to coastal erosion

Risk	**There is a risk that coastal erosion caused by storms will result in a loss of public land that will affect public access and amenity**		
Description	Beyond the hazard protection precinct covered by the Kingscliff CRMS (BMT WBM, 2015), coastal erosion poses a risk to public land and access along the entire beach. Coastal erosion may result in a loss of public land, reducing the amenity of the beach, and a loss of access where accessways are eroded. It should be noted that while land may be permanently lost to the ocean, beach accessways and facilities in parks can be readily replaced, so the impacts can be considered short term.		
Existing controls	• The NRM unit's Dune Crew is responsible for the repair and management of beach accessways. They will inspect access ways after storms, temporarily close unsafe areas of the beach and beach accesses, and undertake repairs on a priority basis. • The process for the inspection, temporary closure for public safety, and repair of damages to public land and beach accessways following erosion events is formally detailed in the Kingscliff - Dreamtime Beach Emergency Action Sub Plan (EASP), appended to this CZMP. • Volunteer based dune rehabilitation groups include: Fingal Head Coastcare and Kingscliff Community Dunecare. The volunteer groups are supported (materials, expertise etc.) by Council. • The proposed seawall upgrade along the Kingscliff Beach Holiday Park shoreline (as part of the Kingscliff Beach Holiday Park Renewal and Central Park developments) shall protect public land behind the beach from erosion, as well as other outcomes.		
Management Options	• Continue to support the NRM Unit's Dune Crew to inspect, manage and repair public land and beach accesses following erosion events (WC24, WC25 amended). • Continue to support existing and new volunteer Dune Care groups. • Implement the Kingscliff - Dreamtime Beach EASP, i.e. following erosion events; and update the EASP as new hazard and monitoring information is collated (WC4). • Undertake opportunistic beach nourishment using available sand sources, to remediate erosion in areas of high public access demand (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, Tweed River, etc., as may become available from time to time (see Kingscliff CRMS, BMT WBM 2015 for further details). • Determine preferred approach to extraction of sand from Area 5 of the Tweed River, for use as sand nourishment on Kingscliff – Dreamtime Beach. This action shall provide an interim source of sand up to 660,000 m^3 until an additional large-scale nourishment program is investigated in 2030 (see Section 3.5.1 of the main CZMP Document). • Complete the upgrade to the seawall along the Kingscliff Beach Holiday Park shoreline as part of the Kingscliff Beach Holiday Park Renewal and Central Park developments (KC2, KC6 amended). • Re-establish a coastal dune along the foreshore of Faulks Park and Lions Park. Volume of sand required is approximately 20,000m^3. Source of sand can be terrestrial or marine (e.g. Tweed River, Cudgen Creek, Area 5, as noted above). • Modify/protect vertical seawall in front of Cudgen Headland SLSC with an engineered wall that maximises access and amenity to the beach. • 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 (WC6, FH8 amended). • Explain to the community the processes causing periodic erosion of land and accesses as part of a comprehensive Coastal Community Education Strategy (WC36 amended). • 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, which will be required in the future due to progressive beach recession. The easement should extend from Fingal Head to Jack Bayliss Park.		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Minor	**Medium**

D.4.3 Inappropriate management of coastal processes

Risk	**There is a risk that a lack of community understanding about natural variability in beach width will result in community pressure on decision makers during periods of erosion, resulting in inappropriate, costly and/or obstructive management responses**		
Description	Sand movements into and along Kingscliff Beach tends to occur as large sand waves that can intermittently leave the beach in a highly eroded state. In the aftermath of such events, there can be pressure to act quickly to remediate the erosion without fully assessing the impacts of such works, or allowing the beach to recover naturally. In the past, ad hoc placement of rocks, sand bags and other works has occurred on Kingscliff Beach (e.g. in the hazard protection zone), with the long term impact and management of these actions having to be assessed retrospectively.		
Existing controls	• Council's website includes up to date information on coastline management. In particular, planned nourishment exercises are explained and opportunities for interested community members to attend drop in information stalls are given. The information on nourishment includes maps of the sand supply truck routes, and where applicable, pipeline routes. • Recent reports outlining coastal processes and erosion are available on Council's website, including the NSW Coastal Panel Report Coastal Erosion at Kingscliff, December 2011; and Tweed Shire Coastal Hazards Assessment (BMT WBM 2013).		
Management Options	• Continue to support the NRM Unit's Dune Crew to appropriately manage dune vegetation (WC18 amended). • Continue to support existing and new volunteer Dune Care groups (WC18 amended). • Implement the Kingscliff - Dreamtime Beach Emergency Action Sub Plan (EASP) as required, i.e. following erosion events; and update the EASP as new hazard and monitoring information is collated (WC4). Using the EASP shall aim to avoid ad-hoc protection and remediation works that may worsen issues in future. • Undertake opportunistic beach nourishment using available sand sources, to remediate erosion in areas of high public access demand (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, Tweed River, etc., as may become available from time to time (see Kingscliff CRMS, BMT WBM 2015 for further details). • Determine preferred approach to extraction of sand from Area 5 of the Tweed River, for use as sand nourishment on Kingscliff – Dreamtime Beach. This action shall provide an interim source of sand up to 660,000 m^3 until an additional large-scale nourishment program is investigated in 2030 (see Section 3.5.1 of the main CZMP Document). • Re-establish a coastal dune along the foreshore of Faulks Park and Lions Park. Volume of sand required is approximately 20,000m^3. Source of sand can be terrestrial or marine (e.g. Tweed River, Cudgen Creek, Area 5, as noted above). • 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 (WC6, FH8 amended). • 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, which will be required in the future due to progressive beach recession. The easement should extend from Fingal Head to Jack Bayliss Park. • Explain natural coastal processes particularly in high usage areas, to build the resilience of the community to intermittent erosion episodes, as part of a comprehensive. Coastal Community Education Strategy (WC36 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Residual Risk
	Occasionally	Moderate	**High**

D.4.4 Feral Animals

Risk	**There is a risk that feral animals will cause increased mortality of shorebirds, turtles, and other threatened species, resulting in reduced biodiversity values**		
Description	The key threats to nesting shorebirds and turtles and other threatened species are from foxes and domesticated / wild dogs and cats (see separate threat below for off-leash dog areas). While cane toads may breed in some open areas like carparks, the extent of threat from them is not considered high.		
Existing controls	• Limited due to limited funding and a dependence on continual securing of grant funding. • Fox management is primarily focussed on fumigating dens on an ad hoc basis dependent upon grant funding. • Education programs aimed at improving responsible dog and cat ownership.		
Management Options	• For new subdivisions, prepare new development consent guidelines (e.g. via section 88B of the *Local Government Act 1993*), to require a restrictive covenant on all residential lots that either prohibits the keeping of cats and dogs, or that requires cats to be kept on premises (as dogs are). • Prepare and implement a Council policy requiring cats to be kept within property boundaries. • Develop and implement a feral animal strategy (WC3). • Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to be responsible for monitoring and restricting access to shorebird and turtle nesting sites (ranger to cover other issues also, see WC12 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Moderate	**High**

D.4.5 Recreational Facilities

Risk	**There is a risk that existing recreational facilities will not satisfy demand created by nearby urban expansion and tourism, resulting in lost tourism potential and poor social amenity**		
Description	Insufficient availability and / or degradation of recreational facilities and beach area due to increased population. Population growth caused by nearby urban developments (e.g. Salt), and increasing numbers of visitors from QLD, NSW and abroad. Overpopulation may encourage the creation of informal tracks to access un-used sections of beach (see Vegetation Vandalism for actions), and which may also impact upon shorebird and turtle nesting sites.		
Existing controls	• The Kingscliff Locality Plan has been prepared. The document aims to guide future growth, balancing development and employment opportunities with environmental protection and community expectations while strengthening the existing character of the local area. Preparation of the document includes an extensive program of community consultation. The document shall address issues such as car parking, access ways and maintenance, shade and recreational facilities, ongoing management of signage in accordance with Australian Standards, and more. • The proposed Kingscliff Holiday Park Renewal shall include a reduction in the size of the park to create space for the Central Park; reducing the number of camp sites and providing more cabins and ensuite sites; new amenities, recreational elements, landscaping and other facilities. • The proposed Kingscliff Central Park will be a large community space north of Cudgen Headland SLSC within former land of the Holiday Park. It will include a boardwalk, landscaping, picnic shelters and barbeques, play equipment and a cenotaph, all intended for residents and visitors to use and enjoy. • Funding for the Holiday Park and Central Park developments from the Australian Government's National Stronger Regions Fund has just been approved.		
Management Options	• Implement the Kingscliff Locality Plan (WC48, amended). • Complete the Kingscliff Central Park and associated Kingscliff Beach Holiday Park Renewal and revetment upgrade (KC2, KC6 amended). • Re-establish a coastal dune along the foreshore of Faulks Park and Lions Park. Volume of sand required is approximately 20,000m^3. Source of sand can be terrestrial or marine (e.g. Tweed River, Cudgen Creek, Area 5, as noted above). • Modify/protect vertical seawall in front of Cudgen Headland SLSC with an engineered wall that maximises access and amenity to the beach. • Implement the Vegetation Vandalism on Public Land Policy (WC22 amended), and continue to support the NRM Unit's Dune Crew, to manage informal tracks created due to increased recreational use and demand (WC24, WC26, WC27 amended). • Implement the Development Design Specifications D14 – Landscaping Public Space, to provide consistency in design and theme for recreational infrastructure in the coastal zone (WC14 amended). • Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to be responsible for monitoring of the creation of informal tracks; and fencing off nesting sites or closing beach access points as necessary over shorebird / turtle nesting season (FH4) (ranger to cover other issues also, see WC12 amended). • Promote the shorebird and turtle nesting seasons and need for care by beach users, as part of a comprehensive Coastal Community Education Strategy (WC36, FC20 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Minor	**Medium**

D.4.6 Off road vehicle access

Risk	**There is a risk that off-road vehicle access will impacts on shorebirds, turtles, and natural areas resulting in reduced biodiversity value**		
Description	Off-road driving, including four-wheel drives (4WDs), may cause damage to the beach and natural areas, particularly where drivers do not obey rules for beach driving. Vehicles driving on beaches may destroy turtle and shorebird nesting sites.		
Existing controls	Four-wheel driving in the Tweed LGA is regulated by Council's Beach Vehicle Policy Version 1.2 (adopted in 2008 and reviewed in June 2013). The policy is quite restrictive and expected to result in a continuing decline in beach driving into the future. There is no legal 4WD access on Kingscliff - Dreamtime Beach except for licenced commercial fishermen. The beach vehicle permit season runs from the 1 August through to the 31 of July each year and makes provision for permits under three categories: • Renewal of current permits for amateur fisherman; • Professional Fisherman (only to licensed net fishermen); • Special permits (require a disability parking permit). Relevant restrictions placed on permit holders through the policy include: • The Permit is issued for the purpose of fishing only - joyriding and picnicking are not permitted; • The vehicle is not to be driven above the high tide mark, except when travelling to and from the beach; • Under no circumstances is the vehicle to be driven on or over frontal dunes or foreshore areas not designated as access points; • Vehicles are to be driven only on the beaches specified by the Permit; and • Access to beaches by 4WD is only permitted via designated access points. As required, illegal vehicle access points are rehabilitated by the NRM unit's Dune Crew.		
Management Options	• Continue to implement Council's Beach Vehicle Policy. • Continue to support the NRM Unit's Dune Crew to rehabilitate illegal vehicle accesses and place signage about legal vehicle use (FH5, FH6 amended). • Promote the shorebird and turtle nesting seasons and need for care by beach users, as part of a comprehensive Coastal Community Education Strategy (FC20, WC36 amended). • Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to be responsible for monitoring compliance with the Beach Vehicle Policy; and for fencing off nesting sites or closing beach access points as necessary over the shorebird / turtle nesting season (FH4) (ranger to cover other issues also, see WC12 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Minor	**Medium**

D.4.7 Dog access

Risk	**There is a risk that off-leash dogs will affect breeding outcomes for shorebirds and turtles, causing a reduction in their numbers**		
Description	Uncontrolled dog access to beaches threatening other users and local wildlife		
Existing controls	• Existing dog exclusion areas have been predominantly selected to prohibit dogs off leash at swimming beaches. This has meant approved off-leash areas often coincide with nesting sites for shorebirds and turtles, causing ongoing issues. • While not specifically in the Dreamtime - Kingscliff compartment, there are recent examples of dog exclusion areas established by Council to protect shorebirds. The dog exclusion area at Hastings Point in the vicinity of Cudgen Creek Entrance was an initiative of the 2013 Coastal Zone Management Plan for Tweed Coastal Estuaries. The Hastings Point area has been identified as a significant site for both resident and migratory shorebirds. Council has designated a dog exclusion area encompassing land east of Tweed Coast Road from Yugari Drive north to Peninsula Street, including all foreshore areas of the Cudgera Creek estuary and the beach north of Cudgera Creek mouth to the shoreline adjacent to the Peninsula Street beach access walkway. The closure of this area to dogs is to protect significant shorebird and beach nesting bird habitat and reduce disturbance. • Council holds “Dogs Breakfast” events to provide education and engagement with local dog owners on key issues. There are a number of alternative approved dog off leash exercise areas along the coast of the Tweed Shire, as follows: • South Kingscliff Beach - from the boundary of Salt residential area north to the rockwall of Cudgen Creek; • South Cabarita Beach - 200m south of Norries Headland to a point one kilometre north of Cudgera Creek; • South Pottsville Beach - 200m south of the main bathing area at Pottsville Beach to 200m north of Black Rocks; • South Fingal Head / Kingscliff Beach - access from Murphys Road Kingscliff to a point 0.5km south of the beach access point at the Fingal Head Quarry; • Amaroo Park on the corner of Darlington Drive and Amaroo Drive, Banora Point; • Hibiscus and Oyster Point Park at the bottom of Bushland Drive, Banora Point; and • Ducat Park - Ducat Street, Tweed Heads.		
Management Options	• Continue to support “Dogs Breakfast” events to inform owners how to reduce disturbance by domestic dogs on nesting and migratory shorebirds, which may include closure of sections of beach / off-leash areas during the breeding season. This may form part of a comprehensive Coastal Community Education Strategy (WC36 amended). • Review the off-leash dog area (KC10 amended) to consider alternatives, for example: – Permanent closure of the Dreamtime off-leash dog area, with promotion of alternative fenced off leash areas nearby; – Periodic closure of the off-leash dog area during nesting season for turtles, shorebirds and migratory birds; or – Establishment of an alternative off-leash area at Kingscliff during set times of day to avoid coinciding with swimmers, and closure of the Dreamtime off-leash area. • Upgrade signage to clearly delineate the off leash areas, and to provide education about nesting animals and responsible pet ownership (WC23, FH4 amended,). • Fund a Coastal Compliance Ranger for the NRM unit’s Coastal Team, to monitor off-leash dog recreation (ranger to cover other issues also, see WC12 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Moderate	**High**

D.4.8 Vegetation Vandalism

Risk	**There is a risk that loss of native vegetation caused by vandalism of trees and vegetation will result in reduced scenic and biodiversity values**		
Description	Vandalism of native coastal vegetation has been caused by: • Creation of individual tracks to beach by private landowners; • Mowing of dunal areas and fencing beyond property boundaries; • Pruning of vegetation to improve coastal views; • Vandalism/ Removal / Poisoning of trees in park and dunes; • Dumping of rubbish in the dunes; and • Illegal weekend camping that results in destruction of vegetation for fires (and subsequent risk of bushfire), littering, and the creation of illegal tracks.		
Existing controls	• Council has a Vegetation Vandalism on Public Land Policy (2014) to manage damage caused by the above activities, and share expertise and resources with other land managers (e.g. Crown Lands, OEH etc). The Policy provides for: – Community Education, – Monitoring and Prevention, – Regulation and Enforcement, and – Rehabilitation. • Offences will be advertised through local media. Responses to offences may include erecting large fences in front of damaged or destroyed vegetation. • The NRM unit's Dune Crew will assist with the monitoring and rehabilitation elements of the Vegetation Vandalism on Public Land Policy. • There are volunteer based dune rehabilitation groups that may support the monitoring and rehabilitation process, including: Fingal Head Coastcare and Kingscliff Community Dunecare.		
Management Options	• Implement the Vegetation Vandalism on Public Land Policy (WC22 amended). • Continue to support the NRM unit's Dune Crew to assist with the monitoring and rehabilitation elements of the Vegetation Vandalism on Public Land Policy. • Continue to support existing and new volunteer Dune care programs, to assist with the monitoring and rehabilitation elements of the Vegetation Vandalism Policy. • Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to be responsible for monitoring of illegal damage to dune vegetation, and compliance with conditions of consent regarding protection / rehabilitation of dune vegetation (ranger to cover other issues also, see WC12 amended). • Conduct education of residents regarding the values of dune vegetation, as part of a comprehensive Coastal Community Education Strategy (KC14, WC36 amended). • Facilitate liaison between Council, Crown Lands, NPWS, OEH and TBLALC through the Tweed Vegetation Committee regarding consistent management of adjoining areas of natural habitat (WC44, WC45, FH3, amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Minor	**Medium**

D.4.9 Weeds

Risk	**There is a risk that native vegetation will be displaced by weed infestation, resulting in reduced habitat value**		
Description	Weed infestation is an issue along the coastal strip. Weeds include garden escapees and Bitou Bush.		
Existing controls	• Volunteer based dune rehabilitation groups include: Fingal Head Coastcare and Kingscliff Community Dunecare. The volunteer groups are supported (materials, expertise etc.) by Council. • The NRM unit's Dune Crew conducts weed removal and rehabilitation of dune vegetation. • Bitou Bush is very actively managed to prevent Bitou bush invasion into Queensland and to control its spread further south. This has been funded through numerous grant programs over the years. Activities have been supported by the Tweed Shire Bitou Bush Control Strategy (2003). Annual aerial monitoring of Bitou Bush for the Tweed (and greater Northern containment zone) is undertaken.		
Management Options	• Continue to support Bitou bush management including annual aerial mapping. • Continue to support volunteer Dunecare programs (new and existing). • Continue to support the NRM Unit's Dune Crew to undertake weed removal in dunes. • Implement the Species Selection Guide For Parks policy, to provide for suitable species to be used in coastal parks adjacent to dune vegetation (WC7) • Prepare and implement a broad based Vegetation Management strategy and principles for whole of coast. Update and expand site specific Vegetation Management Plans to fill in the gaps between dunecare work areas (WC1 amended). • Facilitate liaison between Council, Crown Lands, NPWS, OEH and TBLALC through the Tweed Vegetation Committee regarding consistent management of adjoining areas of natural habitat (WC44, WC45, FH3, amended). • Conduct education of residents about the use of native species and weeding in their gardens to reduce the escape of weeds to nearby bushland, as part of a comprehensive Coastal Community Education Strategy (WC36 amended). • 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, which will be required in the future due to progressive beach recession. The easement should extend from Fingal Head to Jack Bayliss Park.		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Often / Continuous	Moderate	**High**

D.4.10 Aboriginal Heritage

Risk	**There is a risk that coastal erosion caused by storms will result in a loss of Aboriginal Heritage values**		
Description	Known significant sites have been mapped, but this has not been compared with the hazard mapping. Generally, specific locations for Aboriginal Heritage are not publicised. There may also be unknown sites of significance uncovered by erosion in the future.		
Existing controls	Council is currently preparing an Aboriginal Cultural Heritage Management Plan. This plan aims to identify and assess known and potential Aboriginal Cultural Heritage and provide a framework for the management of Aboriginal Cultural Heritage. The plan is being prepared in consultation with the Aboriginal community and within the protocols of the signed Memorandum of Understanding (MOU).		
Management Options	• Implement the Aboriginal Cultural Heritage Management Plan for the Aboriginal cultural heritage values along the coastline (WC9). • Develop a procedure or decision support tool to outline the protocols to be followed if significant sites are disclosed by erosion. This should include notification to NPWS and the LALC, as is the current procedure. • Provide education about Aboriginal heritage and culture as part of a comprehensive Coastal Community Education Strategy (WC36 amended), which may include interpretive signage (WC10, amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
			UNKNOWN

D.4.11 Homelessness in the Dunes

Risk	**There is a risk that illegal camping/sheltering in the dunes will result in damage to dune vegetation, littering and other waste disposal, and an increased risk of bushfires due to the lighting of camp fires**		
Description	This risk specifically relates to homeless people living in the dunes, causing damage to dune vegetation, littering and other waste management issues. It is important to note that homelessness is a broader social issue for the whole community. Management of illegal camping by weekenders is discussed as part of the Vegetation Vandalism risk (see D.4.8).		
Existing controls	It is noted that homelessness is a broader social issue, and would not normally be considered in a CZMP. Council recognises that homelessness is an issue for some in the Tweed Shire. Council has a range of services and a Homelessness Policy, including: • Several places that offer a free meal to the homeless community; • The Murwillumbah Community Centre - Nullum House, and Fred's Place in Tweed Heads offer a range of homeless related support services; • Council has a Community Development Officer - Families and Youth and Community Development Officer - Social Planning whose roles are to advocate for homeless people across the Shire; • Youth Homelessness Matters Day, held each year during National Youth Week, which aims to raise public awareness about youth homelessness; • The Tweed Shire Housing and Homelessness Network, which aims to maximise opportunities to address homelessness and housing needs across government, service providers, community and those at greatest risk; and • A Homelessness Policy (2015), which outlines Council's commitment to preventing and reducing homelessness; and ensuring that homeless people are treated respectfully and appropriately and are not discriminated against. The Policy covers all Council services, in particular: o access to Council services and facilities o interacting with homeless people in public places o Council's regulatory activities o strategic land use planning and o community development. In terms of the managing the impacts of homelessness in coastal dunes that best relate to a CZMP, the Vegetation Vandalism on Public Land Policy contributes to the detection and remediation of damage in the dunes, including collection of litter and waste.		
Management Options	Homelessness is a broader social issue for which Council already has a range of actions and activities in place, beyond the scope of a typical CZMP. The management options recommended below are focused on improving coastal outcomes, e.g. managing vegetation and habitat in the dunes. • Implement the Vegetation Vandalism on Public Land Policy (WC22 amended). • Continue to support the NRM unit's Dune Crew to assist with monitoring and rehabilitation as required after illegal sheltering in the dunes. • Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to assist with monitoring of illegal sheltering (and damage) in the dunes (ranger to cover other issues also, see WC12 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Minor	**Medium**

D.4.12 Stormwater runoff

Risk	**There is a risk that water pollution caused by stormwater runoff will result in human and environmental health impacts**		
Description	Stormwater runoff onto the beach may cause: • enhanced scouring and erosion of the beach around outlets; and • risks to human health and/or environmental health from untreated stormwater.		
Existing controls	The Tweed Urban Stormwater Quality Management Plan does not cover stormwater outlets leading directly onto the beach. However, it does focus on improving stormwater draining to creeks and rivers such as Cudgen and Tweed, which in turn improves beach water quality adjacent to creek entrances, such as Cudgen at the southern end of Kingscliff Beach.		
Management Options	The replacement of the seawall along the Kingscliff Beach Holiday Park shoreline will include improvements to stormwater outlets to manage erosion and water quality risks (KC2, KC6 amended). The seawall is being constructed as part of the Kingscliff Beach Holiday Park renewal and Central Park developments, to be part funded by Council, the Holiday Park (owned by Council) and the Australian Government's National Stronger Regions Fund.		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Infrequent	Insignificant	**Low**

D.4.13 Data Gaps

Risk	**There is a risk that poor decision making as a consequence of unrecognised data gaps will result in future issues that will impact on social and environmental values**		
Description	A lack of beach volume and hydrographic data may impede a complete understand of coastal processes. Without a complete understanding of coastal processes, there is a risk that decisions may have an adverse impact on the coast and exacerbate erosion issues. As sea level rise progresses, the community is likely to demand more accurate proof of impacts before supporting costly and / or unpalatable management actions. Improving our understanding of coastal processes and the progression of climate change influences (e.g. the influence of sea level rise on coastal recession) is underpinned by the collection of adequate beach volume and hydrographic data.		
Existing controls	Coastal monitoring (WC6, FH8) has been limited, and not done routinely. Cross shore surveys have been taken since erosion events in 2010. Some NSW Government marine LiDAR and one hydrosurvey has been collected since the 2010 erosion event.		
Management Options	• 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 (WC6, FH8 amended). There are a number of recent technologies (particularly aerial photogrammetry from drones) that could substantially reduce the time and cost to collect beach volume and hydrographic data. These technologies are becoming increasingly available and affordable. • Communicate the results of beach monitoring, to improve the community's understanding of coastal processes, especially erosion events, to be completed as part of a comprehensive Coastal Community Education Strategy (WC36 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Infrequent	Moderate	**Medium**

D.4.14 Management Arrangements

Risk	**There is a risk that incompatible management regimes across multiple land managers will impact on social and environmental values**		
Description	The coastal zone is covered by a range of NSW legislation, state agency plans, and Council policies and plans. Without proper, relevant co-ordination of actions by the various managers, there is a risk that opposing actions may be implemented that results in a reduction in social or environmental outcomes.		
Existing controls	The Tweed Vegetation Committee co-ordinates management responses in adjoining reserves. The Kingscliff Foreshore Management Group was convened to develop and implement the Kingscliff Foreshore Management Plan, which includes the Central Park and Holiday Park redevelopments and seawall upgrade. This group meets on a monthly basis. Aside from these, co-ordination between Council, Crown Lands and OEH for the whole study area, plus the TBLALC for Dreamtime Beach, and across the range of issues affecting Kingscliff-Dreamtime Beach (e.g. managing habitat, nesting sites, dunes, public parks, erosion, and recreational / commercial precincts, etc.) tends to be ad hoc and on an as needs basis.		
Management Options	• Maintain the Tweed Vegetation Committee to facilitate liaison between Council, Crown Lands, OEH (NPWS, Coastal Branch) and TBLALC regarding consistent management of adjoining areas of natural habitat (WC44, WC45, FH3, amended). • Maintain the Kingscliff Foreshore Management Group as long as necessary to facilitate integration of the various plans covering the coastal region (WC46 amended). • Maintain framework for managing leases in Council Reserves, as per the Commercial use of Council Managed Land Policy and generic Plan of Management for Community Land (WC50, WC51, WC52 amended). • As necessary, facilitate working groups with relevant stakeholders (including members from different Council departments) to co-ordinate action on coastal management issues.		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Insignificant	**Low**

D.4.15 Edge Erosion Effects

Risk	**There is a risk that coastal erosion caused down drift of the Kingscliff hazard protection structures will impact upon ecological habitats, threatened species, public beach amenity and beachfront development**		
Description	It is well recognised that seawalls and other hazard protection measures may cause “edge effects”, that is, erosion of the adjacent unconsolidated land (beach sand and dunes), particularly where the hazard protection structures are situated within the active beach zone, on receding coasts, and / or on high littoral drift coasts. This effect is already evident as a consequence of the Kingscliff Beach hazard protection structures, as a scalloped and eroded section of the dune immediately adjacent to Kingscliff Beach Bowling Club, in Jack Bayliss Park. While erosion is evidently occurring, it is at present restricted to coastal dune within a public park. There are little if any impacts evident on the ecological habitats and threatened species that exist in habitat further north of Jack Bayliss Park. There are also no impacts evident on residential development, which currently lies landward of the projected maximum hazard zone for 2100. While there are some limited impacts on beach amenity, there is substantial environmental beach amenity immediately north of the current erosion escarpment. Therefore, while the frequency of occurrence is considered “occasionally”, the consequence is considered “minor”.		
Existing controls	• The NRM unit’s Dune Crew conducts rehabilitation of dune vegetation. • Volunteer based dune rehabilitation groups include: Fingal Head Coastcare and Kingscliff Community Dunecare. The volunteer groups are supported (materials, expertise etc.) by Council.		
Management Options	• Continue to support the NRM Unit’s Dune Crew to inspect, manage and repair public land and beach accesses following erosion events (WC24, WC25 amended). • Continue to support existing and new volunteer Dune Care groups. • Implement the Kingscliff - Dreamtime Beach Emergency Action Sub Plan (EASP) as required, i.e. following erosion events; and update the EASP as new hazard and monitoring information is collated (WC4). • Undertake opportunistic beach nourishment using available sand sources, to remediate erosion in areas of high public access demand (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, Tweed River, etc., as may become available from time to time (see Kingscliff CRMS, BMT WBM 2015 for further details). • Determine preferred approach to extraction of sand from Area 5 of the Tweed River, for use as sand nourishment on Kingscliff – Dreamtime Beach. This action shall provide an interim source of sand up to 660,000 m^3 until an additional large-scale nourishment program is investigated in 2030 (see Section 3.5.1 of CZMP). • 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, which will be required in the future due to progressive beach recession. The easement should extend from Fingal Head to Jack Bayliss Park. • 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 (WC6, FH8 amended). • Explain to the community the processes causing periodic erosion of land and accesses as part of a comprehensive Coastal Community Education Strategy (WC36 amended).		
Risk Assessment	Likelihood / Frequency	Consequence	Risk
	Occasionally	Minor	**Medium**

Appendix E Coastal Management Options Assessment

E.1 Risk Assessment Outcomes: Existing and New Actions

The risk assessment identified:

- Existing controls already in place to treat the coastal risks identified in this report, which this CZMP supports to continue to be implemented;
- Actions from Tweed CMP 2005 that were not, or only preliminarily implemented, but which remain valid approaches to treating the coastal risks, and so have been brought over into the new CZMP; and
- New actions to treat the coastal risks.

All of the proposed actions are listed in Table E-1, with denotation of their action number from the former CMP 2005, and listing of the risk(s) treated. To support their ongoing implementation, the list of existing controls is provided in Table E-1, also with their action number from Tweed CMP 2005 where relevant, and listing of the risk(s) treated.

E.2 Multi-Criteria Assessment of Options

The majority of actions proposed in this CZMP have been carried over from the former Tweed CMP 2005. There are only eight new actions proposed. Given that the majority of actions have previously been assessed through the coastal management process, a high level ('coarse') multi-criteria analysis has been used. A detailed multi-criteria analysis was conducted in the Kingscliff CRMS to cover the substantial options proposed for the Hazard Protection Precinct, refer to BMT WBM (2015) for full details.

The following criteria were considered for each of the actions, as shown in Table E-2:

- Whether the option **addresses a high level risk**;
- **Capital Cost and Recurrent Cost**, with values based upon an order of magnitude difference in expenditure;
- **Effectiveness / Risk Reduction Potential**, to consider whether an option presents a long term solution or a short term solution, and in turn, the potential risk reduction from the option;
- **Practicality to Implement**; considering the approvals, funding applications, resources, technical studies, lead-in time etc. required before the action can be implemented;
- **Acceptability**, noting whether the option is more or less likely to be acceptable to the community (and which should be clarified with community feedback, should the action be implemented);
- **Environmental / Social Impact**, to identify if the option may affect the surrounding environment, beach amenity and access; and
- **Consistency with the management intent of the precinct** to which the action will primarily apply.

It is noted that the technical feasibility of the option is not explicitly assessed here, as it is presumed that all recommended options are technically viable.

A rapid analysis based upon a "traffic light" colour system was used to assess the option against each of the above criterion, as either (see Table E-2):

- **"GO"**;
- **"SLOW"**, and proceed with caution; or
- **"STOP"**.

The criteria were not weighted, meaning that each criteria has an equal influence on the overall score of the assessment.

E.3 Options Assessment

The results of the coarse filtering of options and recommendations for implementation are provided in Table E-3. All actions are recommended for implementation, having scored ≥ 5 out of a possible 8 in the multi-criteria analysis (noting that negative scores are also possible in the analysis). This is not surprising given that most of the actions are an amendment or extension of actions previously recommended in the 2005 CMP.

Implementation details for all recommended actions are provided in the main report.

Table E-1 Actions Recommended to Treat the Coastal Risks

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
Retained Actions	***Report Section***	***D.4.1***	***D.4.2***	***D.4.3***	***D.4.4***	***D.4.5***	***D.4.6***	***D.4.7***	***D.4.8***	***D.4.9***	***D.4.10***	***D.4.11***	***D.4.12***	***D.4.13***	***D.4.14***	***D.4.15***	***CRMS***
When land that is deferred matters is transferred to the new Tweed LEP, use Environment Zones or other appropriate zone (e.g. Public Recreation) for undeveloped lands.	WC41 amended	✓															✓
Develop and implement a feral animal strategy.	WC3				✓												
Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to monitor: • Shorebird and turtle nesting sites, and fence off nesting sites or close beach access points as necessary over the breeding season; • 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.	WC12, FH4, WC21 amended				✓	✓	✓	✓	✓			✓					

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
Review the off-leash dog area to consider alternatives, for example: • Permanent closure of the Dreamtime off-leash dog area, with promotion of alternative fenced off leash areas nearby; • Periodic closure of the off-leash dog area during nesting season for turtles, shorebirds and migratory birds; and • Establishment of an alternative off-leash area at Kingscliff during specific times of day to avoid conflict with swimmers, to enable closure of the Dreamtime off-leash area.	KC10 amended							✓									
Prepare and implement a broad based Vegetation Management strategy and principles for the whole of the Tweed coast. Update and expand site specific Vegetation Management Plans to fill the gaps between Dunecare work areas.	WC1 amended									✓		□					
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	WC36 amended, WC10 in relation to signage for Aboriginal heritage, WC22 and KC14 in relation to dune values, FC20 in relation to threatened species.		✓	✓		✓	✓	✓	✓	✓	✓			✓		✓	

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
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 extensive 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 Tourist Park 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.																

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
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.	WC6, FH8 amended		✓	✓										✓		✓	✓
Upgrade signage regarding off leash areas making the extents of the off-leash area very clear, and to provide education about nesting animals and responsible pet ownership.	WC23, FH4 amended							✓									
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 camp sites and providing more cabins and ensuite sites, to make space for a Central Park;; and new amenities, recreational elements, landscaping and other facilities. Central Park shall include a boardwalk, landscaping, picnic shelters, barbeques, play equipment 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.	KC2, KC6 amended		✓			✓							✓				✓

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
New Actions																	
Undertake opportunistic beach nourishment using available sand sources, to remediate erosion in areas of high public access demand (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, Tweed River, etc., as may become available from time to time (see Kingscliff CRMS, BMT WBM 2015 for further details).			✓	✓												✓	✓
Determine preferred approach to extraction of sand from Area 5 of the Tweed River, for use as sand nourishment on Kingscliff – Dreamtime Beach. This action shall provide an interim source of sand up to 660,000 m^3 until an additional large-scale nourishment program is investigated in 2030 (see Section 3.5.1 of CZMP document).			✓	✓												✓	✓
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 above).			✓	✓		✓											
Modify/protect vertical seawall in front of Cudgen Headland SLSC with an engineered wall that maximises access and amenity to the beach.			✓			✓											

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
For new subdivisions, prepare new development consent guidelines (e.g. via section 88B of the Local Government Act 1993), to require a restrictive covenant on all residential lots that either prohibits the keeping of cats and dogs, or that requires cats to be kept on premises (as dogs are).					✓			✓									
Prepare and implement a Council Policy requiring cats to be kept within property boundaries.					✓			✓									
Coordinate within Council to enable the provision of maintenance activities in cross-over regions between the Parks maintenance crew (managed by the Recreation Services Unit) and Council's Dune Crew (managed by the NRM Unit - Coastal). The two groups manage adjacent areas (parks and adjacent beach accesses and dunes). The action is aimed at enabling the two 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.									✓	✓							
Develop a procedure or decision support tool to outline the protocols to be followed if significant Aboriginal sites are uncovered by erosion. This should include notification to NPWS and the LALC, as is the current procedure											✓						

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
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, which will be 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 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 WC36 amended for Community Education details).			✓	✓						✓						✓	
As necessary, facilitate working groups with relevant stakeholders (including members from different Council departments) to co-ordinate action on coastal management issues.															✓		
Existing Actions																	
Tweed Local Environment Plan 2014 (LEP 2014) contains Clause 7.5 Coastal Risk Planning. Support ongoing implementation, and update the LEP Coastal Risk Planning area (and state-wide maps in future) with new coastal vulnerability information as it becomes available.	WC43	✓															✓

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
For land that is deferred matters, the Tweed LEP 2000 applies. It contains Clause 26 Development in Zone 7 (f) Environmental Protection (Coastal Lands) and Clause 36 Coastal erosion outside Zone 7 (f), both of which aim to protect land that may be susceptible to coastal erosion processes from inappropriate development.	WC43	✓															✓
Tweed Development Control Plan Section B25 - Coastal Hazards ('DCP B25'). Support ongoing implementation but also update of the DCP as new information becomes available.	WC5, WC43	✓															✓
Kingscliff - Dreamtime Beach Emergency Action Sub Plan (EASP), to be implemented and regularly updated with new hazard and monitoring information.	WC4		✓	✓													✓
Fox management involving fumigating dens (ad hoc)					✓												
Kingscliff Locality Plan	WC48, amended					✓											
Beach Vehicle Policy	WC31						✓										✓

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
NRM Unit's Dune Crew is responsible for: • Management of beach access ways (repair and upkeep, proper demarking of formal accesses, viewing platforms); • Inspection, temporary closure, and repair of erosion damage to public land and beach accesses after erosion events; • Rehabilitation of illegal vehicle and pedestrian access points; and • Dune vegetation rehabilitation and management, including weed removal, and monitoring and rehabilitation of damaged vegetation (such as due to vandalism, illegal sheltering etc.)	WC24, WC25, WC26, WC27, WC29 (all relate to beach accesses); incorporates intent of WC18 relating to dune rehab, FH5 and FH6 in relation to managing unauthorised vehicle access via existing or informal accesses.		✓	✓		✓	✓		✓	✓		✓				✓	
Volunteer based dune rehabilitation groups, such as Fingal Head Coastcare and Kingscliff Community Dunecare. Council should continue to seek grant funding and support these groups, as well as help to develop new groups	Incorporates intent of WC18, WC25		✓	✓					✓	✓						✓	✓
“Dogs Breakfast” events to provide education and engagement with local dog owners on key issues								✓									
Vegetation Vandalism on Public Land Policy (2014)	WC22, FH14, & incorporates issues on coast relating to WC13.								✓			✓					
Bitou Bush management (funded by various grant programs), as supported by the Tweed Shire Bitou Bush Control Strategy (2003).										✓							

Risks Addressed	CMP 2005 Action No.	Inappropriate development	Erosion of public land and access	Poor coastal processes mngt	Feral Animals	Recreational Facilities	Off-road vehicles	Dog Access	Vegetation Vandalism	Weeds	Aboriginal Heritage	Homelessness in the Dunes	Stormwater Runoff	Data Gaps	Management Arrangements	Edge Erosion Effects	Hazard Protection Precinct
Annual aerial monitoring of Bitou Bush for the Tweed (and greater Northern containment zone).										✓							
Aboriginal Cultural Heritage Management Plan.	WC9										✓						
Species Selection Guide For Parks, to provide for suitable species to be used in coastal parks adjacent to dune vegetation.	WC7									✓							
Development Design Specifications D14 – Landscaping Public Space.	WC14					✓											
Maintain the Tweed Vegetation Committee to facilitate liaison between Council, Crown Lands, OEH (NPWS, Coastal Branch) and TBLALC regarding consistent management of adjoining areas of natural habitat. This could cover issues relating to vegetation vandalism, weed management (especially large scale Bitou spraying programs), protecting shorebird and turtle nesting sites, and management of specific habitats (e.g. Littoral Rainforest, Coastal Wetlands).	WC44, WC45, FH3, amended								✓	✓					✓		
Maintain the Kingscliff Foreshore Management Group as long as necessary to facilitate integration of the various plans covering the coastal region.	WC46, amended														✓		✓
Maintain framework for managing leases in Council Reserves, as per the Commercial use of Council Managed Land Policy and generic Plan of Management for Community Land.	WC50, WC51, WC52														✓		

Table E-2 Multi Criteria Assessment Tool

	Address High Level Threat	Cost	Ongoing Cost	Effectiveness / Risk Reduction Potential (RRP)	Practicality to Implement	Acceptability	Environmental or Social Impact	Consistency with precinct intent
STOP	Does not address a high risk	High ($300K to millions)	High ($300K to millions)	Option provides only a SHORT term solution, and so, minimal reduction in risk.	Option requires detailed approvals (EIS etc), technical studies (design, feasibility studies), funding applications, and resources above existing staff (e.g. external consultancy >$100,000).	Unlikely to be acceptable to community and politically unpalatable. Extensive community education, endorsement by Minister(s) and Council required.	Will impact negatively on environment, community or beach amenity	Inconsistent
SLOW	Addresses 1 high risk	Medium (e.g. $30,000 - $300,000)	Medium (e.g. $30,000 - $300,000)	Option is considered worthwhile, but may only provide a MEDIUM term reduction in risk.	Requires some approvals, further studies and applications, but these are likely to be approved. May require redistribution of existing staff resources, or small consultancy to assist.	Would be palatable to some, not to others (50/50 response). Briefing of Councillors, GM and community consultation required.	No net impact	Largely consistent with some trade-offs
GO	Addresses 2 or more high risks	Low (< $30,000)	Low (< $30,000)	Option provides an effective LONG term solution.	No /minimal approvals, studies or other tasks are required. Can be done within existing staff time.	Is very politically palatable, acceptable to community. Minimal consultation required.	Will benefit environment, community or beach amenity (e.g. improve beach access, recreation, habitats etc.)	Completely consistent

Table E-3 Multi-criteria Assessment of Options

[1] Scores are added based on GO =1, SLOW =0, STOP = -1.
[2] Actions with a score of: ≥ 5 are recommended (YES); 0-5 maybe suitable in some cases or locations (?); and < 0 are not recommended (NO).

Action	Address High Level Threat	Cost	Ongoing Cost	Effectiveness / Risk Reduction Potential	Practicality to Implement	Acceptability	Environmental or Social Impact	Consistency with precinct intent	Score[1]	Action[2] Recommended (Y, N, ?)
When land that is deferred matters is transferred to the new Tweed LEP, use Environment Zones or other appropriate zone (e.g. Public Recreation) for undeveloped lands.	SLOW	GO	GO	SLOW	GO	GO	GO	GO	6	YES
Develop and implement a feral animal strategy	SLOW	GO	GO	GO	GO	GO	GO	GO	7	YES
Fund a Coastal Compliance Ranger for the NRM unit's Coastal Team, to monitor: • Shorebird and turtle nesting sites, and fence off nesting sites or close beach access points as necessary over the breeding season; • 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.	GO	GO* (as a cost per risk addressed, it is very low)	GO* (as a cost per risk addressed, it is very low)	GO	SLOW	GO	GO	GO	7	YES

Action	Address High Level Threat	Cost	Ongoing Cost	Effectiveness / Risk Reduction Potential	Practicality to Implement	Acceptability	Environmental or Social Impact	Consistency with precinct intent	Score[1]	Action[2] Recommended (Y, N, ?)
Review the off-leash dog area to consider alternatives, for example: • Permanent closure of the Dreamtime off-leash dog area, with promotion of alternative fenced off leash areas nearby; • Periodic closure of the off-leash dog area during nesting season for turtles, shorebirds and migratory birds; and • Establishment of an alternative off-leash area at Kingscliff during specific times of day to avoid conflict with swimmers, to enable closure of the Dreamtime off-leash area.	SLOW	GO	GO	GO	SLOW	SLOW	GO	GO	5	YES
Prepare and implement a broad based Vegetation Management strategy and principles for the whole of the coast. Update and expand site specific Vegetation Management Plans to fill the gaps between Dunecare work areas.	SLOW	GO	GO	GO	GO	GO	GO	GO	7	YES
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.	GO	SLOW	GO	GO* (due to improved risk analy-sis)	GO	GO	GO	GO	7	YES
Upgrade signage regarding off leash areas making the extents of the off-leash area very clear, and to provide education about nesting animals and responsible pet ownership.	SLOW	GO	GO	GO	GO	GO	GO	GO	7	YES
Upgrade the seawall along the Kingscliff Beach Holiday Park shoreline, as part of the Kingscliff Beach Holiday Park Renewal and Central Park developments.										YES* (refer to CRMS)

Action	Address High Level Threat	Cost	Ongoing Cost	Effectiveness / Risk Reduction Potential	Practicality to Implement	Acceptability	Environmental or Social Impact	Consistency with precinct intent	Score[1]	Action[2] Recommended (Y, N, ?)
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 accesses 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 extensive 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 Tourist Park 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.	GO	GO	GO	GO	GO	GO	GO	GO	8	YES

Action	Address High Level Threat	Cost	Ongoing Cost	Effectiveness / Risk Reduction Potential	Practicality to Implement	Acceptability	Environmental or Social Impact	Consistency with precinct intent	Score[1]	Action[2] Recommended (Y, N, ?)
Undertake opportunistic beach nourishment using available sand sources, to remediate erosion in areas of high public access demand (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, Tweed River, etc., as may become available from time to time (see Kingscliff CRMS, BMT WBM 2015 for further details).	GO	SLOW	SLOW	SLOW	GO	GO	GO	GO	5	YES
Determine preferred approach to extraction of sand from Area 5 of the Tweed River, for use as sand nourishment on Kingscliff – Dreamtime Beach. This action shall provide an interim source of sand up to 660,000 m3 until an additional large-scale nourishment program is investigated in 2030 (see Section 3.5.1).	GO	SLOW	SLOW	SLOW	GO	GO	GO	GO	5	YES
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 above).										YES* (refer to CRMS)
Modify/protect vertical seawall in front of Cudgen Headland SLSC with an engineered wall that maximises access and amenity to the beach.										YES* (refer to CRMS)
For new subdivisions, prepare new development consent guidelines (e.g. via section 88B of the Local Government Act 1993), to require a restrictive covenant on all residential lots that either prohibits the keeping of cats and dogs, or that requires cats to be kept on premises.	GO	GO	GO	GO	GO	SLOW	GO	GO	7	YES
Prepare and implement a Council Policy requiring cats to be kept within property boundaries.	GO	GO	GO	GO	GO	SLOW	GO	GO	7	YES
As necessary, facilitate working groups with relevant stakeholders (including members from different Council departments) to co-ordinate action on coastal management issues.	STOP	GO	GO	GO	GO	GO	GO	GO	6	YES

Action	Address High Level Threat	Cost	Ongoing Cost	Effectiveness / Risk Reduction Potential	Practicality to Implement	Acceptability	Environmental or Social Impact	Consistency with precinct intent	Score[1]	Action[2] Recommended (Y, N, ?)
Develop a procedure or decision support tool to outline the protocols to be followed if significant Aboriginal sites are uncovered by erosion. This should include notification to NPWS and the LALC, as is the current procedure	SLOW	GO	GO	GO	GO	GO	GO	GO	7	YES
Coordinate within Council to enable the provision of maintenance activities in cross-over regions between the Parks maintenance crew (managed by the Recreation Services Unit) and Council's Dune Crew (managed by the NRM Unit - Coastal). The two groups manage adjacent areas (parks and adjacent beach accesses and dunes). The action is aimed at enabling the two 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.	SLOW	GO	GO	GO	GO	GO	GO	GO	7	YES
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, which will be 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 not vegetated 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 WC36 amended for Community Education details).	GO	GO	GO	GO	GO	GO	GO	GO	8	YES

Appendix F Kingscliff - Dreamtime Beach Emergency Action Sub Plan (EASP)

BMT WBM

Kingscliff - Dreamtime Beach Coastal Erosion Emergency Action Sub Plan

Reference: R.B21093.003.00.EASP.docx
Date: February 2016
Confidential

Kingscliff - Dreamtime Beach Coastal Erosion Emergency Action Sub Plan

Prepared for:	Tweed Shire Council
Prepared by:	BMT WBM Pty Ltd (Member of the BMT group of companies)

Offices

Brisbane
Denver
London
Mackay
Melbourne
Newcastle
Perth
Sydney
Vancouver

Document Control Sheet

BMT WBM Pty Ltd
126 Belford Street
Broadmeadow NSW 2292
Australia
PO Box 266
Broadmeadow NSW 2292

Tel: +61 2 4940 8882
Fax: +61 2 4940 8887

ABN 54 010 830 421

www.bmtwbm.com.au

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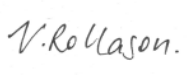
Title:	Kingscliff - Dreamtime Beach Coastal Erosion Emergency Action Sub Plan
Project Manager:	Verity Rollason
Author:	Verity Rollason
Client:	Tweed Shire Council
Client Contact:	Jane Lofthouse
Client Reference:	

Synopsis: **This Kingscliff - Dreamtime Beach Coastal Erosion Emergency Action Sub Plan (EASP) forms an appendix to the Kingscliff - Dreamtime Beach Coastal Zone Management Plan (CZMP). The EASP shall also form an appendix to the Tweed Shire Local Disaster Plan (DISPLAN). This EASP outlines actions to be performed before, during and after a coastal erosion emergency event, and the roles and responsibilities for coastal emergencies.**

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	February 2016	PEH		VPR	

DISTRIBUTION

Destination	Revision										
	0	1	2	3	4	5	6	7	8	9	10
Tweed Shire Council	1e										
BMT WBM File	1e										
BMT WBM Library	1e										

Acronyms

CEEASP Controller	Council's Coastal Erosion EASP controller
CP Act	*Coastal Protection Act, 1979*
CZMP	Coastal Zone Management Plan
DISPLAN	Tweed Shire Local Disaster Plan
EASP	Emergency Action Sub-Plan
LEMC	(Tweed Byron) Local Emergency Management Committee
LEMO	Local Emergency Management Officer
LEOCON	Local Emergency Operations Controller
OEH	Office of Environment and Heritage
SERM	State Emergency and Rescue Management
SERMA	*State Emergency and Rescue Management Act, 1989*
SLSC	Surf Life Saving Club
TSC	Tweed Shire Council

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1 Introduction

1.1 Introduction

This Coastal Erosion Emergency Action Sub-Plan (Coastal Erosion EASP) applies to Kingscliff - Dreamtime Beach, which extends between Fingal Head in the north and Cudgen Creek entrance in the south. This area is administered by Tweed Shire Council (Council). The beach is also subject to the Kingscliff - Dreamtime Beach Coastal Zone Management Plan (BMT WBM, 2016), which outlines practical actions for managing coastal erosion and other risks to the beach, to reduce the impacts of such risks over the long term.

This Coastal Erosion EASP details those actions to be taken by the lead combat agency and/or Council before, during and after a coastal erosion emergency. It does not duplicate actions within the Kingscliff - Dreamtime Beach CZMP, but rather is aimed at complementing the CZMP in respect to event-specific response actions.

1.2 Coastal Zone Management Planning

The appropriate process for managing coastal hazards and coastal risks along the New South Wales coast is through the preparation of Coastal Zone Management Plans (CZMPs) as documented by NSW Government guidelines and regulations. Through the development and subsequent implementation of these CZMPs, the coastal hazards are identified and, as appropriate, the risks are addressed through a range of planning, design and protection measures. In this way, the likelihood and consequence of emergencies resulting from erosion during storm events is minimised (as is consistent with the risk management approach including prevention and mitigation measures detailed in the Tweed Shire Local Disaster Plan (DISPLAN)). Furthermore, the need for unplanned protection or other works to manage coastal erosion is reduced.

Legislation requires that a Coastal Erosion EASP is to help manage the residual risks to properties, assets and life, until such time as the key elements of a CZMP have been implemented, or for circumstances of unforeseen storm severity resulting in significant and sudden coastal erosion. .

1.2.1 Legislated Role of the Coastal Erosion Emergency Action Sub-Plan

The Coastal Erosion EASP is a required component of the preparation of a CZMP as set out in the NSW *Coastal Protection Act 1979* (the CP Act). Section 55C(1)(b) of the CP Act states a CZMP must provide for *'emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event'.* Section 4 of the CP Act states that the part of a CZMP that deals with the matters specified in Section 55C(1)(b) is an emergency action sub-plan.

"The emergency action sub-plan forms an integral component of a CZMP. It outlines a council's intended response to a coastal erosion emergency and explains ways in which and where beachfront property owners can place emergency coastal protection works according to the Coastal Protection Act 1979,"

*"Section 55C(2)(a) of the CP Act requires that CZMPs **must not** include matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 (SERMA) in relation to emergency responses" (OEH 2011, page 1).*

The roles and responsibilities of government agencies, councils and other relevant organisations during severe storm events (including events that cause erosion) are detailed in Section 2.19 of the NSW State Storm Plan (SES, 2013).

1.2.2 Minimum Requirements for Emergency Action Sub-Plans

The Coastal Erosion EASP must be consistent with and not duplicate or contradict any plans prepared under the *State Emergency and Rescue Management Act 1989* (*SERM Act*). The relationship between these two planning frameworks is shown in Table 1-1, which has been adapted from OEH (2011: page 14).

Table 1-1 Contents of CEEAS and SERM Act plans (adapted from OEH, 2011)

Coastal Erosion EASPs	SERM Act Plans
Any coastal protection works or other actions to be carried out by council when coastal erosion is imminent or occurring, or in recovering from coastal erosion.	Actions in relation to the prevention of, preparation for, response to and recovery from emergencies, excluding permanent or temporary coastal protections works.
Any additional requirements for landowner placement of temporary coastal protection works beyond those in the *Coastal Protection Act 1979* (e.g. constraints on access and the location of works)*	Actions are consistent with the NSW State Disaster Plan and the State Storm Subplan.

IMPORTANT NOTE* *No locations for temporary coastal protection works in accordance with the CP Act and the Code of Practice associated with temporary works are currently identified on Kingscliff - Dreamtime Beach. It is also possible that sections of the CP Act relating to temporary works will be repealed upon replacement of the CP Act with the proposed Coastal Management Act, as part of the NSW Government's reforms to the coastal management framework.*

The minimum requirements for a Coastal Erosion EASP are set out in the NSW Government Guideline (OEH, 2011) which reflects the requirements expressed in the CP Act. These are:

- describing intended emergency actions to be carried out during periods of beach erosion, such as coastal protection works for property or asset protection, other than matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* relating to emergency response (sections 55C(1)(b) and (g) of the CP Act *1979*); and
- describing any site-specific requirements for landowner emergency coastal protection works describing the consultation carried out with the owners of land affected by a subplan.

2 Emergency Planning Hierarchy

2.1 Storm Coastal Erosion Emergency Response Operations

There is an established hierarchy in planning and responsibility that applies to emergency management in NSW, including those emergencies resulting from a storm or disaster as defined at clause 6.1.3 of the NSW State Storm Plan (September, 2013). The various roles and responsibilities are defined in the NSW Storm Plan and within the Tweed DISPLAN (November, 2010).

For the emergencies of flood and damage control for storms, including the coordination of evacuation and welfare of affected communities, the overall control of operations in response to these emergencies is vested in the Commissioner of the State Emergency Service (SES), as defined in the DISPLAN (Part 1.12; p. 17). The Local Emergency Operations Controller (LEOCON) is to coordinate support resources if requested by the appointed SES Local Controller.

Responsibilities for various hazards relating to the open coast are explained as follows:

- The combat agency for Coastal Erosion is the SES (see DISPLAN Part 1.18; p. 20). The DISPLAN refers to the Tweed Shire Local Flood Plan. After approval of this Coastal Erosion EASP, the DISPLAN should be amended to also refer to this Coastal Erosion EASP;
- The combat agency for Cyclone is the SES (see DISPLAN Part 1.18; p. 20). The DISPLAN refers to the Tweed Shire Local Flood Plan. After approval of this Coastal Erosion EASP, the DISPLAN should be amended to also refer to this Coastal Erosion EASP;
- The combat agency for Tsunami Hazards is the SES (see DISPLAN Part 1.18; p. 20). The DISPLAN refers to the Tweed Shire Local Flood Plan and the NSW Tsunami Emergency Sub Plan 2008;
- As the lead combat agency, response operations by the NSW SES will begin on the receipt of an Australian Government Bureau of Meteorology (BoM) watch or warning (e.g. Severe Thunderstorm Warning, Tropical Cyclone Watch), or following impact of a storm not covered by a formal warning (the BoM is responsible for issuing warnings for Floods, Severe Storms, Strong Wings, Storm Surge and/or Coastal Erosion);
- Although NSW SES is the combat agency for coastal erosion, they are not responsible for commanding, controlling and conducting physical mitigation works (see clause 2.2.32 of the NSW State Storm Plan (September 2013)). This responsibility is held by Council;
- The Local Emergency Operations Controller (LEOCON) or the responsible combat agency can activate response arrangements detailed in the DISPLAN.

The DISPLAN informs this Coastal Erosion EASP (i.e. the Coastal Erosion EASP is a sub-plan to the DISPLAN).

The role of Council in a storm emergency is to command, control and conduct physical mitigation works that may be requested by the SES to assist with the emergency relief or to undertake activities (including protection works) to protect assets under local government (Council) control.

Where any proposed protection works to manage coastal erosion emergency events require development approval, Council must only undertake such works during an emergency where the consent has been obtained in advance. Where the works are exempt (such as minor works or emergency works to protect a road or stormwater system under SEPP (Infrastructure) 2007), Council must first undertake an assessment to determine that the works will not result in a significant adverse environmental impact. Before undertaking any works, Council must also confirm that the works proposed are in accordance with the currently gazetted or adopted CZMP. *Note: While the Kingscliff - Dreamtime Beach CZMP does propose protection works, this Coastal Erosion EASP does not propose any protection works for emergency management purposes that require development consent.*

Following the emergency, Council is required to be involved in the remediation of damage to assets and infrastructure, removal of any hazardous items and the reinstatement of the dunes, beaches and accessways in an appropriate and safe manner. This will include works of varying priorities and timeframes in accordance with usual Council maintenance procedures.

2.2 Non-Storm Coastal Erosion Emergency Response Operations

Where a coastal erosion emergency arises from storm events other than those outlined in Section 2.1, the responsibility to manage these rests with Council. Such an event could arise, for example, from a period of high tides and large swell which result in substantial erosion to the back of the beach. Kingscliff Beach is particularly susceptible to coastal erosion events outside of specific storm events as outlined in Section 2.1. For these conditions, the Kingscliff - Dreamtime Beach CZMP proposes small-scale sand nourishment on an opportunistic basis, and which may not always coincide with such erosion events. The main actions proposed within this Coastal Erosion EASP for such erosion events are focussed on maintaining safe public access to the beach.

It is not possible to determine a trigger for such an occurrence, and therefore, the determination to invoke this Coastal Erosion EASP (in this case by Council) would need to be based on monitoring of the beach state (and assessment by Council officers). In such a case, the Coastal Erosion EASP would be implemented following a request from the designated Council Officer.

2.3 Assets and Development at Threat

The extent of coastal hazards affecting Kingscliff - Dreamtime Beach is defined in the Tweed Shire Coastal Hazards Assessment (BMT WBM, 2013). This study maps the indicative landward extent of erosion hazards that may be anticipated for the present, 2050 and 2100 timeframes. The landward extent of potential erosion hazards are presented in Figures in Section 4 of BMT WBM (2013).

Along Kingscliff - Dreamtime Beach the potential extent of beach erosion is presently restricted by the sandy beach, incipient dunes and foredune crest of the beach, or otherwise restricted by physical protection works, which have been established between Cudgen Headland Surf Life Saving Club (SLSC) and Kingscliff Beach Bowling Club. Presuming that the existing protection works are largely sufficient, assets potentially at risk from storm erosion at the present time include (from south to north):

- Faulks and Lions Park, and associated beach and dunes;

- Jack Bayliss Park;
- defined beach and dune access tracks under care and control of Council; and
- the beaches and dunes of Dreamtime Beach.

The Kingscliff - Dreamtime Beach CZMP details those works than will be undertaken outside of storm erosion events to manage the existing erosion risk. The CZMP proposes the replacement of protection works along the Kingscliff Beach Holiday Park foreshore with a properly engineered revetment, an upgrade to the seawall fronting the Cudgen Headland SLSC, dune rebuilding at Faulks and Lions Parks, opportunistic small-scale sand nourishment on the beach fronting Faulks, Lions and Bayliss Parks, a rolling vegetation easement to encourage dune vegetation to migrate landwards into adjacent parkland in response to ongoing erosion, and ongoing dune vegetation maintenance.

Given that the above actions are intended to improve the beach's resilience to coastal erosion, no further protection actions prior to, during, or after a coastal erosion emergency are detailed in this Coastal Erosion EASP. The preferred approach is to assess and repair assets following the event, which in most instances will affect beach accesses and dunes, and will becomes a routine maintenance role.

The landward extent of the erosion hazard as considered in this Coastal Erosion EASP may increase into the future as sea level rises. Future revisions of the Coastal Erosion EASP should take this into account, along with each proposed review of the CZMP.

3 Emergency Responses

3.1 Communications

3.1.1 Storm Emergency

Where coastal erosion is anticipated as a result of a watch or warning issued by the BoM, the responsibility for communicating the potential hazards defaults to the SES as the combat agency. Activation of the DISPLAN would trigger this Coastal Erosion EASP. Council would assist in the provision of information on the current state of beaches as well as potential for impacts on beach access. Internally, Council staff with relevant responsibilities should be placed on standby and commence monitoring the impacts. As described in Section 2.19 of the SES (2013), Local SLSCs should be contacted with a view to distribute advice contained in the BoM's weather warnings to people on patrolled beaches when dangerous surf conditions are predicted and to close patrolled beach water areas when dangerous conditions are caused by storms.

As the emergency progresses, Council is required to continue monitoring these areas and updating information through the LEOCON as appropriate. Where specific hazards are resulting in damage, Council will provide this information to the SES and for distribution through the media or directly to the community as appropriate.

Following the emergency, Council is responsible for advising the public on the current state of beaches and recreation areas in the Council area (when/if they are re-opened for the public). Where residual hazards remain to be addressed, Council should take appropriate action to convey this to local communities including the use of access closures, signage and the release of media bulletins via the SES.

3.1.2 Non Storm Erosion Emergency

Where the emergency does not trigger the State Storm Plan or DISPLAN, Council is responsible for initially monitoring the potential progress of erosion and subsequently implementing this Coastal Erosion EASP. The roles and responsibilities of Council in communicating the emergency to the community remain the same except that information needs to be provided by Council directly through the media rather than through the SES as outlined in Section 3.1.1.

3.2 Council Actions Prior to a Coastal Erosion Emergency

The following activities should be undertaken by Council prior to the emergency:

- Contribute to community storm education initiatives, and assist the NSW SES with community awareness programs to ensure people understand the coastal erosion threat and its management;
- Provide NSW SES with copies of coastal hazard studies and management plans to assist with emergency planning and intelligence development;
- Where the likelihood of an emergency event is identified (e.g. Storm warnings or damaging wave warnings from the BoM), the local lifeguards (or appropriate council representative) will

inform the Cudgen Headland SLSC. The Council lifeguards and / or the SLSC will then take the appropriate action to close the beach;

- Where difficulties / damage are known to exist on beach accessways and these are likely to be exacerbated by storm erosion, Council at their discretion may close those accessways and place appropriate signage;
- Commence monitoring the effects of the erosion on assets and development potentially at threat; and
- As appropriate, the Council Coastal Erosion EASP controller (CEEASP Controller) will initiate the Coastal Erosion EASP.

It is noted that the Kingscliff - Dreamtime Beach CZMP outlines the need for ongoing, regular monitoring and upkeep of beach accessways and dune vegetation, to reduce public safety risk, and reduce the risk to these assets during storms.

3.3 Council Actions During a Coastal Emergency

The following activities should be undertaken by Council during the emergency:

- Subject to the availability of adequate resources, assist NSW SES with reconnaissance to identify storm damage; traffic management on Council managed roads; resources (e.g. plant, equipment and personnel); and removal of trees and other debris from Council managed road and public land during clean-up operations;
- Distribute advice contained in weather warnings to people on the beach when dangerous surf conditions are predicted via Council lifeguards;
- Close the beach when dangerous conditions caused by storms occur and notify NSW SES and Surf Life Saving NSW;
- Where damage to beach accessways is identified and/or reported to Council, take appropriate action to close off the accessways by installing temporary fencing / signage and/or advising the local community of the hazards at the first opportunity;
- Where damage to assets is identified through monitoring, assess the damage and any opportunities for limiting further damage that may be appropriate during the event. It is noted that physical mitigation works are outlined in the Kingscliff - Dreamtime Beach CZMP for implementation in due course, and no further protection works are recommended in this EASP for installation during an erosion emergency;
- Where repairs are permissible and may be readily and safely undertaken, this shall be done at the first opportunity; and
- At the appropriate time the CEEASP controller will determine that the emergency has passed and that the remediation stages of the plan are to commence.

Note that actions undertaken by Council during a coastal emergency event should not conflict with other agency actions, such as those SES. During any of the above activities, Council should

remain focused on the safety of Council staff who may be working under adverse weather conditions.

3.4 Council Actions Following the Cessation of a Coastal Erosion Emergency

The following activities would be undertaken by Council following the emergency, within their usual maintenance programs:

- Council will undertake an inspection of all beach accessways, beaches and dunes to establish any physical damage to assets or dangers to the public in accessing and using the beach and dune areas;
- Where an accessway is considered unsafe, action will be taken to close the accessway (top and/or bottom) and to place appropriate signage warning the accessway is unsafe for use (e.g. see Figure 3-1);
- Prioritise the work required to repair and reopen any damaged or unsafe beach accessways in accordance with the Council maintenance works schedule;
- Where an erosion escarpment has been created at the back of the beach (height greater than 1.5 m[1]), document the extent of the escarpment and at the earliest opportunity undertake a risk assessment of the likely hazard to beach users (both to persons on the beach and to persons on the dune above the scarp) from collapse of the erosion scarp (for example, onto people at the scarp base);
- Where the risk is deemed unacceptable, at the earliest opportunity undertake appropriate mitigation works which may include:
  - regrading the escarpment to a stable slope (following approval from Council's Design Unit);
  - fencing and signposting escarpments, to discourage public access (top and/or bottom) until such time as the beach recovers naturally; and
  - keeping the beach closed until such time as the risk has reduced to an acceptable level.

At the appropriate time the CEEASP controller will declare the emergency has finished and the Coastal Erosion EASP is no longer operative.

Figure 3-1 Example of Closure of Unsafe Beach Access by Council Following Erosion

[1] A height of 1.5 m is specified due to the public safety risk (for example, from a fall or trip from this height or scarp collapse). The action required may simply be to fence off the escarpment until such time as the beach recovers naturally.

3.5 Landowner Initiated Actions

Under the CP Act, property owners with land that is seaward of an immediate erosion hazard line are permitted to submit development applications to install permanent protection works, provided such works are consistent with the adopted CZMP for that coastline. There are no private property owners within the immediate erosion hazard line at Kingscliff - Dreamtime Beach.

Temporary coastal protection works are only permitted under the CP Act at locations listed in Schedule 1 of the Code of Practice accompanying the CP Act, none of which are on Kingscliff - Dreamtime Beach.

As such, there are no circumstances where property owners would be able to initiate coastal protection works along Kingscliff - Dreamtime Beach.

4 Responsibilities

Specific responsibilities under the Coastal Erosion EASP are tabulated in Table 4-1.

Council (through the nominated CEEASP controller) must tabulate relevant Council positions and responsibilities for implementation and execution of the Coastal Erosion EASP (names and contact numbers). This list is to be readily available within Council, updated as positions or responsibilities change, and communicated to each of the nominated contact persons following any update.

Table 4-1 Specific Responsibilities for Implementation of the Coastal Erosion EASP

Position	Responsibilities
Combat Agency NSW State Emergency Service	Facilitate damage control for storms and with the legislative requirement to protect people from danger, to maintain their safety and health and manage the media during severe weather events.
Local Council	Responsible for commanding, controlling and conducting physical mitigation works. This includes assisting NSW SES with reconnaissance, installing fencing and signage in areas affected by erosion resulting in unsafe conditions, and construction of emergency mitigation works during or after a storm event in accordance with the *Environmental Planning and Assessment Act 1979* (NSW).
Local Emergency Operations Controller (LEOCON)	Execution of the Local DISPLAN, including aspects relating to coastal erosion.
Council Coastal Erosion EASP Controller (CEEASP Controller)	Liaison with LEOCON during storm emergency. Implementation of the Coastal Erosion EASP during non-storm erosion emergency.
Council Unit Coordinator Natural Resource Management Council Manager Recreation Services	Closure of beaches and accessways as appropriate. Monitor damages to beach, dunes and accessways. Undertake post storm remediation as required.
Council Media Liaison Officer	Distribution of warnings and closures to the media (during non-storm erosion emergency).

5 Plan Review

This Kingscliff - Dreamtime Beach Coastal Erosion EASP should be maintained as required and reviewed at intervals not exceeding 5 years from its initial adoption. Earlier review may be triggered by:

- occurrence of a coastal erosion emergency that exceeds the defined hazard extent as outlined in the Tweed Shire Coastal Hazard Assessment (BMT WBM, 2013);
- revision of the NSW State Storm Plan, the Local DISPLAN (revised each five years) or the CP Act and associated guides, to ensure the plan remains consistent with their objectives;
- unsatisfactory outcomes or concerns following a coastal erosion emergency; or
- proposed changes to the adopted Kingscliff - Dreamtime Beach CZMP.

6 References

BMT WBM (2013), *Tweed Shire Coastal Hazards Assessment*, prepared for Tweed Shire Council, doc. ref R.B19094.001.04, November 2013.

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BMT WBM Bangalow
6/20 Byron Street, Bangalow 2479
Tel +61 2 6687 0466 Fax +61 2 66870422
Email bmtwbm@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Brisbane
Level 8, 200 Creek Street, Brisbane 4000
PO Box 203, Spring Hill QLD 4004
Tel +61 7 3831 6744 Fax +61 7 3832 3627
Email bmtwbm@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Denver
8200 S. Akron Street, #B120
Centennial, Denver Colorado 80112 USA
Tel +1 303 792 9814 Fax +1 303 792 9742
Email denver@bmtwbm.com
Web www.bmtwbm.com

BMT WBM London
International House, 1st Floor
St Katharine's Way, London E1W 1AY
Email london@bmtwbm.co.uk
Web www.bmtwbm.com

BMT WBM Mackay
PO Box 4447, Mackay QLD 4740
Tel +61 7 4953 5144 Fax +61 7 4953 5132
Email mackay@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Melbourne
Level 5, 99 King Street, Melbourne 3000
PO Box 604, Collins Street West VIC 8007
Tel +61 3 8620 6100 Fax +61 3 8620 6105
Email melbourne@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Newcastle
126 Belford Street, Broadmeadow 2292
PO Box 266, Broadmeadow NSW 2292
Tel +61 2 4940 8882 Fax +61 2 4940 8887
Email newcastle@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Perth
Level 3, 20 Parkland Road, Osborne, WA 6017
PO Box 1027, Innaloo WA 6918
Tel +61 8 9328 2029 Fax +61 8 9486 7588
Email perth@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Sydney
Level 1, 256-258 Norton Street, Leichhardt 2040
PO Box 194, Leichhardt NSW 2040
Tel +61 2 8987 2900 Fax +61 2 8987 2999
Email sydney@bmtwbm.com.au
Web www.bmtwbm.com.au

BMT WBM Vancouver
Suite 401, 611 Alexander Street
Vancouver British Columbia V6A 1E1 Canada
Tel +1 604 683 5777 Fax +1 604 608 3232
Email vancouver@bmtwbm.com
Web www.bmtwbm.com