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# COFFS HARBOUR
# COASTAL ZONE MANAGEMENT PLAN

**Final Report** March 2019

Coffs Harbour City Council

# Document Control Sheet

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| **Project Manager** | Verity Rollason | **Client Ref.** | |
| **Authors** | Verity Rollason | **Synopsis** | This Report presents implementation details for the recommended management actions for treating risks from erosion and recession, and coastal inundation to assets and land within the Coffs Harbour LGA coastal zone. |

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**Adoption and Certification of this Plan**
This document was adopted by Coffs Harbour City Council in 2013, and then updated for certification in 2018.

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# 1 Introduction

## 1.1 Purpose of the Coffs Harbour Coastal Zone Management Plan

Coffs Harbour City Council (Council) with the assistance of the Office of Environment and Heritage (OEH) has resolved to prepare a Coastal Zone Management Plan (CZMP) for the Coffs Harbour Local Government Area (LGA) coastline to define the level of risk from coastal hazards and provide a co-ordinated approach to management of coastal hazards. This report documents the Management Plan component of the Coffs Harbour CZMP. The CZMP provides the basis for management and strategic landuse planning of the Coffs Harbour coastline, to provide for growth and development without putting at risk the natural, cultural and heritage values of the coast.

The Coffs Harbour LGA is situated on the NSW north coast approximately halfway between Sydney and Brisbane. The Coffs Harbour LGA coastline extends for nearly 80 km from Tuckers Rocks (on North Beach) in the south to Pebbly Beach in the north. There are 38 beaches of small to medium length along the Coffs coastline.

Beach erosion events have occasionally threatened Coffs Harbour's beaches. Ongoing recession has also been experienced on beaches north of Coffs Harbour. The interruption of natural northerly sediment transport by the harbour construction has resulted in recession of the shoreline to the north, with the most substantial retreat (25 -100 m) experienced at Park and Campbells Beaches. To address ongoing recession, coastline management plans were completed for Park Beach and Campbells Beach in 1998 and 1999, respectively. This Coffs Harbour CZMP shall update these plans and provide a consistent management approach across the LGA, focussing upon areas at greatest risk from coastal hazards.

The mid north coast is expected to experience a population growth rate of ~ 1.1% per year over the next 25 years, with Coffs Harbour expected to support a high proportion of the North Coast population growth target (DP, 2009). Coffs Harbour City Centre is planned as a regional centre and Woolgoolga as a major town on the Mid North Coast. Existing and future development (residential and recreational) within the coastal zone will require careful consideration of the likelihood and consequence from coastal hazards, including climate change impacts, to ensure the development undertaken is appropriate to the level of risk at present and in the future.

The beaches of Coffs Harbour are a major focus for recreation and are the basis for much of the tourism in the region. The beaches of Coffs offer a range of recreational opportunities, from untouched and unpatrolled natural beaches (such as Moonee and Bongil), to more accessible, patrolled beaches with more highly developed recreational facilities (such as Park and Sawtell beaches). Given the high social importance of Coffs beaches to the resident population and visiting tourists, both of which support a range of businesses directly and indirectly, there is additionally an economic imperative to preserve the sandy beach and dune environment.

## 1.2 Objectives of the Coffs Harbour CZMP

The objectives of the Coffs Harbour CZMP are aligned with the goals and objectives of the NSW Coastal Policy 1997 and the objectives of the *Coastal Protection Act 1979*. The objectives of the plan are to:

(1) Recognise and accommodate natural coastal processes and hazards, and outline strategies to deal with threats to existing development and to ensure new development is not exposed to such threats;

(2) Incorporate the effects of climate change (including sea level rise and changes to storm intensity and frequency) within the hazard assessment, and prepare actions to manage high risks that arise due to climate change;

(3) Provide for the management of redevelopment or new developments to ensure that the value of assets at risk is not increased, with provisions for scale and setback of redevelopment to additionally ensure the aesthetic or ecological values of the coastline are not compromised;

(4) Guide the development of design and planning standards and guidelines to control the height, scale and setback of development to protect public access and ensure beaches and foreshores are not overshadowed;

(5) Protect and preserve European and Indigenous cultural heritage;

(6) Identify and prepare programs to acquire, dedicate or reserve lands of high conservation value to ensure their protection and preservation; and

(7) Identify opportunities to restore and enhance coastal amenity and recreational, ecological and cultural values.

## 1.3 Scope of a Coastal Zone Management Plan

Strategic planning in the coastal zone is influenced by many factors. Coastal Zone Management Plans aim to specifically address the impacts of coastal hazards upon assets and land, which may include social, physical or economic assets. Therefore, the actions within a CZMP will specifically target reducing, eliminating or mitigating the likelihood and / or consequence of the major hazards that may threaten these assets, being:

- **beach erosion** (for which the mapping includes erosion at stormwater outlets, drainage lines and estuary entrances);
- **long term recession** due to historical factors (such as the interruption of littoral drift at Coffs Harbour) and future sea level rise; and
- **coastal inundation** (during high tides combined with storms and sea level rise), which can manifest as both wave overtopping of the open coastline, or inundation of land behind the open coastline via coastal creeks and estuaries and stormwater systems connecting to the ocean.

This CZMP investigates management options for the impacts of coastal hazards on elements such as ecological habitats, recreational facilities, private lands and so on. That is, there are actions within this CZMP that relate to ecological, recreational or economic issues in so far as such aspects are

impacted by coastal hazards. This CZMP is not specifically an ecological, recreational or economic study, and therefore the actions in this CZMP may not directly relate to aspects such as improving ecological habitats or expanding recreational facilities.

The CZMP largely targets the land potentially affected by coastal hazards and the land that may be influenced by Council and other stakeholders through management actions. Strategies implemented through the CZMP will be considerate of any impacts upon the portion of the coastal zone below sea level.

## 1.4 Study Area

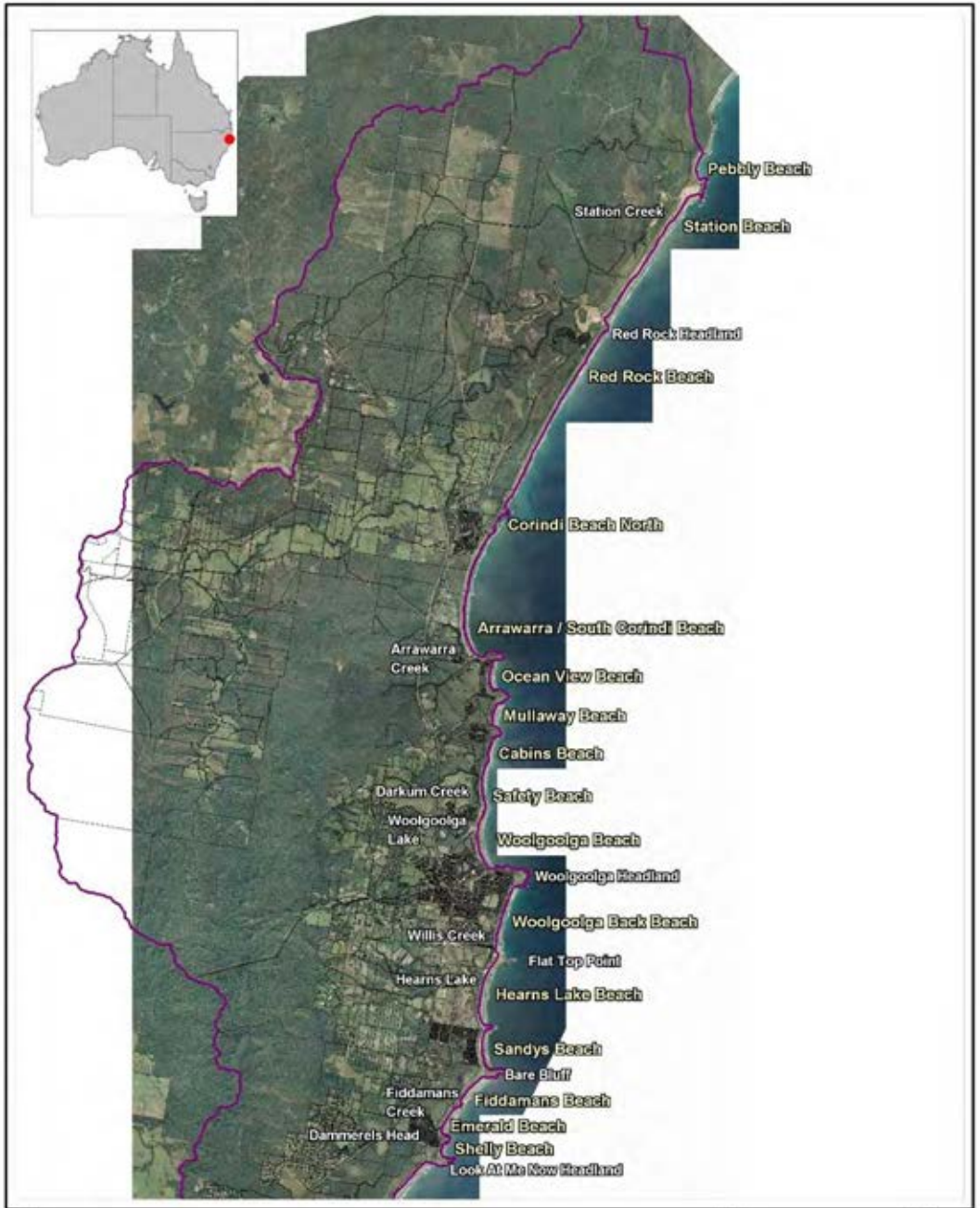
The Coffs Harbour LGA coastline is approximately 80 km in length, extending from Tuckers Rocks in the south to Pebbly Beach in the north. The coastline includes 38 beach embayments. The Coffs Harbour LGA coastline and its beaches are illustrated in Figure 1-1 and Figure 1-2.

Coffs Harbour's beaches are typically high energy sandy beaches of small to medium length, interspersed by protrusive rocky headlands, islands and rock reefs.

This Coffs Harbour CZMP is a coastline management plan, with estuarine health and management aspects of estuaries located in the Coffs Harbour coastal zone being addressed by the existing estuary management plans listed in Table 1-1. The study area covers the immediate coastal environments such as beaches, dunes, headlands, bluffs, and coastal entrances and waters to the extent that their management is affected by coastal processes and hazards and related human activities.

**Table 1-1 Estuary-based Coastal Zone Management Plans in the Coffs LGA**

| Estuary Management Plans in the Coffs LGA (from south to north) |
|---|
| Bonville and Pine Creeks Coastal Management Program (in prep) |
| Boambee / Newports Estuary Management Study and Plan (2012) |
| Coffs Creek Estuary Coastal Zone Management Plan (2015) |
| Moonee Creek Estuary Management Plan (2008) |
| Hearnes Lake Estuary Management Plan (2009) |
| Willis Creek Estuary Coastal Zone Management Plan (2013) |
| Darkum Creek Estuary Coastal Zone Management Plan (2013) |
| Woolgoolga Lake Estuary Coastal Zone Management Plan (2013) |
| Arrawarra Creek Estuary Coastal Zone Management Plan (in prep) |
| Pipe Clay Lake Estuary Coastal Zone Management Plan (2011) |
| Corindi River Estuary Management Plan (2004) |




Title:
**Coffs Harbour LGA Study Area North**

Figure: 1-1

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Approx. Scale

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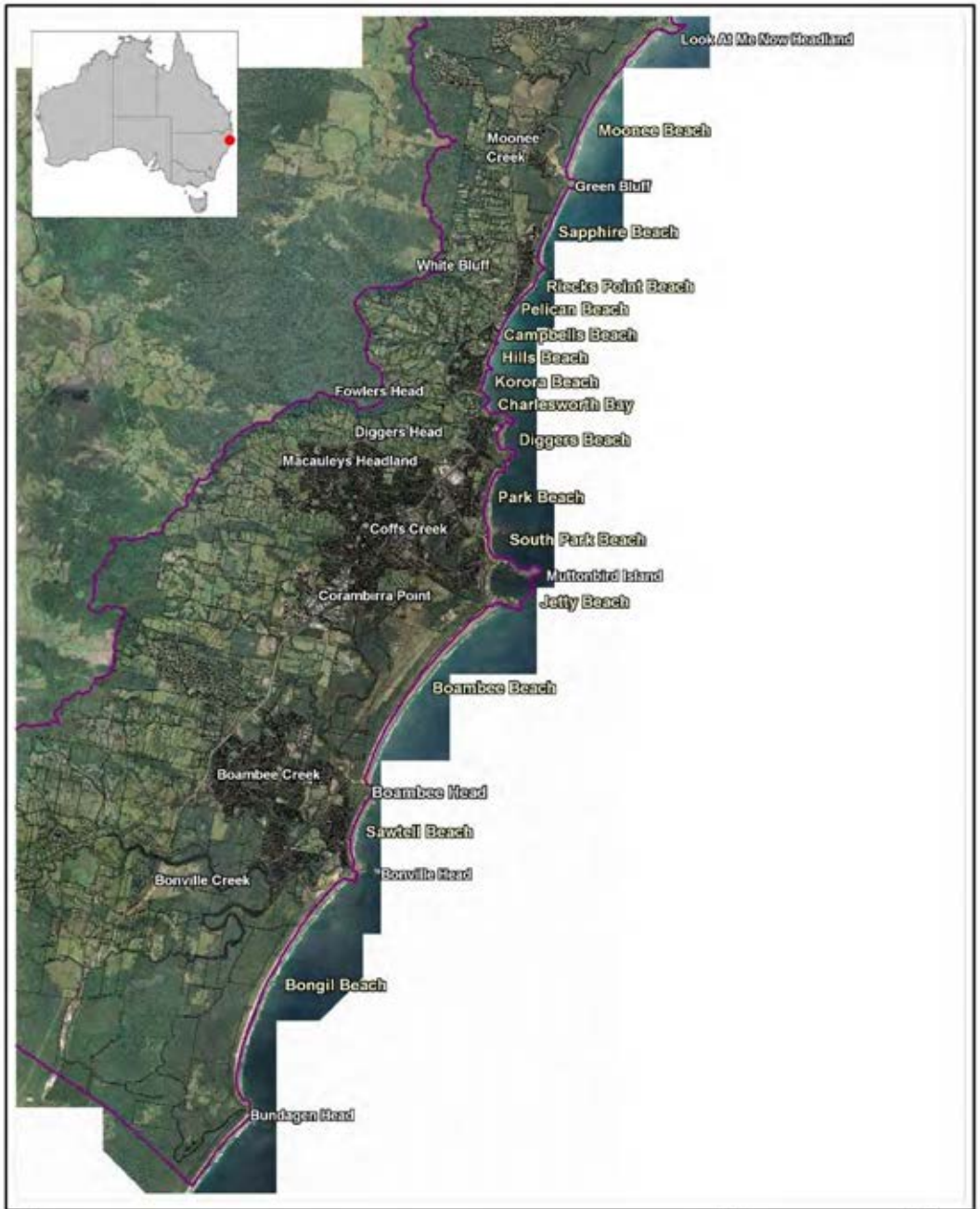


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**Coffs Harbour LGA Study Area South**

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### 1.4.1 Land Tenure and Management

Lands within the Coffs Harbour coastal zone include both public and private lands. Many of Coffs beaches lie within public land based reserves, namely: Bongil Bongil National Park which covers Bongil Beach and North Beach; Muttonbird Island Nature Reserve, which includes Muttonbird Island (but no beaches); Moonee Beach Nature Reserve, which includes Moonee Beach and Fiddamans Beach; and Yuraygir National Park which includes Pebbly Beach and Station Beach. The reserves and parks are managed by the NSW National Parks and Wildlife Service (NPWS). Council and NPWS jointly manage the Coffs Coast Regional Park (which extends from Diggers Beach to Woolgoolga Headland, and from north of Woolgoolga Lake to 450 m south of Corindi Beach Village) under the *National Parks and Wildlife Act 1974*. The boundary of the park extends seaward to the mean high water mark (MHWM).

Some 31 of Coffs beaches and adjacent water-based areas lie within the Solitary Islands Marine Park, which is managed by the NSW Department of Primary Industries (DPI). The SIMP extends northwards from Muttonbird Island (at Coffs Harbour) to Plover Island (north of the Coffs LGA coastline). The landward boundary of the SIMP extends to the MHWM, which complements the Coffs Coast Regional Park.

There are many Crown Land Reserves that are either managed by Council, the NSW Department of Industry – Lands & Water (Crown Lands Division) (hereafter DoI – Crown Lands), or the various Reserve Trusts for the various parcels of Crown Land (e.g. NSW Crown Holiday Parks Trust manages the Corindi Beach Reserve and Red Rock Coast Reserve, and so on). Crown Land reserves are required to have a Plan of Management (POM) defining permissible uses of these lands in accordance with the *Crown Lands Act 1996* (or equivalent). When implementing actions in this CZMP for Crown Land reserves, the applicable POM(s) should be consulted to ensure a consistent, integrated and 'whole of government' approach to coastal zone management

Council is the manager of the Coffs Coast State Park, which extends from Sawtell to Park Beach, including Woolgoolga Lakeside and Woolgoolga Beach Reserve, and including Boambee Reserve except the section west of the railway bridge and south of the creek that is under a private lease through DoI – Crown Lands.

Private lands of the coastal zone mainly consist of residential, along with some commercial / business and industrial properties, and some rural lands.

## 1.5 Coastal Management Process in NSW

### 1.5.1 The New Coastal Management Framework and Transitional Arrangements for this CZMP

The NSW Government has undertaken significant changes to the coastal management framework in NSW, including a new:

- *Coastal Management Act 2016* (CM Act) which replaces the *Coastal Protection Act 1979*,

- *State Environmental Planning Policy (Coastal Management) 2018* (CM SEPP) which amalgamates and replaces SEPP No. 71 Coastal Protection, SEPP No. 14 Coastal Wetlands, and SEPP 26 Littoral Rainforest, as well as providing new development controls; and
- Coastal Management Manual to support the preparation of Coastal Management Programs (CMPs) which replace CZMPs under the CM Act.

These three elements of the new framework came into force in April 2018, as this Coffs Harbour CZMP was being finalised for certification.

Under Clause 6 of Schedule 3 Savings, transitional and other provisions of the CM Act, councils that have submitted their draft CZMPs to the Minister for certification before the CM Act came into force have 6 months to finalise and certify their existing CZMPs under the former *Coastal Protection Act 1979*. Councils then have until 31 December 2021 to update their existing certified CZMPs and make a new CMP under the CM Act.

Therefore, the former *Coastal Protection Act 1979* and its associated guidelines are the governing legislation for preparing and certifying this Coffs Harbour CZMP.

### 1.5.2 Framework for Certifying the Coffs Harbour CZMP

At the time that the final draft Coffs CZMP was completed in 2013, the NSW Government had placed a temporary hold on the certification of CZMPs. Since that time, significant changes to the coastal management process in NSW commenced, culminating in the CM Act, CM SEPP and CMM (as noted above).

As these changes were taking place, the NSW Government again commenced certification of CZMPs under the *Coastal Protection Act 1979*, to retain the momentum in coastal management progress already made by many councils.

To support certification of this Coffs Harbour CZMP, Council commissioned an update of the final draft Coffs Harbour CZMP and supporting Coastal Zone Management Study, to enable it to be certified. Council will then have until 2021 to transfer this CZMP into CMP format of the new CM Act. Certification is an important step for this CZMP, as it allows Council and other responsible parties access to state government funding for coastal management actions.

The *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013) ('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 Act. The CZMP Guidelines dictate the process to be followed when preparing a CZMP including the hazards to be investigated and the timeframes for the hazard assessments and management actions (typically being the immediate, 2050 and 2100 timeframes). The stages for preparing a CZMP are illustrated in Figure 1-3. How this CZMP addresses the Principles for Coastal Management and the minimum requirements for preparing CZMPs outlined in the CZMP Guidelines are provided in Appendix A.

Under Section 733 of the *Local Government Act 1993*, councils are taken to have acted in 'good faith' and thus receive an exemption from liability for land

affected by coastal hazards where their actions substantially accord with the principles of the specified manual, in this case being the CZMP Guidelines.

### 1.5.3 Structure of this Document

This CZMP continues directly from the Coffs Harbour CZMS and outlines the preferred actions to treat coastal risks. The CZMP details:

- a summary of coastal risks in Chapter 2, including coastal processes (Section 2.2), coastal hazards and their likelihood (Section 2.3), the values and issues underpinning the potential consequence of coastal hazards (Section 2.4), and the risk assessment outcomes (Section 2.6);
- recommended actions and implementation details in Chapter 3;
- the mechanisms for evaluating and reviewing the CZMP in Chapter 4; and
- the Coffs Harbour Emergency Action Sub Plan, in Appendix B, which details the responsibilities and response actions for managing storm and non-storm coastal erosion emergencies in the Coffs Harbour LGA.

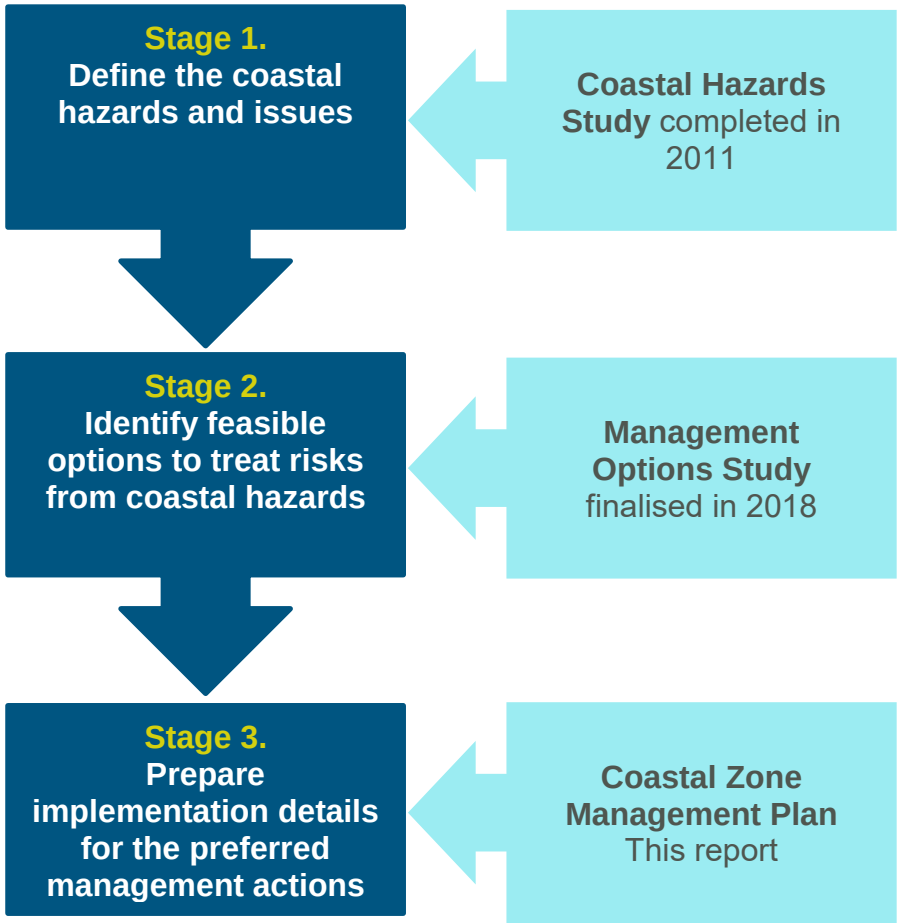



**Figure 1-3 Stages of Preparation of the CZMP**

### 1.5.4 Companion Documents to this CZMP

As described in Figure 1-3, two stages precede the development of a CZMP. The previous stages are documented in separate reports and support the meeting of minimum requirements by this CZMP as follows.

- Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011), which provided detailed technical analysis of coastal processes and hazards (see summary in Section 2.2 and 2.3).
- Coffs Harbour Coastal Zone Management Study (BMT WBM, 2018), which documents the risk assessment process, and values underpinning this (see also Section 2.4 to 2.6). This report also details the options available to manage the priority coastal risks to existing and future development; and the advantages and disadvantages of these options if applied to the Coffs Harbour coastline. A summary of other legislation relevant to managing the coastal zone in NSW is provided in this report also, to support the development of management actions.
- Coffs Harbour Coastal Asset Risk Registers, which details all known assets affected by coastal erosion and recession, and coastal inundation at present, 2050 and 2100. This document provides specific details about the assets affected, and preferred actions to manage the identified high or extreme risks.

## 1.6 Stakeholder and Community Engagement

Engagement of stakeholders and community were undertaken at key stages throughout the development of the CZMP. Table 1-2 summaries the timeline of engagement activities. Detailed description of consultation activities prior to and preparation of this CZMP are detailed in BMT WBM (2017).

During public exhibition of the draft CZMP, Council received a total 19 submissions, including from DoI – Crown Lands, Sapphire Beach Developments, Jetty Action Group, Sustainable City (Coffs Harbour) Incorporated, Woolgoolga Surf Club and residents. All submissions supported the draft CZMP, with a total of 25 issues raised. No significant changes were required, and only minor changes were made to the CZMP.

Following recommendation by the Coast & Estuary Management Advisory Committee (CEMAC), Council adopted the draft CZMP on 14 February 2013.

As noted in the previous section, the NSW Government has again commenced certification of CZMPs. Council has revised this CZMP to enable it to be eligible for certification under the current *Coastal Protection Act 1979*.

**Table 1-2 Engagement Activities Conducted for this CZMP**

| Task | Timing |
|---|---|
| Letter to residents about the Coastal Processes and Hazards Definition Study: FAQs and Maps | April 2011 |
| Information sessions on Coastal Processes and Hazards at Coffs | May 2011 |
| Community workshops: values and priorities | June 2011 |
| Stakeholder Engagement, including:<br>• Council Risk Assessment Workshop<br>• Council Departmental meetings<br>• External Stakeholder meetings | August – September 2011 |
| Letter to residents on Coastal Management Study: FAQs | March 2012 |
| Community workshop: Option Analysis | March 2012 |
| Internal review of CZMP risk register | April 2012 |
| Internal review of CZMP by Council and presentation to and review by CEMAC | October –November 2012 |
| Council adopts Draft CZMP and approves it for public exhibition | November 2012 |
| Public Exhibition of CZMP, including:<br>• Community drop-in sessions (Sawtell, Coffs Harbour and Woolgoolga)<br>• Review and incorporation of submissions | December 2012 – January 2013 |
| Presentation of final draft CZMP to CEMAC, who recommend it be adopted by Council | January 2013 |
| Council adopts the final draft CZMP | February 2013 |
| Certification of the CZMP, including consultation with relevant state agencies | February – May 2018 |

# 2 Coastal Risks

## 2.1 Risk Assessment Process

Throughout the development of this CZMP, a Risk Management approach has been applied using the Australian Standard Risk Management Principles and Guidelines (AS/NZS ISO 31000:2009). In this Standard, risk is defined as the combination of 'likelihood' and 'consequence'.

The 'likelihood' or probability of a coastal hazard occurring was defined as part of the Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011), which is summarised in Section 2.2 and 2.3.

The 'consequence' of the coastal hazards relates to the types of assets and land affected by the hazards, for example private residences, public infrastructure such as sewerage mains, community assets such as the beaches themselves, and ecological assets held within reserves. It also relates to the intrinsic values associated with the coast. This is summarised in Section 2.4 and 2.5.

The 'likelihood' and 'consequence' of the coastal hazards was then combined using GIS processing, to produce a map of coastal risk for Coffs Harbour (BMT WBM, 2018). The risk map highlighted the assets and land at highest risk from coastal processes at present, and by 2050 and 2100. The key areas and assets at risk from coastal hazards is summarised in Section 2.6.

## 2.2 Coastal Processes Summary

Coastal processes (natural and human influenced) are the principal source of risk in the coastal zone, as such processes can generate significant hazards to coastal land and assets. Coffs Harbour's coastal processes are shown conceptually in Figure 2-1.

### 2.2.1 Regional Geomorphology

Coffs Harbour differs from the regions immediately north and south by having a greater number of headland outcrops that separate the coastline into smaller embayments. Headlands also interrupt the region's northerly sand transport. The coastline also has numerous rock reefs, which interact with incoming waves to change the pattern of cross-shore sand transport around them. For rock reefs located close to shore, this permits sand accumulation and even tombolos to form at the shoreline.

The breakwaters forming Coffs Harbour were completed in 1946. The harbour construction has had a significant impact upon the coastline character of the Coffs region. The breakwaters have interrupted the natural northerly sand transport, resulting in significant accretion at the northern end of Boambee Beach, and recession of the beaches north of the harbour, particularly Park Beach.

## Coastal Risks

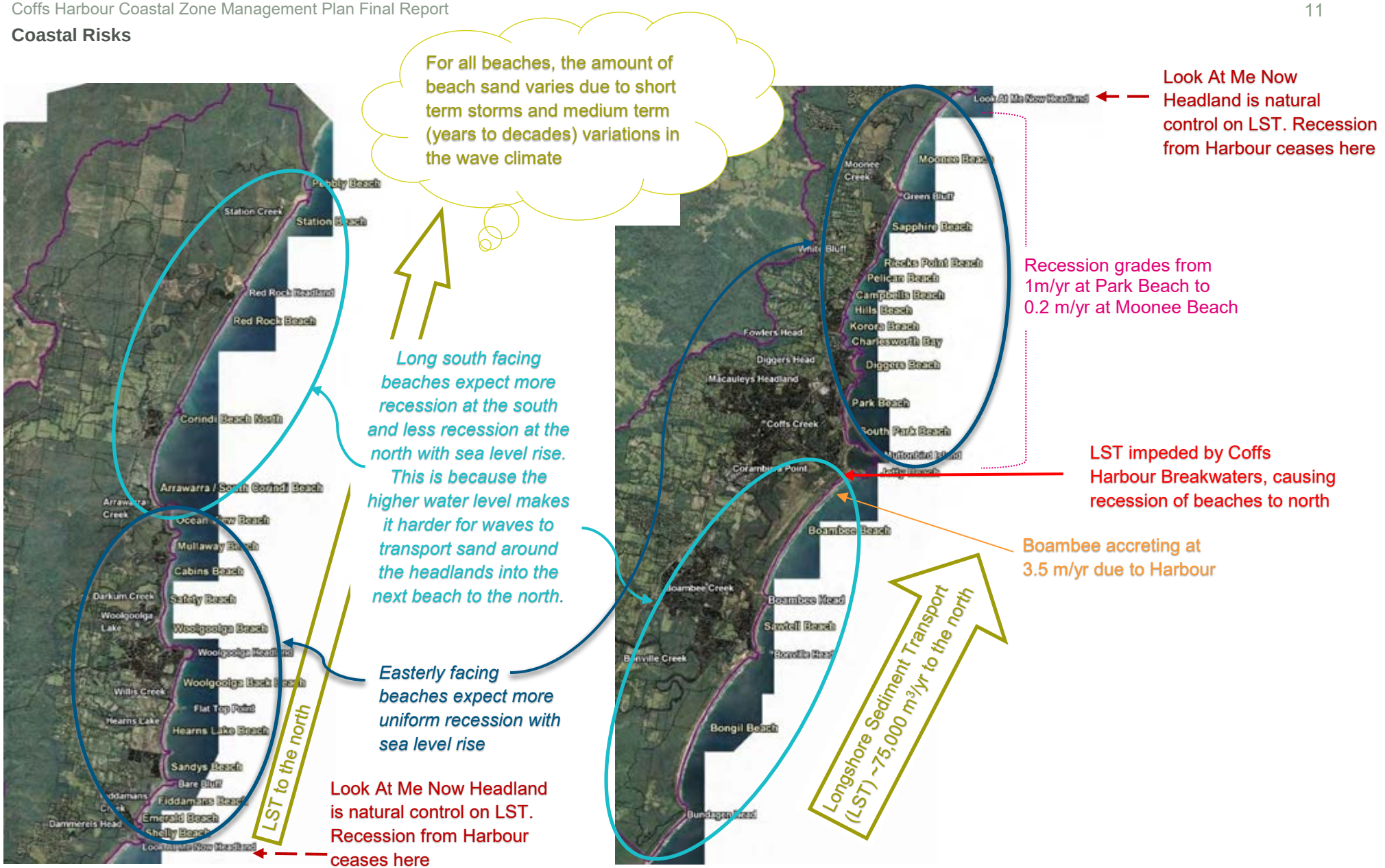



**Figure 2-1 Conceptual Model of Coastal Processes at Coffs Harbour**

### 2.2.2 Waves

NSW's wave climate is driven by the major climatic patterns occurring off the coast. Wave data from Coffs Harbour (and wave direction data from Byron and Sydney) confirms that Coffs Harbour experiences a predominant south easterly swell throughout the year, shifting to more east to north easterly waves over summer and autumn when tropical cyclones occur and onshore sea breezes dominate.

The largest waves typically occur between May and July at Coffs, when tropical cyclones are finishing and east coast low cyclones occur. Waves average 1.57 m at Coffs, with the highest recorded significant wave height of 7.36 m recorded in the month of June.

As the wave climate relates regional climatic patterns, it is also apparent that the wave climate may experience variability in relation to the larger climatic cycles such as the El Nino Southern Oscillation (which varies over about a 2-7 year cycle) and the Interdecadal Pacific Oscillation (varying at decadal timescales of 10-30 years or so).

### 2.2.3 Sediment Transport

The regional average longshore transport rate at Coffs Harbour is 75,000 $m^3$/year. The construction of Coffs Harbour has intercepted virtually all of the northerly littoral transport past the harbour, resulting in substantial accretion at the northern end of Boambee Beach, and substantial recession of Park Beach, and adjacent beaches. The recessionary effect decreases with distance from the harbour, ceasing at about Moonee Beach and Look At Me Now Headland where the coastline orientation turns slightly more east.

A sand mining license is currently held for the removal of sand from the northern end of Boambee Beach, up to a maximum of 16,000$m^3$/year (and 3,000 $m^3$/month), which equates to ~ 20% of the average net northerly regional sediment transport. Future license reviews could consider options to deliver sand to Park Beach, either by truck or by dredging.

Variability in the wave climate over years to decades has been related to similarly long periods of beach erosion or accretion. For example, the 1970s was a period of enhanced storm activity where the beach never fully recovered after each storm and appeared highly eroded. Subtle but sustained shifts in mean wave direction can produce shifts in the regional sediment transport rate, and in turn, the depletion or enhancement of sand reserves at the ends of beach embayments.

### 2.2.4 Water Levels

Elevated water levels in the ocean can produce wave run up and overtopping of coastal barriers; and the inundation of estuary foreshores (which includes any creek, river, lake or lagoon connected to the ocean).

Elevated water levels during a storm comprise of: barometric pressure set up from the storm itself; wind set up piling water towards the shore; astronomical tide; and wave set up generated by breaking waves in shallow water. For Coffs,

the combination of the 100 year recurrence interval values for each of these factors gave an elevated water level of 2.7 m AHD.

Wave run up occurs on top of the elevated water level when waves break either: on the shore and rush over beach face and dune; or overtop a coastal barrier such as the Harbour Breakwaters. Run up (including the elevated water level) of 7.3 m AHD has been measured in the Coffs region.

It is generally considered that the highest elevated water levels would occur for a limited time only (several hours) around the high tide.

### 2.2.5 Climate Change

The key climate change impact of relevance to the assessment of future coastal hazards is sea level rise. Sea level rise projections investigated by BMT WBM (2011) were 0.4 m by 2050 and 0.9 m by 2100 above 1990 mean sea level. These levels were based upon the IPCC (2007) and CSIRO (2007) reports current at that time. Sea level rise projections from the most recent IPCC (2014) report are consistent with these levels, and so, the BMT WBM (2011) findings remain a suitable basis for the Coffs Harbour CZMP (see Figure 2-2). Sea level rise of 0.7 by 2050 and 1.4 m by 2100 was also modelled, and considered under a worst case (or rare) scenario only (see Section 2.3.1). This is reasonable given that IPCC (2014) projections exclude some factors of sea level rise due to their uncertainty, and that sea levels will continue to rise beyond 2100.

Climate modelling for the NSW coast suggests a shift in wave direction of ~ 4°, and increase in maximum wave heights of up to 9% (McInnes et al., 2007). These shifts are within natural variability, however, under a 'rare' scenario, a shift in wave direction to the summer easterly wave climate was investigated for impacts upon shoreline recession extents (see Section 2.3.1). Modelling by McInnes et al. (2007) also suggested a minor change (-3 to +4%) in the height of storm surge water levels, which would increase peak ocean water levels and resulting coastal inundation. The potential minor increase suggested by McInnes et al. (2007) was included in the coastal inundation scenarios, see Section 2.3.2.

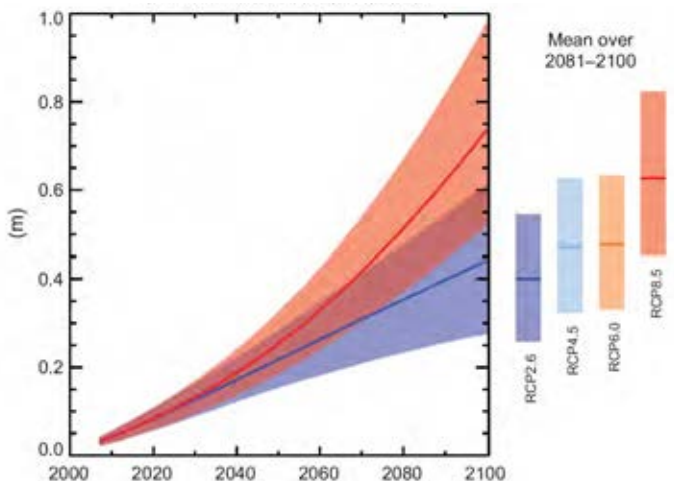



**Figure 2-2 Projections of Global SLR Relative to 1986-2005 Mean Sea Level (IPCC, 2014)**

## 2.3 Coastal Hazard Likelihood

### 2.3.1 Beach Erosion and Recession

The approach to defining the beach erosion hazard was to encompass both short term storm events and medium term beach change driven by wave climate variability over years to decades. Such events do not result in a permanent loss from the sediment system, but may produce substantial erosion of the beach. Historical beach change data was analysed to determine likely beach erosion extents.

At Coffs Harbour, the interruption of sediment transport by the harbour breakwaters has resulted in a permanent loss of sediment from the beaches to the north (to around Moonee Beach). Park, Korora, Campbells and Diggers have experienced severe shoreline recession in the past. Recession due to the harbour breakwaters was modelled for the Coffs region, and included in hazard definition for future time periods. Recession due to sea level rise by 2050 and 2100 was also modelled for the Coffs region.

The definition of beach erosion and recession likelihoods that was applied and mapped for Coffs Harbour is explained in Table 2-1. Present and future erosion and recession values adopted for Coffs Harbour are provided in Table 2-2. Hazard maps can be accessed on Council's webpage. The unlikely scenario was defined in a manner that is consistent with hazard zones typically produced in NSW. For the rare scenario, generally the higher than projected sea level rise produced the worst case erosion outcome for future time periods.

**Table 2-1 Beach Erosion and Recession Hazard Likelihood**

| Likelihood | Immediate | 2050 | 2100 |
|---|---|---|---|
| **Almost Certain** | 'average' beach erosion [1] | 'average' beach erosion [1] + Harbour impact | 'average' beach erosion [1] + Harbour impact |
| **Unlikely** | 'maximum' beach erosion [1] | 'maximum' beach erosion [1] + Harbour impact + 0.4 m SLR | 'maximum' beach erosion [1] + Harbour impact + 0.9 m SLR |
| **Rare** | 'extreme' beach erosion [2] | **Worst Case of:**<br>maximum' beach erosion [1] + Harbour impact + 0.7 m SLR<br>**OR**<br>'extreme' beach erosion [2] + Harbour impact + 0.4 m SLR<br>**OR**<br>'maximum' beach erosion [1] + Harbour impact + 0.4 m SLR + more easterly wave climate | **Worst Case of:**<br>'maximum' beach erosion [1] + Harbour impact + 1.4 m SLR<br>**OR**<br>'extreme' beach erosion [2] + Harbour impact + 0.9 m SLR<br>**OR**<br>'maximum' beach erosion [1] + Harbour impact + 0.9 m SLR + more easterly wave climate |

*[1] 'average' and 'maximum' extent of erosion measured at a beach over the past 3 - 5 decades. These values are used for future time periods also.*

*[2] 'extreme' beach erosion assumed to be 'maximum' erosion plus difference between 'maximum' and 'average' beach erosion.*

**Table 2-2 Erosion and Recession Values Adopted for Beaches in the Coffs Harbour LGA**

| Beach | Erosion [1] (m) | | Recession | | Notes |
|---|---|---|---|---|---|
| | Almost certain [2] | Unlikely [3] | Present | By 2100 with 0.9 m SLR (from S to N) | |
| **North** | 50 | 120 | Stable | 30 to 15 m | Erosion values from Bongil adopted as no photogrammetric data, beaches are similar size and orientation. |
| **Bongil** | 50 | 120 | Stable | 75 to 20 m | |
| **Sawtell** | 15 | 50 | Stable | 50 to 15 m | |
| **Boambee** | 50 | 120 | + 3.5 m/yr | 60 to 20 m | Erosion values from Bongil adopted due to accretionary trend, beaches are similar size and orientation. |
| **Jetty (Coffs Harbour)** | 15 | 50 | + 1.3 m/yr | 40 m | Beach erosion applied from 2 m AHD contour due to low dunes. |
| **South Park** | 15 | 50 | Stable | 115 m | Recession due to harbour has now stabilised. Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Park** | 15 | 50 | -0.9 m/yr | 115 to 50 m | Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Diggers** | 15 | 50 | - 1.0 m/yr | 150 to 110 m | Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Charlesworth Bay** | 40 | 75 | Stable | 40 m | Stable due to gravel sediments. Beach erosion applied from 2 m AHD contour due to low dunes. Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Korora** | 15 | 50 | -0.4 m/yr | 35 to 70 m | Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Hills** | 15 | 50 | -0.2 m/yr | 65 to 45 m | Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Campbells** | 15 | 50 | Stable | 30 to 75 m | Historical recession of 20-30 m which has now stabilised. Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |

| | Erosion [1] (m) | | Recession | | |
|---|---|---|---|---|---|
| **Pelican** | 15 | 50 | Stable | up to 95 m | Historical recession of 20-30 m which has now stabilised. Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Riecks Point** | 15 | 50 | Stable | 70 m, 120 m behind reef | Historical recession of 20-30 m which has now stabilised. Erosion values from Sawtell adopted due to historical recession, beaches are similar size and orientation. |
| **Sapphire** | 15 | 50 | Stable | 110 m to 70 m | Sawtell erosion values adopted, but reasonably consistent with measured values on Sapphire. |
| **Moonee** | 50 | 120 | -0.2 m/yr to +1.2 m/yr | 135 m to 20 m | Recession evident only at southern end of the beach at present. Erosion values from Bongil adopted due to historical recession, but are similar to calculations for Moonee. |
| **Shelly** | 20 | 55 | Stable | 95 m or bedrock limit | Erosion values adopted from Emerald as no photogrammetric data, beaches are similar size and orientation. From Shelly north no longer affected by harbour construction. Look at Me Now Headland is a major natural control on sediment transport. |
| **Emerald** | 20 | 55 | Stable | up to 95 m | Emerald and Fiddamans treated as one beach compartment for determining erosion. |
| **Fiddamans** | 20 | 55 | Stable | up to 105 m | Emerald and Fiddamans treated as one beach compartment for determining erosion. |
| **Sandys** | 15 | 50 | Stable | up to 105 m | Values at Sawtell adopted, for conservatism. Photogrammetric data suggested 5 m and 20 m for average and maximum. |
| **Hearnes Lake** | 15 | 50 | Stable | up to 100 m | Values at Sawtell adopted, for conservatism. Photogrammetric data suggested 5 m and 20 m for average and maximum. |
| **Woolgoolga Back** | 15 | 50 | Stable | up to 105 m | Values at Sawtell adopted, for conservatism, and are consistent with data for Woolgoogla back when questionable 1964 data included. Excluding 1964, photogrammetric data suggested 5 m and 13 m for average and maximum. |
| **Woolgoolga** | 20 | 55 | Stable | up to 105 m | |
| **Safety** | 20 | 55 | Stable | 120 m to 45 m | Erosion values from Woolgoolga adopted as no photogrammetric data, beaches are similar orientation and within same compartment. |

| | Erosion [1] (m) | | Recession | | |
|---|---|---|---|---|---|
| **Cabins** | 20 | 55 | Stable | up to 60 m | |
| **Mullaway** | 20 | 55 | Stable | up to 60 m | |
| **Ocean View** | 15 | 50 | Stable | up to 100 m | |
| **Arrawarra / South Corindi** | 15 | 50 | Stable | 100 m | Recession grades from 100 m at Arrawarra to 30 m at Middle Corindi |
| **Middle Corindi** | 20 | 55 | Stable | 30 m | As above |
| **North Corindi / Red Rock** | 25 | 60 | Stable | 125 m (behind reef) to 40 m | |
| **Station** | 70 | 150 | Stable | 70 to 25 m | |
| **Pebbly** | 15 | 50 | Stable | 65 to 55 m | Erosion values from Sawtell adopted as no photogrammetric data, beaches are similar size and orientation. |

*1: Erosion is measured as a horizontal distance from the 4 m AHD contour.*
*2: Almost certain is average measured erosion*
*3: Unlikely is maximum measured erosion*

### 2.3.2 Coastal Inundation

The Coffs Harbour coastal zone contains numerous large to small estuaries, creeks, rivers, lakes, lagoons and low lying back beach drainage lines. These features are variously closed or open to the ocean at any one time. Coastal inundation poses a particular hazard in the Coffs region where elevated water levels inundate the foreshores of these estuaries. Inundation occurs either as an elevated water level propagating in via an open estuary entrance or acting as a tailwater level that stops water flowing out of the estuary entrance.

Because sea level rise will contribute to elevated ocean water levels in the future, it is considered in the assessment of future inundation hazards. The very small potential increase (some 4%) in the storm surge component of elevated water levels (derived by McInnes et al., 2007) was also included in the 'unlikely' inundation scenario.

Wave run up and overtopping poses a hazard when coastal barriers such as dunes or breakwaters are being overtopped during storm events causing damage to land or assets behind. Once a dune or barrier has been breached, the water spreads out and disperses in the 10 or 20 m behind the dune. Wave overtopping of beaches occurs in combination with beach erosion processes.

Mapping of coastal inundation focussed upon the inundation of estuary foreshores by elevated water levels. The likelihood of coastal hazards defined and mapped for the Coffs region is explained in Table 2-3 below. Hazard maps can be accessed on Council's webpage.

**Table 2-3 Coastal Inundation Hazard Likelihood**

| Likelihood | Immediate | 2050 | 2100 |
|---|---|---|---|
| **Almost Certain** | 1 in 20 year elevated water level [1] | 1 in 20 year elevated water level [1] | 1 in 20 year elevated water level [1] |
| **Unlikely** | 1 in 100 year elevated water level [1] | 1 in 100 year elevated water level [1] + 0.4 m SLR + climate change storm surge [2] | 1 in 100 year elevated water level [1] + 0.9 m SLR + climate change storm surge [2] |
| **Rare** | 1 in 100 year elevated water level [1] + extreme climatic conditions (e.g. 1 in 1000 year storm) | **Worst Case of:** 1 in 100 year elevated water level [1] + extreme climatic conditions + 0.4 m SLR + climate change storm surge [2] **OR** 1 in 100 year elevated water level [1] + 0.7 m SLR | **Worst Case of:** 1 in 100 year elevated water level [1] + extreme climatic conditions + 0.9 m SLR + climate change storm surge [2] **OR** 1 in 100 year elevated water level [1] + 1.4 m SLR |

*[1] Elevated water level = tide + storm surge (barometric and wind set up) + wave set up.*
*2 climate change storm surge = the minor potential increase (+4%) in storm surge water levels due to climate change modelled by McInnes et al. (2007)*

## 2.4 Coastal Values and Issues

### 2.4.1 Community Values

All of the Coffs Harbour beaches are highly valued, albeit for different reasons. The most heavily used beaches are those that are most accessible, for example, Park (plus South Park and Jetty beaches), Woolgoolga and Sawtell Beaches. These beaches are highly valued as they offer a range of recreational opportunities, such as protected swimming, surfing and walking. The mix of low key development and nearby restaurants, cafes and markets offered at these beaches was also highly valued. Community surveys noted the natural setting for the more developed beaches as a key value. The natural green outlook for these beaches gives a sense of nature, while still in proximity to parking, cafes, restaurants, hotels and so on.

The less frequented beaches were also valued by the community for their natural untouched beauty and scenery, solitude and “feeling of remoteness”, while still being relatively close to the urban areas of Coffs. Such beaches include Boambee, Bongil, Woolgoolga Back, Hearnes Lake and Arrawarra.

The cleanliness and health of the natural environment is very important to locals, visitors, and the businesses and industries supported by these users. The network of walking tracks within the green corridor behind the beach and along headlands was also important both to residents and tourists.

### 2.4.2 Public Access Arrangements

Coffs Harbour’s coastline offers both developed beaches with excellent access and amenity provision, as well as very undeveloped and natural beach landscapes. This attractive mixture of both well serviced and untouched beach landscapes suits a wider range of visitors (international and local) and residents. A summary of the beach access arrangements and facilities at each of the beaches (from south to north) is provided in Table 2-4. Management strategy maps depicting the various facilities are also provided in Section 3.12. It should be noted that, while beach accesses are likely to experience erosion from time to time, these assets must necessarily be located within the hazard zone in order to provide safe access.

### 2.4.3 Economic Values

Economic values of the Coffs coastline relate largely to the beaches themselves, which attract tourists to the region. Tourism, through visitor expenditure, is a key driver of the Coffs regional economy (Earthcheck, 2007) and underpins a significant proportion of regional employment. Specifically, tourism supports the accommodation and food services, retail, wholesale, transport and storage, communications, cultural and recreation and personal and other services sectors of the local economy, to various degrees (Earthcheck, 2007).

**Table 2-4 Summary of Access and Facilities at Beaches Located in the Coffs Harbour LGA**

| Beach | Beach Access | Facilities | Park / Reserve | Description |
|---|---|---|---|---|
| Bongil | Informal tracks from Bundagen Head Wheelchair access ramp, footpaths, stairs at Bonville Headland (need to cross Bonville Creek to access beach) | Bonville Pool, carpark, amenities, boat ramp at Bonville Headland | Bongil Bongil National Park Coffs Coast State Park | Majority is untouched, with Bonville Headland well serviced |
| Sawtell | Formal beach accesses along beach | Viewing platforms, SLSC, stairs, boat ramp, amenities, carpark | Coffs Coast State Park | Well serviced |
| Boambee | Stairs, footpaths to Boambee Creek (not beach). Informal tracks and beach access at north end | Viewing platform, car park – Boambee Head<br>Carpark – northern end | Coffs Coast State Park | Majority is untouched, with northern end well serviced |
| Jetty / Coffs Harbour | Numerous formal and informal access | Jetty (historical), eastern and northern breakwaters of Harbour, boat ramps, inner harbour / marina, amenities, carparks, playgrounds, picnic facilities, shops, cafes | Coffs Coast State Park | Well serviced |
| Park and South Park | Formal accesses and ramps along beach and into Coffs Creek. | SLSC, viewing platforms, carparks, amenities, playgrounds, picnic facilities. Shops, cafes at Harbour. Boat ramp into Coffs Creek | Coffs Coast State Park | Well serviced |
| Diggers | Formal accesses and ramps to beach and Jordans Creek, wheelchair access (south end). North Diggers access around rocks only. | Viewing platform, carpark, amenities, playground, picnic facilities. | Coffs Coast Regional Park[1] (1-jointly managed by Council and NPWS) | Well serviced |
| Charlesworth Bay | Footpaths and formal access | Amenities, on street parking. More services also at nearby resort. | Coffs Coast Regional Park[1] | Sufficiently serviced* (*for size and typical visitation) |
| Korora | Footpaths, stairs to beach and creek | Amenities, on street parking | Coffs Coast Regional Park[1] | Sufficiently serviced * |
| Hills | Formal accesses and stairs to beach | Amenities, playground, camping, car park. More services also at nearby resort. | Coffs Coast Regional Park[1] | Sufficiently serviced * |
| Campbells | Formal accesses to beach | On street parking | Coffs Coast Regional Park[1] | Sufficiently serviced * |
| Pelican / Riecks | Formal accesses, boardwalk over creek to beach | Playground, on street parking. | Coffs Coast Regional Park[1] | Sufficiently serviced * |
| Sapphire | Formal accesses (south, centre), wheelchair access (centre of beach), informal access from Green Bluff (north) | Viewing platforms, amenities, playground, on street parking, car park, cafe | Coffs Coast Regional Park[1] | Southern end well serviced, northern end untouched |
| Moonee | Informal access through Moonee Creek (south) or Look At Me Now Headland (north) only | Car park and picnic facilities at creek next to North Coast Holiday Parks (HPs) Moonee Beach, amenities via HP only | Moonee Beach Nature Reserve | Untouched |

| Beach | Beach Access | Facilities | Park / Reserve | Description |
|---|---|---|---|---|
| Shelly | Formal access to beach, paths along headlands | On street parking | Moonee Beach Nature Reserve | Untouched |
| Emerald | Formal access to beach, Dammerels Head and Fiddamans Creek. | Amenities, playground, car park (limited), on street parking. | Coffs Coast Regional Park[1] | Well serviced |
| Fiddamans | Informal access via adjacent beaches only (e.g. across Bare Bluff) | | Moonee Beach Nature Reserve | Untouched |
| Sandys | Formal accesses along beach | Car parks, boat ramp, playground, picnic facilities, amenities | Coffs Coast Regional Park[1] | Well serviced |
| Hearnes Lake | Informal path via southern headland, adjacent to Hearnes Lake entrance | | Coffs Coast Regional Park[1] | Untouched |
| Woolgoolga Back | Formal accesses along beach, stairs from Woolgoolga Headland | Viewing platform | Coffs Coast Regional Park[1] | Untouched |
| Woolgoolga | Formal accesses along beach | Viewing platforms (Woolgoolga Headland and beach), SLSC, car parks, playgrounds, picnic facilities, amenities, boat ramps. Other services via Woolgoolga Beach HP and Woolgoolga Lakeside HP. | Coffs Coast State Park | Well serviced |
| Safety | Formal accesses at north and south end | | Coffs Coast Regional Park[1] | Untouched |
| Cabins | Formal accesses along beach, paths and stairs on headlands | | Coffs Coast Regional Park[1] | Untouched |
| Mullaway | Formal accesses and stairs at north and south ends. Paths along headlands | Amenities, playground, on street parking | Coffs Coast Regional Park[1] | Untouched |
| Ocean View | Formal accesses along beach, paths and stairs from headlands | Amenities, viewing platform | Coffs Coast Regional Park[1] | Untouched |
| Arrawarra | Formal accesses (south end) | Boat ramps, amenities, car park. Other services via Arrawarra Beach HP. | Coffs Coast Regional Park[1] | Untouched |
| South Corindi | Formal access via Darlington Beach HP only | Viewing platform. Car park, amenities via Darlington Beach HP | Coffs Coast Regional Park[1] | Untouched |
| Middle Corindi | Formal access and stairs via North Coast HPs Corindi Beach | Playground. Car park, amenities North Coast HPs Corindi Beach. | None | Untouched |
| North Corindi / Red Rock | Formal accesses north end via North Coast HPs Red Rock | | Yuraygir National Park | Untouched |
| Station and Pebbly | No formal access | | Yuraygir National Park | Untouched |

### 2.4.4 Cultural Heritage

Aboriginal cultural values are typically associated with headlands, estuary foreshores, dunes and littoral rainforest. Further information regarding the cultural significance of the Coffs Harbour coastal area can be found in Section 3.2.4 of the Coffs Harbour Coastal Zone Management Study (BMT WBM, 2018).

While mapping of most sites is not possible for sensitivity reasons, Aboriginal cultural values for such areas were identified through discussions with the Coffs Harbour Local Aboriginal Land Council (LALC), OEH and other identified representatives of the Aboriginal Community and a review of available published information. Such values have been incorporated into the risk assessment wherever possible, and as required in addition to the ecological and other community values associated with the sites. Furthermore, the management approach has focussed upon the response for Aboriginal cultural heritage items or places should they be found or uncovered by coastal hazards, with remaining sites to be managed as they are at present.

### 2.4.5 Ecological Values

The natural values of the marine and estuarine ecosystem north of the harbour have been recognised by their inclusion in the Solitary Islands Marine Park. The Coffs Harbour coastal zone also provides an important fauna corridor between relatively large patches of remnant vegetation at the northern and southern ends of the coastal strip within and beyond the study area namely Yuraygir National Park in the north and Bongil Bongil National Park in the south. This corridor also connects to other inland regional and subregional corridors (CHCC, 2010).

In addition to its ecological value, the habitat corridor provides a natural green back drop to the beach that is of key value to the community. Without protecting the “green corridor”, human settlement becomes the seafront, changing the community as well as ecological value of the beaches.

## 2.5 Coastal Risk Consequence

With the values and issues associated with natural and built assets and land in mind, the consequence to these assets from coastal hazards was assessed via Table 2-5.

**Table 2-5 Consequence to Community, Environment or Economy from Coastal Risk**

| Consequence | Society / Community | Environment | Economy |
|---|---|---|---|
| **Catastrophic** | Widespread permanent impact to community's services, wellbeing, or culture (eg, > 50 % of community affected), or national loss, or no suitable alternative sites exist | Widespread, devastating / permanent impact (e.g. entire habitat destruction), or loss of all local representation of nationally important species (e.g. endangered species). Recovery unlikely. | Damage to property, infrastructure, or local economy > or = $20 million[1] |
| **Major** | Major permanent or widespread medium term (somewhat reversible) disruption to community's services, wellbeing, or culture (eg up to 50 % of community affected), or regional loss, or Only a few suitable alternative sites exist | Widespread semi-permanent impact, or widespread pest / weed species proliferation, or semi-permanent loss of entire regionally important habitat. Recovery may take many years. | Damage to property, infrastructure, or local economy >$5 million to $20 million |
| **Moderate** | Minor long term or major short term (mostly reversible) disruption to services, wellbeing, or culture of the community (eg, up to 25 % of community affected), or sub-regional loss, or Some suitable alternative sites exist | Significant environmental changes isolated to a localised area, or loss of regionally important habitat in one localised area. Recovery may take several years. | Damage to property, infrastructure, or local economy >$500,000[2] to $5 million |
| **Minor** | Small to medium short term (reversible) disruption to services, wellbeing, finances, or culture of the community (eg, up to 10 % of community affected), or local loss, or many alternative sites exist | Environmental damage of a magnitude consistent with seasonal variability. Recovery may take one year. | Damage to property, infrastructure, or local economy >$50,000[3] to $500,000 |
| **Insignificant** | Very small short term disruption to services, wellbeing, finances, or culture of the community (eg, up to 5 % of community affected), or neighbourhood loss, or numerous alternative sites exist | Minimal short term impact, recovery may take less than 6 months, or habitat affected with many alternative sites available. | Damage to property, infrastructure, or local economy <$50,000 |

## 2.6 Risk Assessment

Combining the likelihood and consequence defined the level of risk associated with coastal hazards. This risk assessment formed the basis for developing and prioritising the suite of coastal management options, as detailed in the Coffs Harbour CZMS.

A register of all assets at high or extreme risk from coastal hazards is provided in the Coffs Harbour Coastal Asset Risk Registers (which forms a companion document to this CZMP). The subsequent sections of this CZMP outline the recommended actions for implementation to treat the coastal risks.

In addition to the level of risk, the need for management action was also prioritised based on the estimated timing for the risks, i.e. immediate, 2050 or 2100 timeframes. For more detail on the risk framework used for Coffs Harbour CZMP refer to Chapter 4 of the Coffs Harbour CZMS (BMT WBM, 2018).

The selection of management actions was based upon a cost benefit analysis to first determine if an option was technically viable for the study area, and then to determine which of the risk treatments will provide the greatest benefit (relative to cost) in treating the highest priority risks. Some 23 management options were considered and reviewed, as detailed in Chapter 5 of the Coffs Harbour CZMS (BMT WBM, 2018).

This CZMP outlines those management actions recommended for implementation, in the chapters herein.

# 3 Management Action Implementation Details

## 3.1 Selecting the Management Actions

The Management actions are principally focused on treating erosion and recession hazards and inundation hazards associated with coastal storms combined with long term sea level rise, over both the short and long term. Risks associated with Future Development are different from risks to Existing Development, and therefore different management approaches are required, as shown in Figure 3-1.

The range of management options considered in the Coffs Harbour CZMS were compiled from various sources, including the *NSW Coastline Management Manual* (NSW Government, 1990), the CZMP Guidelines (OEH, 2013), the *First Pass National Assessment of Climate Change Risks to Australia's Coast* (2009), the *NSW Coastal Planning Guideline: Adapting to Sea Level Rise* (DP, 2010) and other coastal management plans and studies.

The Coffs Harbour CZMS provided detailed description and consideration of advantages and disadvantages of the 24 options considered for Coffs Harbour. The options were then evaluated considering a range of criteria within a "traffic light" coloured assessment system of: "go" where the option is suitable with minimal trade offs; "slow" where an option may be suitable at specific sites, or subject to further investigation; and "stop" where the option is not suitable. The assessment of options against the criteria is provided in Table 3-1. The options were further assessed in reference to specific locations and/or issues for Coffs Harbour, before being shaped into detailed site specific actions, as listed in the implementation tables in Section 3.5 onwards.

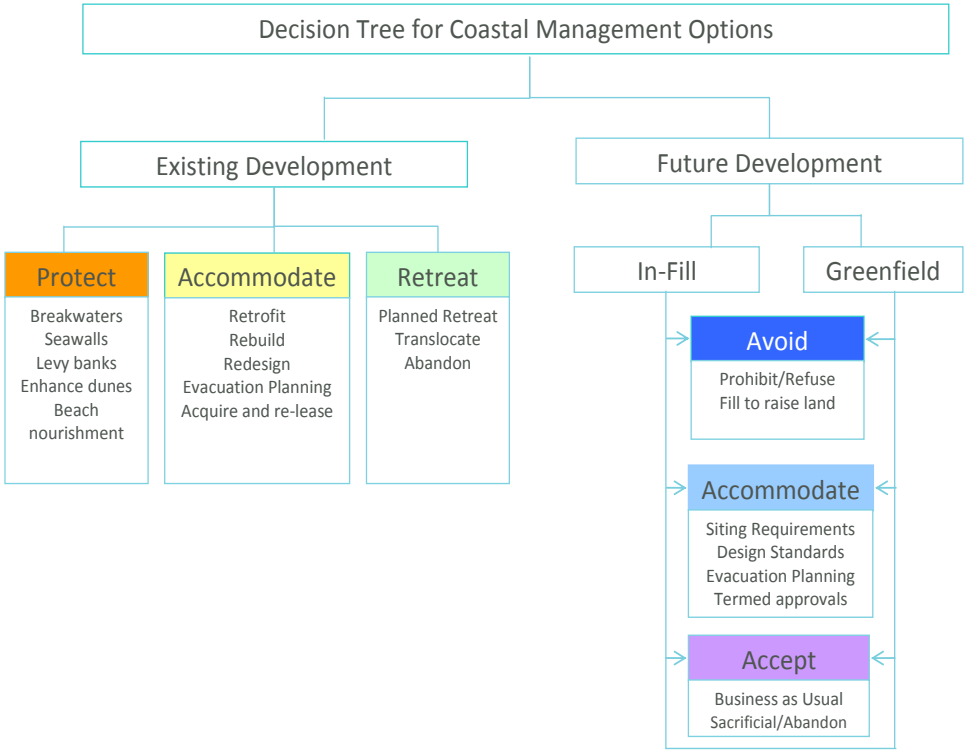



**Figure 3-1 Conceptual Framework for Application of Coastal Management Options**

**Table 3-1 Coarse Filtering of Management Options**

| Option | Treats Erosion | Treats Recession | Treats Wave Overtopping | Treats Inundation | Capital Cost | Recurrent Costs | Environmental or Social Impact | Community Acceptability | Reversible / Adaptable in Future | Effectiveness over time | Legal / Approval Risk | Technical Viability | Score (G = 1, Sl = 0, St = -1) | Overall Analysis | Comments / Priority Locations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coastal Management DCP | ✓ | ✓ | ✓ | | GO | GO | GO | SLOW | GO | GO | GO | GO | 7 | GO | |
| Beach Management | ✓ | | ✓ | | GO | GO | GO | GO | GO | STOP | GO | GO | 6 | GO | Higher priority at degraded locations (refer Table 5-2) |
| Dune Rehabilitation | ✓ | ✓ | ✓ | | GO | GO | GO | GO | GO | STOP | GO | GO | 6 | GO | Higher priority at degraded locations (refer Table 5-2) |
| Seawalls | ✓ | ✓ | ✓ | | STOP | STOP | STOP | SLOW | SLOW | SLOW | SLOW | SLOW | -4 | SLOW | |
| Beach Nourishment | ✓ | ✓ | ✓ | | STOP | STOP | GO | SLOW | GO | SLOW | STOP | SLOW | -3 | SLOW | |
| Artificial Breakwaters | ✓ | | | | STOP | STOP | STOP | STOP | STOP | SLOW | STOP | STOP | -7 | STOP | |
| Groynes | ✓ | | | | STOP | STOP | STOP | STOP | STOP | STOP | STOP | STOP | -8 | STOP | |
| Sacrifice Land or Assets | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | SLOW | STOP | GO | SLOW | SLOW | 3 | SLOW | Costs not based on lost land because beach is retained = higher value |
| Relocate Assets | ✓ | ✓ | ✓ | ✓ | STOP | GO | GO | GO | GO | GO | SLOW | SLOW | 4 | SLOW | |
| Acquisition | ✓ | ✓ | ✓ | ✓ | STOP | GO | GO | SLOW | SLOW | GO | SLOW | GO | 3 | SLOW | |

**Management Action Implementation Details**

| Option | Treats Erosion | Treats Recession | Treats Wave Overtopping | Treats Inundation | Capital Cost | Recurrent Costs | Environmental or Social Impact | Community Acceptability | Reversible / Adaptable in Future | Effectiveness over time | Legal / Approval Risk | Technical Viability | Score (G = 1, Sl = 0, St = -1) | Overall Analysis | Comments / Priority Locations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Buy Back / Lease Back | ✓ | ✓ | ✓ | ✓ | STOP | GO | GO | SLOW | GO | GO | SLOW | GO | 4 | SLOW | |
| Redesign or Retrofit | ✓ | ✓ | ✓ | ✓ | SLOW | SLOW | SLOW | GO | GO | SLOW | GO | SLOW | 3 | SLOW | |
| Integration of CZM Planning Within Council | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Asset Management Planning | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Audit of Existing Council Assets | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Community Education | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | SLOW | GO | GO | 7 | GO | |
| LEP Review and Rezoning | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Monitoring | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Infrastructure Design Elements | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Evacuation Planning | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Combined Flood Studies | | | | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | Higher priority for more developed catchments (refer Table 5-5) |
| Habitat Management | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | GO | GO | 8 | GO | |
| Heritage Management | ✓ | ✓ | ✓ | ✓ | GO | GO | GO | GO | GO | GO | SLOW | GO | 7 | GO | |
| Existing Controls: Flood Prone Land Policy | | | | ✓ | GO | GO | GO | GO | GO | SLOW | GO | GO | 7 | GO | |

## 3.2 Plan Funding

Potential funding programs or sources for each of the strategy groups is provided in Table 3-2.

**Table 3-2 Potential Funding Sources for CZMP Actions**

| Strategy | Action | Potential Funding Sources |
|---|---|---|
| **Asset Management** | A.1 to A.14 | • Council's routine asset maintenance and works program<br>• NSW Government's Coastal Management Program<br>• State and Federal Government Grants (e.g. climate change adaptation / resilience funds)<br>• New Council levies or increased land rates<br>• Relevant State agencies asset management programs (where applicable)<br>• Revenue generated through hire, rental or other commercial partnerships (e.g. for the SLSCs). |
| **Beach and Dune Management** | BD.1 to BD.5 | • NSW Government's Coastal Management Program<br>• Council's parks and reserves maintenance and works program<br>• Northern Rivers Local Land Services / State Government assisted Dune care or weed control Programs<br>• New Council levies or increased land rates |
| **Environmental Planning and Further Studies** | FS.1 to FS.13 | • NSW Government's Coastal, Estuary and Floodplain Management Programs<br>• State and Federal Government Grants (e.g. climate change adaptation / resilience funds)<br>• Federal and State Government Emergency Management Funding<br>• NRM funding programs (especially relating to habitat and or heritage management)<br>• National Trust / Environmental Trust or similar. |
| **Planning and Development Controls** | P.1 to P.6 | • NSW Government's Coastal and Estuary Management Programs<br>• Council's planning department |
| **Monitoring** | M.1 to M.4 | • NSW Government's Coastal Management Program (particularly for re-evaluation of risks)<br>• Council's routine monitoring and works program (e.g. survey department)<br>• New Council levies or increased land rates |
| **Non-Council Asset Management** | NC.1 to NC.4 | • Relevant State agencies asset management programs |
| **Community Education** | E.1 | • NSW Government's Coastal Program<br>• Council's annual community education budget<br>• State and Federal Government Grants (e.g. climate change adaptation / resilience funds) |

## 3.3 Further details for Implementing Actions

While not explicitly stated for every action, it is important to understand that when implementing the actions.

- All relevant environmental assessments, approvals, licences and permits will be obtained.
- Where works are proposed on Crown land, not under Council Trust management, an appropriate authorisation from DoI – Crown Lands will be required prior to the works commencing. Authorisation may be provided by way of licence or potentially the appointment of Council as the reserve manager to streamline future management arrangements. Council should account for lead in time of at least 6 months for issuing of a licence or other authorisation to commence the works.
- Relevant PoMs for public land shall be consulted to ensure a consistent, integrated and 'whole of government' approach to coastal zone management.
- Where actions are proposed on Crown land, consideration of Aboriginal Land Claims lodged under the *NSW Aboriginal Land Rights Act 1983* will need to be undertaken, and any works will also need to be compliant with the *Commonwealth Native Title Act 1993*.
- The *Crown Land Management Act 2016* is expected to commence in 2018, and may have implications that need to be considered when implementing actions in this CZMP.

## 3.4 Implementation Action Plan: Existing and Future Risks

Implementation tables have been provided in Section 3.5 to 3.11 for the 48 recommended actions that require implementation over the next 5-10 years. The actions have been grouped into seven broad categories as listed in Table 3-2. Key strategies for specific locations have been mapped in concert with the risk mapping for 2100, in Section 3.12. Specific application of these strategies to asset and land in Coffs Harbour is given in the Coffs Harbour Coastal Asset Risk Registers (a companion document to this CZMP).

For future intolerable risks (2050, 2100), where necessary, an option(s) and accompanying trigger for implementation of the option(s) have been provided within the Asset Risk Register database (excel spreadsheet provided to Council). These details need only be utilised should a trigger be reached.

As part of the actions to be undertaken, a detailed monitoring program that prescribes regular cross-checking of trigger levels has been prepared. This will ensure Council keeps track of the need to implement action for existing or future risks. The monitoring program also enables collection of data to review the risk assessment at the next review of the Plan document.

## 3.5 Asset Management

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.1** | Add a notation within the Asset Management Plan, indicating the likelihood and timeframe for coastal hazard impact, and type of impact (i.e., erosion or inundation). Prioritisation and maintenance scheduling of forward works programs should then be reconsidered based on the timeframe and type of hazard exposure. | All Council assets at risk (*refer to Coffs Harbour Coastal Asset Risk Registers listing wastewater, roads, public buildings etc., Numbers: 1-5; 727, 29, 47, 6266, 77-155, 159160, 164-253*) | 1 | Year 1 or as soon as practical | Council | Staff time only | Nil | See Asset Management Planning Option (Chapter 5 of Coffs CZMS) |
| **A.2** | Link Monitoring outcomes for triggers (Action M.2 & M.1) back to the Asset Management Plan by recording the measured distance between each asset and erosion escarpment (and date) compared with trigger distance, to ensure triggers are regularly checked and any action required is taken accordingly. This could also be reported in State of Environment Reports or other relevant forum, as needed by Council. | All Council assets at immediate to 2050 high/extreme risk - *Coffs Harbour Coastal Asset Risk Registers numbers: 23, 27, 77-101, 104126, 128-139, 142-144, 164-167, 172-3, 1756, 195-6, 205207, 209-211, 223-4, 241, 244246.* | 1 | After first monitoring event (see M.1), then yearly after collation of monitoring data | Council | Staff time only | M.1, M.2 | See Asset Management Planning & Monitoring Options (Chapter 5 of Coffs CZMS) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **A.3** | Conduct an audit for high / extreme risk assets:<br>• Investigate site constraints for relocation as a first option, then redesign to replace assets in existing location, ability to use a re-locatable structure or accept loss of the asset (manage to fail),<br>• Record the replacement option (i.e. “relocate”, “redesign/retrofit”, “relocatable” or “manage to fail”) in Asset Management Plan<br>• Important considerations for the audit include:<br>• management actions for adjacent land that may be affected by the option (particularly protection options, where adjacent land is being sacrificed or where residential properties may also be protected – see Asset Risk Register Spreadsheet notes)<br>• the availability of land for relocation (e.g. for roadways, may need to consider battle-axe arrangements or rear-lane access, facilitated through Council; for wastewater assets, RL / AHD is important, etc.),<br>• the lifespan of the asset compared with expected hazard impact (e.g. lifeguard tower of 25 year life may be accepted in a 2050 hazard zone)<br>• the need for proximity to the coast (e.g. Lifeguard towers),<br>• the depth to bedrock to provide suitable foundations to withstand erosion,<br>• the entire network link, e.g. for roadways or parts of the wastewater network.<br>• the ability and cost to provide the same service from a relocatable instead of permanent structure; and<br>• the cost of the structure such that damage can be accepted and a replacement structure built. | All Council assets at high to extreme risk by 2050. *Refer Coffs Harbour Coastal Asset Risk Registers numbers: 77-82, 84-86, 106-108, 114-119, 124126, 128-131, 134-5, 137-8, 142-3, 175, 205-207, 209-211, 223-4, 241, 244246.* | 1 | Conduct Action in Year 1 or as soon as practical. Implement preferred action when asset replacement due OR when trigger for hazard is reached (refer Monitoring strategy) | Council | Staff time. May require minor geotechnical consultancy to assess foundation capacity/depth to bedrock for specific sites. | A.1, And include outcomes at: Jetty Beach: FS.9; South Park: FS.4 & FS.5; Park Beach: FS.6, A.6, and A.7; Korora Beach: FS.7; Campbells Beach: FS.8; Bonville Head: FS.10; Woolgoolga Beach: A.6 A.7, A.8; Ocean View Beach: A.11 | See Audit of Existing Council Assets (Chapter 5 of Coffs CZMS) |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.4** | Investigate the relocation Coffs Harbour SLSC and associated sewerage pump station (PS39) and rising main (45819), Surf Club Road and carpark:<br>1. Liaise with Coffs Harbour SLSC (who holds Lease 358521 from the Crown over Lot 101 DP 1182248 for a term of 20 years to 2024. The lease area is an inholding within Park Beach Reserve managed by the Coffs Coast State Park Trust.<br>2. Determine alternative location for SLSC and associated assets<br>3. Investigate commercial partnerships (e.g. for restaurant /bar /function centre in building) to assist funding replacement SLSC structure<br>4. Rebuild assets further landward and demolish existing<br>5. Allow remaining land to retreat, to retain the sandy beach<br>Timing for implementation of a relocation action will be dependent upon the success of beach scraping and dune management actions (see BD.1, BD.3) to prolong the current asset.<br>*Note: erosion escarpment is currently ~ 35 m landward of the SLSC. While the SLSC is considered at medium (tolerable) risk, an option has been identified for the SLSC due to the highly costly sewer assets associated with its function. Managing the sewer assets is dependent upon the approach to the SLSC (and vice versa).* | Park Beach (north to Fitzgerald Street). *Refer to Coffs Harbour Coastal Asset Risk Registers numbers: 10, 96-7, 176* | 1 | Year 1 - Record "relocation" action in the Asset Management Plan for relevant assets<br>When erosion escarpment is within 30 m of the SLSC OR asset replacement is required, conduct studies for new alternative building and associated wastewater assets, Surf Club Road and carpark and put into forward works plans. When funding becomes available, rebuild assets further landward. Sacrifice land as impacts occur, ensuring public safety is maintained. | Council (inc Coffs Water, Coffs Coast State Park Trust, roads, etc.). | Staff time only to investigate alternative location for assets and investigate commercial partnerships.<br>$5 million to rebuild assets further landward | A.1, BD.1, BD.3 | See Relocate Assets Option (Chapter 5 of Coffs CZMS) |

## Management Action Implementation Details

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.5** | Reconfigure assets (Macauleys carpark) through scaling back in size, or relocate assets (Ocean Pde, Macauleys stormwater outlet or amenities) as impacts occur, ensuring public safety is maintained. Protection for these assets will not be implemented. This will ensure a sandy beach is retained through beach retreat.<br>Commencing this action will require liaison with:<br>• Coffs Coast State Park, who manage Park Beach Reserve<br>• Council's roads department for Ocean Parade and Macauleys car park<br>• Coffs Coast Regional Park, wherever land within Macauleys Headland is affected by the action.<br>*Note: erosion escarpment is 15 m from edge of Macauleys carpark, and 25 m from amenities.* | Park Beach north from end of residences to Macauleys carpark. *Refer Coffs Harbour Coastal Asset Risk Registers numbers: 14, 172-3.* | 1 | Year 1 - record the "relocation" action in the Asset Management Plan for relevant assets. When erosion escarpment is within 30 m of an asset OR when asset replacement is required, commence investigations to relocate further landward. Relocate / reconfigure assets when funding becomes available. Sacrifice land as impacts occur, ensuring public safety is maintained. | Council | $50,000$100,000 each to relocate amenities, stormwater and carpark assets, >$200,000 to relocate roadway | A.1 | See Relocate Assets and Sacrifice Land Options (Chapter 5 of Coffs CZMS) |
| **A.6** | Investigate options (Protect, Accommodate or Retreat) to mitigate coastal hazard risk to Woolgoolga. Designs for a replacement structure should consider provision of amenities, and ability for such amenities to replace the amenity structure at the southern end of beach if required in the long term.<br>*Note: This action has commenced, with the Woolgoolga Lakeside Reserve POM (including Woolgoolga Lakeside Holiday Park) adopted 2013, and Woolgoolga Beach Reserve POM (including Woolgoolga Beach Holiday Park) adopted in 2017.* | Woolgoolga Beach (SLSC and associated facilities). *Refer Coffs Harbour Coastal Asset Risk Registers number 22.* | 1 | Year 1 – Finalise risk management option. Year 2 or as soon as practical commence investigations for a replacement structure, and put into forward works plans, and Asset Management Plan. When funding is available, rebuild asset further landward. | Council | Staff time only to investigate alternative location for asset and investigate commercial partnerships. $5 million to rebuild assets further landward | Nil | See Relocate Assets Option (Chapter 5 of Coffs CZMS).<br>See also POMs relevant to Woolgoolga as listed in Note. |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.7** | Accept the risk of erosion impacts to the amenities structure at the southern end of Woolgoolga Beach, and relocate the structure further landward after impacts occur or when asset replacement is required. The provision of this service from a replacement SLSC structure should also be considered as an alternative to replacement. If damages occur, the structure must not be protected with ad hoc works. It should be cordoned off and demolished, and a new structure built further landward.<br>*Note: This action has commenced. Woolgoolga Beach PoM provides a strategic framework for transitional arrangements to support relocation of Woolgoolga Beach SLSC club house to the current Marine Rescue site, and construct a new surf club (the DA for the new SLSC is approved). Arrangements are in place to relocate Marine Rescue to Arrawarra. The SLSC will relinquish the Crown lease where the former club house was located.* | Woolgoolga Beach (Amenities). *Refer Coffs Harbour Coastal Asset Risk Registers number 23.* | 2 | Year 1 -record this action in the Asset Management Plan. Rebuild the asset further landward after impacts occur (ensuring public safety is maintained) OR when asset replacement is required, whichever occurs sooner. | Council | Staff time only to enter into Asset Management Plan. $300,000 to demolish old structure and rebuild new structure further landward. | A.6 | See Relocate Assets Option (Chapter 5 of Coffs CZMS) |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.8** | Reconfigure assets /sites within the Woolgoolga Lakeside Caravan Park property boundary to accommodate impacts, and sacrifice land to retain a sandy beach through natural retreat.<br>In association with this, sacrifice sewer assets if and when the Woolgoolga Lakeside Caravan Park must be abandoned (beyond 2050).<br>Update Woolgoolga Beach Reserve POM (2004) to include action (which is a response to coastal risks) (in association with Action FS.13).<br>The erosion escarpment is 30-40 m from assets within the Caravan Park. The rising main and pump station (PPS, 112650) appear to essentially service the Woolgoolga Lakeside Caravan Park. Therefore, if the caravan park is eventually abandoned in the long term (2050 +), these sewer assets are no longer required and can also be decommissioned.<br>*Note: This action has commenced, with the Woolgoolga Lakeside Reserve POM (including Woolgoolga Lakeside Holiday Park) adopted 2013, and Woolgoolga Beach Reserve POM (including Woolgoolga Beach Holiday Park) adopted in 2017.* | Woolgoolga Beach (Lakeside CP and associated sewer assets).<br>*Refer to Coffs Harbour Coastal Asset Risk Registers numbers: 66, 132-3.* | 2 | Year 1 - record this action in the Asset Management Plan. Update POM with this action at next review of POM (see Action FS.13). Conduct investigations to reconfigure site when erosion escarpment is within 35 m of cabin assets. Implement relocation of assets when site reconfiguration design is complete. | Council. | Re-configuration designs as minor consultancy or staff time. Relocation of cabins ~$5,000 - $10,000 per episode. Decommissioning of sewer assets ~$50,000. Staff time only to update POM (refer Action FS.13). | Nil | See Relocate Assets and Sacrifice Land Options (Chapter 5 of Coffs CZMS) |
| **A.9** | Decommission former outfall pipeline at Sawtell Beach | Sawtell Beach (RM 51788).<br>*Refer Coffs Harbour Coastal Asset Risk Registers number 76.* | 1 | Year 1 – already in progress | Council | As per existing decommissioning program | Nil | |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.10** | Investigate ability to retrofit Bonville Ocean Pool to withstand wave and sea level rise impacts, involving:<br>1. Liaise with Coffs Coast State Park who manage the reserve (81703) within which the pool lies;<br>2. Conduct feasibility study for raising and strengthening the pool walls to withstand inundation and wave impacts, or determine alternative option to manage asset (which may include sacrifice), and<br>3. Implement structural works (retrofit) at trigger. | Bonville Ocean Pool, r*efer Coffs Harbour Coastal Asset Risk Registers number 1.* | 2 | Year 2 or as soon as practical (separately or as part of A.3) undertake study and record preferred action in Asset Management Plan. Implement option when maintenance of pool is required OR when sea level rise impacts commence, whichever is the sooner. | Council | Staff time (with assistance from minor consultancy, if required). | Nil | Refer to Asset Risk Register Spread-sheet (structures). |
| **A.11** | Relocate the amenity building and sewer rising main connection further landward (as it is assumed that the main primarily services the building), to retain the sandy beach by allowing natural retreat. This shall include:<br>1. Liaise with Coffs Coast Regional Park (who manage Ocean View Beach Reserve) and Coffs Water (who manage sewerage assets);<br>2. Decide whether to accept the risk of impacts and relocate the building and sewer main further landward after impacts occur OR to act prior to impact at trigger distance of 30 m from the building;<br>3. If the risk is accepted and damages occur, take steps to ensure management / works staff understand that the asset must not be protected with ad hoc works. It should be cordoned off and demolished, then rebuilt further landward.<br>*Note: The erosion escarpment is currently 35-40 m from the building.* | Ocean View Beach, *Refer Coffs Harbour Coastal Asset Risk Registers numbers: 27, 139.* | 2 | Year 1 – record this action in Asset Management Plan. Dependent on decision to act after impact have occurred or prior, or otherwise implement relocation when asset replacement (for the amenities or sewer pipeline) is required. | Council | Staff time, plus $100,000 to $300,000 to relocate assets. | Nil | See Relocate Assets and Sacrifice Land Options (Chapter 5 of Coffs CZMS) |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Responsibilities | Estimated Cost / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **A.12** | Undertake actions specified in A.3 for remaining assets at medium to extreme risk between the present and 2100. Given the long timeframes for likely hazard impact, the expected life of asset will be important. | Council assets at high /extreme risk by 2100 *refer Coffs Harbour Coastal Asset Risk Registers Nos: 23, 7-8, 19, 21, 24, 29, 102-3, 120-3, 136, 1401, 147-8, 159, 185, 187, 219, 225, 238-9, 242.* | 2 | As soon as practical (may be completed in conjunction with A.3 if resources are available). | Council | Staff time. May require minor geotechnical consultancy for specific assets. | A.1 | See Audit of Existing Council Assets (Chapter 5 of Coffs CZMS) |
| **A.13** | 1. Investigate the height/level within stormwater pipes and outlets connected to the ocean and estuaries to determine the extent of;<br>permanent inundation with sea level rise; and<br>periodic inundation with storms plus sea level rise (i.e. coastal inundation at the levels specified in BMT WBM 2011).<br>2. Update the Asset Management Plan to include this information. | All stormwater outlets connecting to the ocean or estuaries. | 2 | Year 5 to 10 | Council | Staff time only | Nil | See Infra-structure Design Elements Option (Chapter 5 of Coffs CZMS) |
| **A.14** | Identity appropriate materials for use in all stormwater, wastewater and water assets that better withstands seawater impacts (including the outside of wastewater and water pipes and pump stations). Update the Asset Management Plan or other appropriate Council Policy / Resource to ensure that such designs are used in asset replacement. | All stormwater, wastewater and water assets. | 2 | Year 5 to 10 | Council | Staff time only | Nil | See Infra-structure Design Elements Option (Chapter 5 of Coffs CZMS) |
| **A.15** | For board and chain access ways, accept the risk to these structures and replace assets if and when damage has occurred, involving:<br>1. Conduct inspection of beach accessways and cordon off access at damaged walkways and highly eroded escarpments. Focus on most heavily used beaches first.<br>2. Once inspection is complete, compile a report to prioritise repair works.<br>3. Implement repairs as per the prioritised schedule. | All beaches | 2 | After a major storm, conduct actions 1 to 3. | Council | Staff time only. Minor costs to repair accessways (up to $1000 per structure) | Nil | See Sacrifice Land and Assets Option (Chapter 5 of Coffs CZMS). |

## 3.6 Beach and Dune Management

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **BD.1** | Implement dredging and sand placement program to improve sand reserves on Park Beach, as follows.<br>**Action Part a:**<br>• Develop a joint agreement between DoI – Crown Lands, the SIMP (managed by DPI) and Council for placement of dredged sand from Coffs Harbour on Park Beach.<br>• Develop a regular program for dredging of Coffs Harbour, including an investigation of the best location for placement of dredged sands (e.g. offshore in surf zone or on beach)<br>• Lobby NSW Government for funding assistance/ access to dredger to conduct the dredging program.<br>*Note: this action has commenced. DoI – Crown Lands has historically maintained a navigation channel from the inner harbour to the entrance to Coffs Harbour. This dredging activity has been undertaken in accordance with the overarching NSW Coastal Dredging Strategy (2017) and is fully funded by the state government. Where materials have met specifications, previous navigation dredging campaigns have nourished Park Beach with the dredged material. This activity has required the approval of the SIMP.*<br>*Dredging activities associated with the Council boat ramp on the southern side of the harbour, and the Coffs Harbour jetty, are primarily a Council responsibility. Part funding for this activity is available under the 'Rescuing Our Waterways' program, with funding subject to a competitive application process. Council is also responsible for regulatory and approvals processes for the ramp.* | Park Beach and Coffs Harbour, *refer Coffs Harbour Coastal Asset Risk Registers No.:1014, 44-47, 96101, 172-176, 270-272, 372376.* | 1 | Year 1 or as soon as practical | Council, DoI – Crown Lands (for inner arbour to entrance to Coffs Harbour, see Note for Action Part a; and for Action Part b) | Staff time.<br>Funding for Council dredging to be sought as part of this action.<br>DoI – Crown Lands dredging is fully funded by the state government (see Note in action details). | Nil | See Beneficial Use of Dredged Sand Option (Chapter 5 of Coffs CZMS) |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **BD.1** | **Action Part b.**<br>Seek opportunities to consult with DoI – Crown Lands to continue to improve the return of sand to Park Beach. This may include a review of Sand Mining Licence (Li 546616 (DOC15/130930)) held by Holcim (Australia) Pty Ltd for extraction of sand on Boambee Beach (max. 16, 000 $m^3$ per year, max. 3,000 $m^3$ per month), at the next licence renewal (i.e. 2020), with a view to improving the delivery of sand to Park Beach. Future license reviews could consider options to deliver sand to Park Beach, either by truck, dredging, or other means. | *As above* | *As above* | *As above* | *As above* | *As above* | *As above* | *As above* |
| **BD.2** | Undertake beach scraping and re-contouring to increase sand volumes and height of frontal dunes.<br>*Note:*<br>• *The outcomes of geologic investigations (FS.3) at Arrawarra's southern end may preclude the need for beach scraping due to bedrock substrates and fine sands.*<br>• *Beach scraping has not been noted for Campbells and Korora Beaches, as the frontal dunes lie within private property boundaries, and there is minimal distance from the high tide beach to re-establish a dune. These and Pelican Beaches are receding beaches.*<br>• *any scraping activities would require the appropriate regulatory and approval processes where material is proposed to be dredged from or placed on Crown Land.* | Emerald Beach (southern end), Sandys Beach, Woolgoolga Beach (southern end), Arrawarra Beach (southern end) | 1 | Opportunistically when monitoring shows that beaches are accreted following recovery from storm erosion | Council. | $5,000 - $10,000 per episode. | Nil | See Beach Scraping Option (Chapter 5 of Coffs CZMS) |
| | | Diggers beach, refer *Coffs Harbour Coastal Asset Risk Registers Nos.:22-3, 48, 58, 60, 62-65, 125-6, 128, 142-3, 205-207, 209-211, 223-4, 244-5, 273-276, 305-316, 318-326, 341-346, 377-380, 411-2, 418-422, 431-3, 447-449.* | 2 | | | | | |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **BD.3** | Work with existing or establish a formal dune care program, to undertake dune rehabilitation in priority locations, which shall also incorporate weed and pest management, and managing public access arrangements in terms of environmental and safety impacts.<br>This action must be undertaken in combination with beach scraping episodes to reduce loss of sand by wind. The dune care programs should be accompanied by community education regarding the role of dunes and dune vegetation to provide a buffer to storms, in addition to ecological benefits. Dune rehabilitation incidentally resolves and prevents issue relating to sand drift. | Emerald, Sandys, Woolgoolga, Arrawarra (southern end), Jetty, Park, Diggers | 1 | Year 1 or as soon as practical | Council | $5,000 – $20,000 per beach<br>*Reliance on NPWS limited budgets for Landcare is not sufficient / appropriate to implement this option.* | Combine with BD.1, BD.2, BD.4, BD.5 and BD.6 | See Dune Rehabilitation Option (Chapter 5 of Coffs CZMS) |
| | | Sawtell, South Park, Hills, Pelican, Riecks Point, Sapphire, Fiddamans, Safety, Cabins, Mullaway, Ocean View, Middle Corindi, | 2 | | | | | |
| | | Korora, Campbells | 3 | | | | | |
| | | North, Bongil, Boambee, Charlesworth Bay, Moonee, Shelly, Hearnes Lake, Woolgoolga Back, Arrawarra (northern end), Corindi North, Red Rock, Station, Pebbly. | 4 | | | | | |
| | | Public access arrangements: listed in Table 2-4, and prioritised according to beach priorities listed above. | As above | | | | | |
| **BD.4** | Investigate the use of sand from another source (i.e. nourishment), on a one-off basis to rebuild a frontal dune<br>*Note: the appropriate regulatory and approval processes are required where material is proposed to be dredged from or placed on Crown Land.* | Emerald (southern end), Sandys, Woolgoolga (southern end), Arrawarra (southern end) *refer Coffs Harbour Coastal Asset Risk Registers Nos.:22-3, 58, 60-65, 1256, 128, 142-3, 205-207, 209211, 223-4, 2445, 305-316, 318326, 341-346, 411-2, 418-422, 431-3, 447-449.* | 2 | Year 2 or as soon as practical | Council. | Staff time to conduct investigation. Nourished sands typically $25/m$^3$ (with volumes required to be determined through investigation). | Nil | See Beach Scraping Option (Chapter 5 of Coffs CZMS) |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **BD.5** | Develop, adopt and implement a Council policy that requires any sand removed from suitable estuary/lagoon entrances to be returned to the adjacent beach. The policy should include that any local excavation material from construction sites immediately adjacent to beaches that have a suitable particle size distribution should also be returned to the beach.<br>*Note: this action has been implemented in other locations, e.g. Gold Coast. Approvals will be required from the relevant authorities as part of the REF / Development Application. In particular, this action may trigger the Protection of the Environment Operations Act 1997 where transferring and placing excavated material may be classed as waste and so require sampling, analysis, approvals etc. Consultation with the EPA is required to better understand implications of this action.* | Entire LGA coastline | 2 | Year 5 – 10 | Council | Staff time only. | Nil | See Beach Scraping Option (Chapter 5 of Coffs CZMS) |

## 3.7 Environmental Planning and Further Studies

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.1** | Prepare or update Floodplain Risk Management Plans (FRMPs), including:<br>Conduct a flood study that combines ocean water level events, future sea level rise and catchment rainfall to determine the extent of inundation from both coastal inundation and catchment flooding hazards;<br>Use the flood study to update the Flood Risk Mapping to define low, medium and high flood risk precincts)<br>Prepare and apply flood planning levels for development and other strategies to manage the risks from inundation (i.e. prepare a Floodplain Risk Management Plan).<br>*Note: FRMPs are complete for Coffs Creek and are currently being prepared for Boambee / Newports Creek and Woolgoolga Lake.* | Woolgoolga Lake | 1 | Year 1 and as funding becomes available through the NSW Floodplain Management Program | Council | $100,000 - $200,000 per study (to be completed by external flood consultancy) | Nil | See Combined Flood Studies Option (Chapter 5 of Coffs CZMS) |
| | | Fiddamans Creek | 1 | | | | | |
| | | Hearnes Lake | 1 | | | | | |
| | | Bonville Creek (inc Middle and Pine Creek) | 1 | | | | | |
| | | Jordans Creek | 2 | | | | | |
| | | Moonee Creek | 2 | | | | | |
| | | Willis Creek | 2 | | | | | |
| | | Arrawarra (& Yarrawarra Creek) | 2 | | | | | |
| | | Corindi River | 2 | | | | | |
| | | Pipe Clay Lake | 3 | | | | | |
| | | Darkum Creek | 3 | | | | | |
| | | South Creek (Campbells), Hayes Creek | 3 | | | | | |
| | | Pine Brush Lagoon | 3 | | | | | |
| | | Creek at Charlesworth Bay | 3 | | | | | |
| | | Bundageree Creek | 3 | | | | | |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.2** | Cross check inundation mapping with emergency response and evacuation plans contained in the DISPLAN subplan Local Flood Plan, to ensure roads and properties affected by coastal inundation outside of known flood risk areas have an appropriate response in place.<br>Update flood emergency response plans based upon outcomes of FRMPs (refer Action FS.1.) when completed. | Priority locations are as per FS.1 above. | 1 | Year 2 or as soon as funding available (e.g. through NSW Coastal Program or other relevant source | Council<br>SES | Staff time | Nil | See Combined Flood Studies Option (Chapter 5 of Coffs CZMS) |
| **FS.3** | Conduct a geotechnical assessment to determine the depth to bedrock in areas shown to be at extreme to high risk of erosion and recession by 2100, focusing on residential areas (although the scope of the assessment may be expanded as required by Council). Ground-truthing or field work exercises during the study shall focus on those properties found to be at immediate high or extreme risk (such as at Sandys, Emerald, Woolgoolga and Arrawarra Beaches). The study shall also identify other substrates that may provide suitable foundation capacity to withstand erosion and recession hazards. The outcomes of the study may:<br>• identify properties likely to be able to provide foundation stability from local bedrock (or other substrate);<br>• constrain hazard extents during future revision of the hazard zones;<br>• provide a tool for Council to cross-check site specific geotechnical assessments (noting that this action shall not replace the need for site-specific geotechnical assessments to accompany development applications in coastal hazard areas) | Emerald | 1 | Year 2 or as soon as funding available (e.g. through NSW Coastal Program or other relevant source | Council | Geotechnical consultancy ~ $100,000 | Nil | See Geotechnical Assessment of Depth to Bedrock Option (Chapter 5 of Coffs CZMS) |
| | | Sandys | 1 | | | | | |
| | | Woolgoolga | 1 | | | | | |
| | | Arrawarra | 1 | | | | | |
| | | Bonville Head | 2 | | | | | |
| | | Sawtell | 2 | | | | | |
| | | Diggers | 2 | | | | | |
| | | Pelican | 2 | | | | | |
| | | Safety | 2 | | | | | |
| | | Cabins | 2 | | | | | |
| | | Ocean View | 2 | | | | | |
| | | Corindi | 2 | | | | | |
| | | Other areas / assets may be added to the study, as required by Council | 2 | | | | | |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.4** | Conduct condition audit for existing seawall at South Park Beach and investigation of future maintenance requirements (including for sea level rise). Enter maintenance requirements into Asset Management Plan. | South Park (*refer Coffs Harbour Coastal Asset Risk Registers Nos.: 87-95, 164-167, 268-9, 369-70, and indirectly 4043, 168-171, 269.*) | 1 | Year 2 or as soon as practical | Council | Minor consultancy ($10,000$15,000). Staff time to enter into Asset Management Plan | Nil | |
| **FS.5** | Investigate feasibility of extending existing seawall to mouth of Coffs Creek, including potential for funding assistance from benefitting landholders (e.g. Australian Rail Track Corporation (ARTC), Coffs Water, commercial businesses etc). The study shall provide triggers for implementation or alternative long term options where extension to the existing structure is not found to be feasible. Outcomes of the study should be entered into the Asset Management Plan, and consider cost sharing arrangements where applicable.<br>*Note: Where works are pursued, approvals may be required from the relevant authorities as part of the REF / Development Application.* | South Park, for: Rising mains (8); Commercial Dev't, Marina Drive, Orlando Street, North Coast Railway line, Beach, Important Habitat. *Refer Coffs Harbour Coastal Asset Risk Registers Nos.: 87-95, 164-167, 268-9, 369-70, and indirectly 40-43, 168-171, 269.* | 2 | If funding is available for a combined study, conduct with FS.4. Otherwise, commence when the northern end of the seawall is exposed by erosion (i.e., edge effects become apparent). | Council. | Minor consultancy ($10,000$15,000). | A.4 | |
| **FS.6** | Investigate long term options for managing the beach and assets, which may involve: beach nourishment, protection works, acquisition and retreat, or a combination of these options. The investigation shall include consultation with the various asset owners affected by the option.<br>*Note: the approach to adjacent lands (SLSC, Caravan Park, Macauleys Headland, etc.) is to enable natural retreat to ensure continuation of a portion of sandy beach. This may influence options to manage the central part of the beach. Where works are pursued, approvals may be required from the relevant authorities as part of the REF / Development Application.* | Park Beach (central section from Fitzgerald St and northernmost residences on Ocean Pde), *also refer Coffs Harbour Coastal Asset Risk Registers Nos.: 44-46, 98-101, 174, 270-272, 372-3.* | 1 | Year 2 or as soon as practical, due to proximity of existing erosion escarpment to the Hoey Moey building of ~20 m. | Council. | $25,000 for consultancy, or staff time | Nil | Refer Chapter 5 of CZMS for protect, retreat and accom-modate options |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.7** | Investigate options to manage the existing recession hazard, which may include constructing a seawall along entire beach or planned retreat. Study should consider new funding models involving joint partnerships between private property owners (e.g. funding models expected to form part of NSW Government coastal reforms in 2013). Design and construction of any protection options should enhance public access and amenity (such as public promenade/walkway on structure). Where a seawall is not found to be feasible, the study should outline alternative management options for all at risk assets.<br>*Note: Korora Beach is already highly degraded due to ongoing recession, with currently a coarse sandy beach that is relatively unsafe for swimming due to its steep beach face. There is limited (degraded) habitat or public reserve between the beach and private property, and limited sand reserves for short term alternatives such as dune management. While seawalls do result in a loss of beach amenity overtime, a seawall could be combined with promenades and public 'right of way' to improve the current public amenity and access to the beach.*<br>*Where works are pursued, approvals may be required from the relevant authorities as part of the REF / Development Application.* | Korora Beach (*refer also Coffs Harbour Coastal Asset Risk Registers Nos.:18, 1045, 191, 278-83, 383-4.)* | 1 | Year 2 or as soon as practical, due to proximity of erosion escarpment to private residences (<10 m in places) | Council. | $20,000 for consultancy, or staff time. | Nil | Refer Chapter 5 of CZMS for protect, retreat and accom-modate options |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.8** | Investigate options to manage the existing recession hazard, which may include constructing a seawall along entire beach or planned retreat. Study should consider new funding models involving joint partnerships between private property owners (e.g. funding models expected to form part of NSW Government coastal reforms). Design and construction of any protection options should enhance public access and amenity (such as public promenade/walkway on structure). Where a seawall is not found to be feasible, the study should outline alternative management options for all at risk assets.<br>*Note: Some private properties and public assets (such as the road) are at immediate erosion risk. Campbells Beach is highly degraded due to ongoing recession, with a coarse sandy beach that is unsafe for swimming due to its steep beach face, and limited habitat. Public foreshore access is limited to the high tide beach as private property boundaries extend to the erosion escarpment. Construction of a seawall offers the opportunity to regain public foreshore access, such as through 'right of way' agreements (as currently used at Sapphire Beachfront Estate development) and / or a public promenade at the top of the structure. The immediacy of the need for protection works at the Sapphire Beachfront Estate should be considered when investigating the southern end of Campbells Beach. The Sea Level Rise Action Plan (in the Community Management Statement accompanying the development) has set triggers for when action to manage SLR impacts to the Estate properties shall be investigated.*<br>*Where works are pursued, approvals may be required from the relevant authorities as part of the REF / Development Application.* | Campbells Beach (*refer Coffs Harbour Coastal Asset Risk Registers Nos.:51-2, 109-113, 195-6, 287-292, 388392.)* | 1 | *In progress* | Council. | $80,000 for consultancy, or staff time | Nil | Refer Chapter 5 of CZMS for protect, retreat and accom-modate options. |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.9** | Investigate the preferred approach to managing Jetty Beach, Jetty Beach foreshore and wastewater assets (being to either relocate assets and sacrifice the Jetty Beach foreshore parkland OR to protect Jetty Beach foreshore land and assets, and sacrifice the beach). Record the preferred option for the relevant sewer and other assets in the Asset Management Plan.<br>*Note: This action has commenced. The preferred approach has been determined and implemented. Coastal protection works were installed with a beach retained, improved public access and amenity and rejuvenated foreshore and public assets.*<br>*Future works are the subject of ongoing consultation as part of the Jetty Foreshore Master Plan, with public open space, commercial uses, beach access and asset placement and management being key considerations.* | Jetty Beach inc all assets, e.g. rising mains, Jetty Beach, Foreshore parklands, Important Habitat, Jordan Esplanade (*refer Coffs Harbour Coastal Asset Risk Registers Nos.:39, 83, 160, 366-7.*) | 1 | Prior to A.3 for Jetty Beach assets (as the outcomes of the study shall inform the audit) OR When the erosion escarpment is within 20 m of the rising main, whichever occurs sooner. | DoI – Crown Lands, Council. | Minor consultancy ($25,000$40,000) or staff time. | Nil | Refer Chapter 5 of CZMS for protect, retreat and accom-modate options. |
| **FS.10** | Conduct investigation of existing seawall protection (in addition to depth to bedrock as part of geotechnical assessment) to determine existing protection for houses and roadway. Provide recommendations for future management approach for roadway and houses.<br>*Note: Sawtell Reserve POM addresses the issue as follows "investigate and apply appropriate methods to protect and stabilise the northern bank of Bonville Creek near the mouth of Middle Creek". Substantial sections of the wall behind freehold properties backing onto Middle Arm are located on Crown land (below the defined MHWM). The bed of Middle Arm (i.e. land below MHWM) is not within Sawtell Reserve and not subject to a PoM, therefore future works in this area require a licence from DoI – Crown Lands. Other regulatory and approvals processes should also be sought for works arising from this action.* | Bonville Head adjacent to Bonville Creek and Bongil Beach (existing residential property, Boronia Street, *refer to Coffs Harbour Coastal Asset Risk Registers Nos.:144, 254-256*). | 1 | Year 5-10 or as soon as funding available (e.g. through NSW Coastal Program or other relevant source). | Council | Minor consultancy (~$25,000). | FS.3 | Refer Chapter 5 of CZMS for protect, retreat & accom-modate options. |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.11** | In close consultation between NPWS, Local Aboriginal Groups and Historical Societies, develop a decision framework for managing Aboriginal and Non-Indigenous Heritage Items and places affected by coastal hazards. The framework would include what actions are necessary when sites are uncovered by erosion. This may include relocating the item (for example, as is conducted for burial sites), re-burying the item elsewhere (for example as is done for midden sites), sacrificing the item or protecting the item (as is done for midden sites also). Initial focus should be given to the Arrawarra Fish Traps, which are at immediate risk. | Applicable to all beaches and estuaries. *Many sites of known heritage have not been identified for privacy reasons.* This option also aims to manage assets that at yet are unknown or unidentified. | 1 | Year 5-10 Implementation of the Framework is then only triggered once heritage items are uncovered or seriously threatened by future coastal erosion. | OEH, with assistance from Council to provide the hazard and risk information. | Staff time or consultancy if required. | Nil | See Heritage Man't Option (Chapter 5 of Coffs CZMS) |
| **FS.12** | Undertake a study of important plant communities and habitat areas (e.g. EECs) within the hazard zones to investigate priorities for managing erosion and recession and permanent inundation due to sea level rise, to:<br>• Identify flora/fauna species that, due to their limited distribution, need to be managed;<br>• Prioritise rehabilitation needs based upon the relative threat from coastal hazard impacts, to protect and enhance lower risk distributions, particularly those with conservation significance; and<br>• Identify areas as designated buffers around important habitats, to enable migration in response to hazard impacts.<br>The above actions should feed into biodiversity strategies, which do not specifically require coastal hazards impacts to be assessed when determining risk and resilience of ecosystems. Strategies to apply the above actions include the Coffs Harbour Biodiversity Action Strategy (e.g. C1.1 and C1.2), estuary CZMPs, Natural Area Restoration Plans, and Coastal Reserve Plans. Council to collaborate with OEH and NPWS. | All known EEC and important habitat areas, including parks, reserves and waterways (taking into consideration both risk to habitats to 2100 and these areas in context of the entire network of habitats). | 2 | Year 5-10 | Council. | Staff time only, or minor consultancy ($50,000 - $100,000). | Nil | See Habitat Man't Option (Chapter 5 of Coffs CZMS) |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **FS.13** | Update Woolgoolga Beach Reserve POM to incorporate relevant actions from this CZMP for assets within the reserve boundary (i.e., Action A.7. A.8, and refer to Appendix B Asset Risk Register Spreadsheet for Woolgoolga Beach for other relevant actions).<br>*Note this action has commenced, but may be considered again at next POM review. Woolgoolga Lakeside Reserve POM (including Woolgoolga Lakeside Holiday Park) was adopted in 2013; Woolgoolga Beach Reserve POM (including Woolgoolga Beach Holiday Park) was adopted in 2017.* | Woolgoolga Beach (Reserve) | 2 | At next review of the POM | Council (as Reserve Trust Manager), plus further discussion with DoI – Crown Lands. | Staff time only. | Nil | |

## 3.8 Planning and Development Controls

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **P.1** | Prepare a Coastal Hazards section for Part D of the DCP to manage erosion and recession and wave overtopping risks to future development and re-development. The controls should be applicable to the type of development (e.g. high density residential, alterations/additions, public facilities) and level of risk (extreme, high, medium, low). Refer to Chapter 5 of Coffs CZMS for information on risk approach to different types of development. Criteria / controls in the DCP should include:<br>• Setbacks for development behind a specified hazard zone (e.g. "unlikely" hazard line), proposed seawall alignment or Foreshore Building Line;<br>• Foundation capacity requirements, triggering a site specific geotechnical assessment for depth to bedrock. Particularly where there is no foundation capacity, consider<br>• Applicability of using temporary, sacrificial or relocatable structures (e.g. lifeguard towers, park cabins);<br>• Alternative locations for the structure (especially public assets);<br>• Distance-Based Development Approvals<br>• Minimum floor levels for wave overtopping;<br>• Maximum floor area for buildings and alterations and additions.<br>*Note: The Sapphire Beachfront Estate may require separate controls within the DCP (e.g. as an area control plan) as the development has already included works and management controls to reduce the impact of coastal hazards to properties in the Estate.* | All land areas within the 2100 Erosion and Recession Hazard or Risk Area *Note: Coastal inundation (excluding wave overtopping) shall be managed through flood planning controls, see Action P.4, P.5, FS.1, FS.2* | 1 | Year 1 or as soon as practical | Council | Staff time or consultancy ($25,000 $50,000) | Nil | See Coastal Hazards Develop-ment Controls Option (Chapter 5 of Coffs CZMS) |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **P.2** | Integrate Coastal Zone Management into Council's operations by conducting internal Council training to educate the different Council departments and the Councillors about coastal hazards zones and the CZMP, to support greater consideration of coastal hazards and development controls in Council planning and other activities.<br>Repeat internal education on a regular (1 -2 yearly) basis. | Whole of Coffs Harbour City Council | 1 | Year 1 or as soon as practical | Council | Staff time only | Nil | See Integrate CZM Planning within Council Option (Chapter 5 of Coffs CZMS) |
| **P.3** | Prepare an internal checklist, guideline or policy document to facilitate the consideration of coastal hazard zones and timeframes by Council in the preparation or revision of:<br>• Community & Crown Land Plans of Management,<br>• Masterplans<br>• Review of Environmental Factors (REF) for works not requiring development consent<br>• DCPs<br>• At the early stages of planning new infrastructure and conducting strategic planning (e.g. designing new road networks, sewer networks etc.) (i.e. prior to preparation of development applications), and<br>• Any other works not requiring development consent or assessment | Whole of Coffs Harbour City Council | 1 | Year 2 or as soon as practical | Council | Staff time only | Nil | See Integrate CZM Planning within Council Option (Chapter 5 of Coffs CZMS) |

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **P.4** | Review and apply Council's existing Flood Prone Land Policy to all coastal catchments without current Floodplain Risk Management Plans, using the Coastal Inundation Hazard water levels as an interim low risk flood planning level.<br>*Note: this is an interim action only, to capture risks from coastal inundation until such time as Flood Studies and Floodplain Risk Management Plans that investigate the combined influences of the ocean and catchment have been completed for all coastal catchments.* | Whole LGA | 1 | Year 2 | Council | Minimal staff time only | Nil | See Coastal Hazards Dev't Controls Option (Chapter 5 of Coffs CZMS) |
| **P.5** | Where a catchment has an existing Floodplain Risk Management Plan that has included an allowance for sea level rise, application of this plan shall incidentally manage coastal inundation | Whole LGA | 1 | Year 2 | Council | Minimal staff time (as using existing plans) | Nil | See Coastal Hazards Dev't Controls Option (Chapter 5 of Coffs CZMS) |
| **P.6** | When reviewing the zoning of land using the Planning Proposal and Gateway Process, utilise the most current hazard mapping and monitoring data to identify at risk land for rezoning (or to keep appropriate zoning), to reduce future risks to future development<br>*Note: the Planning Proposal and Gateway Process includes both Local Environment Plan (LEP) reviews conducted by Council and rezoning proposals that may accompany development applications.* | Whole LGA | 1 | At next review of LEP | Council | Staff time only | Nil | See LEP Review and Rezoning (Chapter 5 of Coffs CZMS) |

## 3.9 Monitoring

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **M.1** | Survey the beach in cross section at regular profiles along the beach. Survey profiles should be established at 50 or 100 metres apart along the beach, and to capture significant assets (e.g. surf clubs, residences at risk, sewerage assets). Preferably, the beach profiles should align with the existing photogrammetric profiles at the beaches, to enable the new data to be assessed in context with the historical data.<br>Where considered useful, install a marker (e.g. stake with signage in the dunes seaward of a surf club or other significant beach positions / assets) as a community education tool to illustrate the natural fluctuations in beach position with storms, and potential recession in the future with sea level rise.<br>The monitoring program and installation of markers / sighting poles could investigate the use of assistance from local dune care groups (e.g. as a pilot program, utilising basic survey techniques such as the Emery method that have enabled monthly surveying of Narrabeen Beach for >35 years). | Park | 1 | Year 1, then every 6-12 months, plus immediately after major storm events (i.e. Hs > 4-5 m) | Council | Staff time only (internal cost of about $20,000 per year) | Nil | See Monitoring Option (Chapter 5 of CZMS) |
| | | Korora | 1 | | | | | |
| | | Campbells | 1 | | | | | |
| | | Emerald (inc. Fiddamans Creek entrance) | 1 | | | | | |
| | | Sandys | 1 | | | | | |
| | | Woolgoolga (inc Lake entrance) | 1 | | | | | |
| | | Arrawarra (inc Creek entrance) | 1 | | | | | |
| | | Refer to Coffs Harbour Coastal Asset Risk Registers for assets at immediate to 2050 extreme / high risk that should be regularly assessed. | 1 | | | | | |
| | | Sawtell | 2 | | | | | |
| | | Diggers (inc. Jordans Creek entrance) | 2 | | | | | |
| | | South Park | 2 | | | | | |
| | | Jetty & northern end of Boambee Beaches (Gallows) | 2 | | | | | |

**Management Action Implementation Details**

| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **M.2** | Collect or otherwise obtain aerial laser survey data for the beaches and process the data to create a 4 m AHD contour at each beach, except for Jetty and Charlesworth use the 2m AHD contour and the 3 m AHD contour at Sandys Beaches. Measure the perpendicular distance between the contour and significant assets to determine if or when a trigger has been breached, requiring action to manage erosion or recession for the assets. | All beaches and assets.<br>Refer to Table 5-4 in Coastal Zone Management Study (BMT WBM, 2018) for trigger distance to assets at each beach | 1 | Year 2 for processing the existing aerial laser survey data to establish a baseline distance to assets.<br><br>Repeat every 2-3 years. | Council. | Staff time only, or consultancy ($20,000 - $50,000) if there is no government run state-wide LiDAR collection program. | Nil | See Monitoring Option (Chapter 5 of Coffs CZMS) |
| **M.3** | Monitor lagoon / coastal creek entrance breakout level, frequency and berm height, as sea level rise (including recession) impacts upon the entrance configuration. | Hearnes Lake requires separate monitoring.<br>Berms captured by beach profile monitoring at:<br>• Woolgoolga Lake<br>• Fiddamans Creek<br>• Arrawarra Creek<br>• Jordans Creek | 1<br><br>2 | In combination with M.1 | Council. | Staff time only. | M.1 | See Monitoring Option (Chapter 5 of Coffs CZMS) |
| **M.4** | Monitor frequency, depth and spatial extents of coastal inundation events. | Boambee | 1 | Event-based monitoring | Council | Staff time only | Nil | See Monitoring Option (Chapter 5 of Coffs CZMS) |
| | | Coffs | 1 | | | | | |
| | | Woolgoolga | 1 | | | | | |
| | | Bonville | 1 | | | | | |
| | | Fiddamans | 1 | | | | | |
| | | Corindi | 1 | | | | | |
| **M.5** | Re-run risk assessment based on monitoring results and revise management response if risk level changes (i.e. increase or decrease in level of risk). | All beaches | 1 | After ~ 10 years of monitoring | Council | Staff time only, or minor sub consultancy (up to $25,000) | M.1 – M.4 | See Monitoring Option (Chapter 5 of Coffs CZMS) |

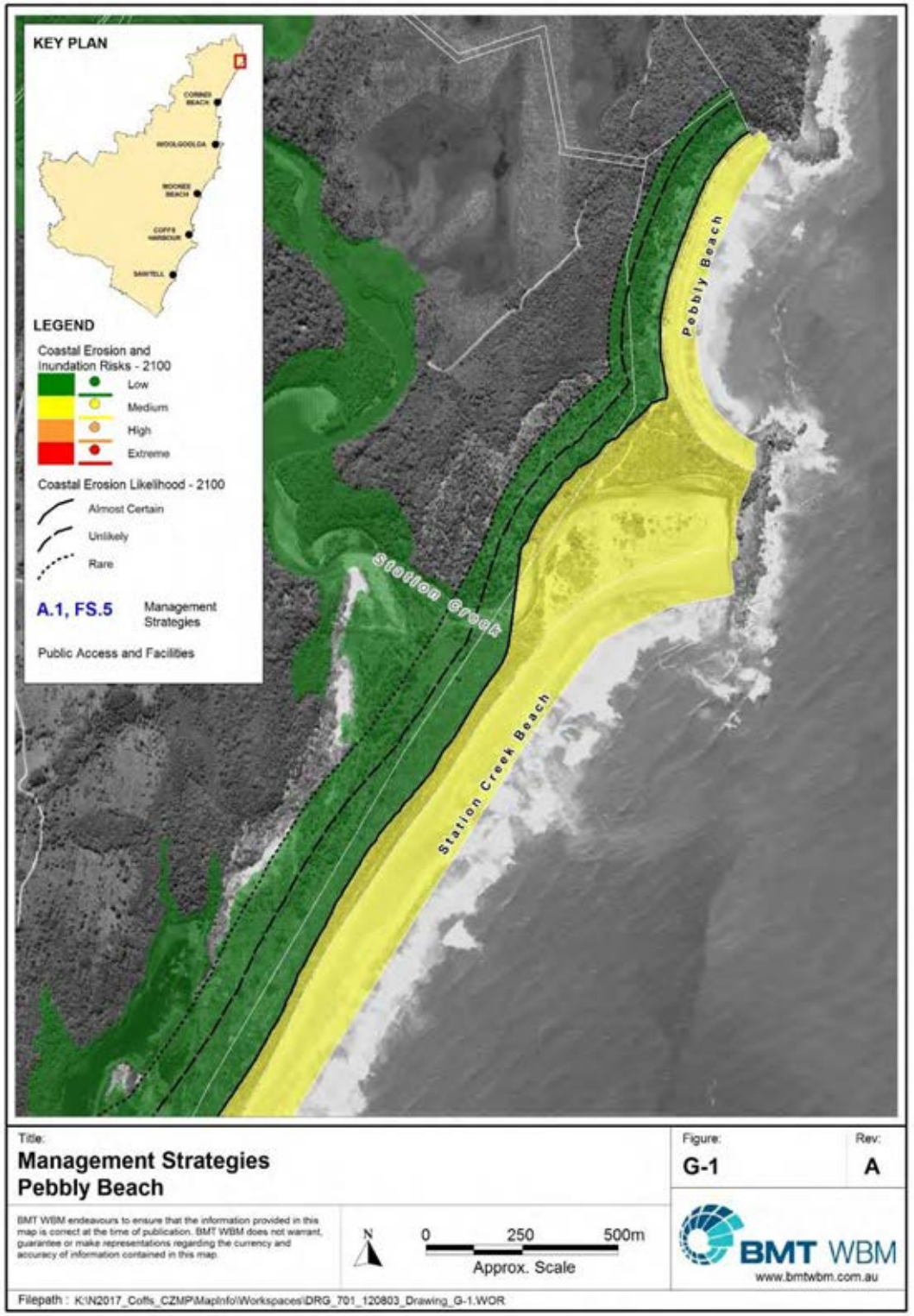
## 3.10 Non-Council Asset Management

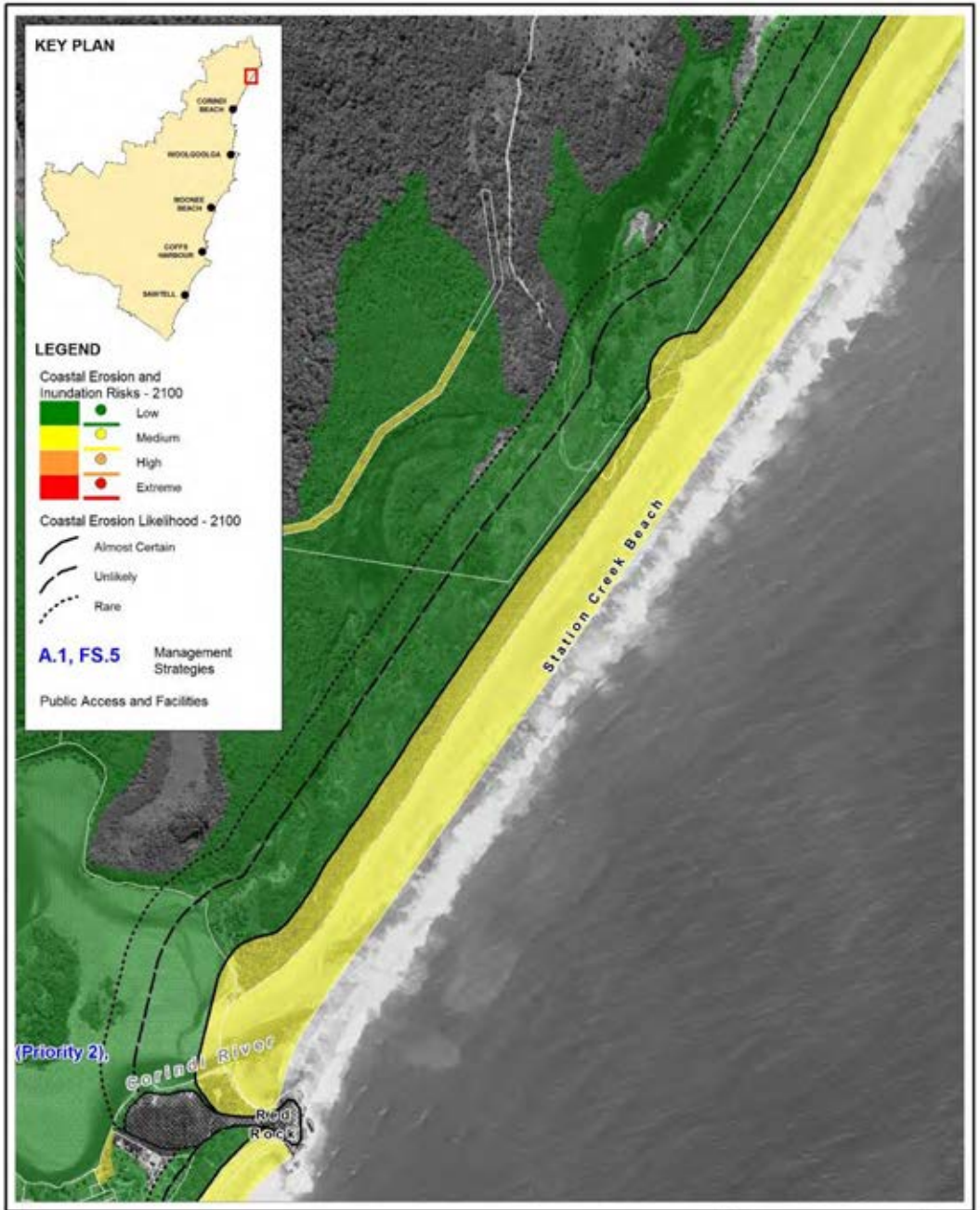
| Ref. | Action | Beach Location(s) | Priority | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Preceding Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **NC.1** | Provide erosion and recession, and coastal inundation hazards mapping to all non-Council government agencies and management authorities, to assist them in managing risks to their assets (e.g. breakwaters, revetments, bridges, foreshores, Marina, boat ramps and harbours not in Council control). | Coffs Harbour *(refer also Coffs Harbour Coastal Asset Risk Registers Nos.: 161-163, 363)* | 1 | Year 1 or as soon as practical. | Council | Minimal staff time only | Nil | See Asset Management Planning Option (Chapter 5 of Coffs CZMS) |
| **NC.2** | Provide erosion and recession, and coastal inundation hazards mapping to ARTC for North Coast Railway line sections at risk. Recommend to ARTC that the following options be further investigated for the bridge and line section at the southern end of Boambee Beach, and line section at the centre of Boambee Beach:<br>• Relocate bridge section, pylons and line section further landward.<br>• Retrofit bridge section, pylons and line section in current location (e.g. raising the line section onto a bridge with pylons to withstand impacts). | Boambee Beach, South Park Beach (*refer also Coffs Harbour Coastal Asset Risk Registers Nos.: 156-8*) | 1 | Year 1 or as soon as practical. | Council to provide data and suggest management options to ARTC | Minimal staff time only | Nil | See Asset Management Planning Option (Chapter 5 of Coffs CZMS) |

## 3.11 Community Education

| Ref. | Action | Beach Location(s) | Pri o-rity | Timing / Trigger | Respon-sibilities | Estimated Costs / Resources | Precedin g Actions | Further Info. |
|---|---|---|---|---|---|---|---|---|
| **E.1** | Prepare and implement an ongoing community education program, to inform the community about coastal risks. The risk approach is a useful way of expressing to community both likelihood and consequence from coastal hazards. This approach assists the community to make their own decisions based on how they perceive the risk from coastal hazards over the likely timeframes of impact (i.e. present to 2100). Education now will assist the community to understand how Council may need to respond to coastal hazards now and in the future, and prepare the community to accept and implement future actions. Education regarding coastal risks and intended management responses should be repeated frequently (e.g. 1 – 2 yearly), with the program incorporating improved information as it becomes available. | At various locations across the LGA | 1 | Year 2, then every 1-2 years | Council | Staff time only, with possibly minor consultancy assistance ($10,000 $20,000) | Nil | See Comm-unity Education Option (Chapter 5 of Coffs CZMS) |

## 3.12 Management Strategy Maps






Title:
**Management Strategies**
**Station Creek Beach**

Figure: **G-2** Rev: **A**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Approx. Scale

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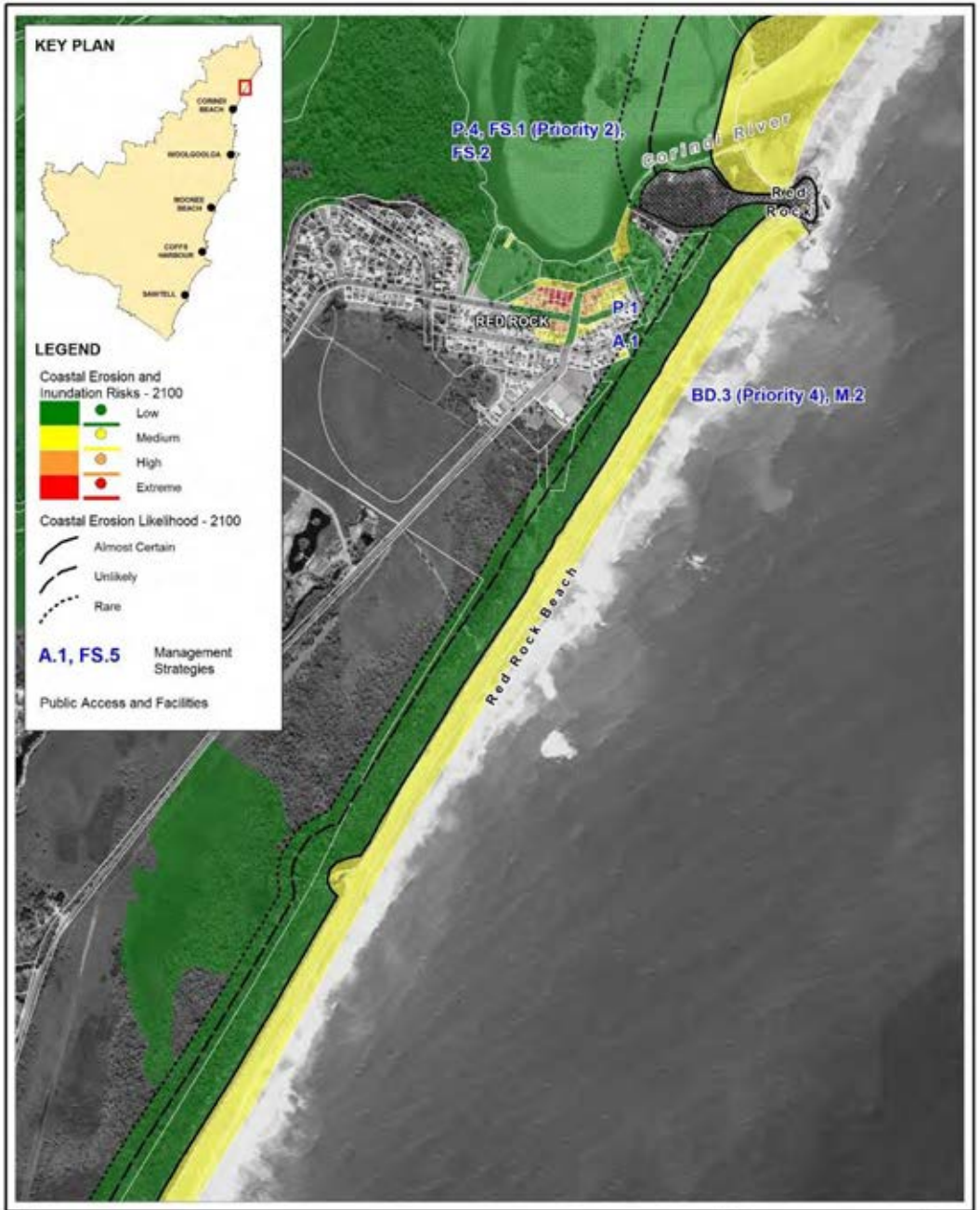


Title:
**Management Strategies**
**Red Rock Beach North**

Figure: **G-3** Rev: **A**

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Approx. Scale

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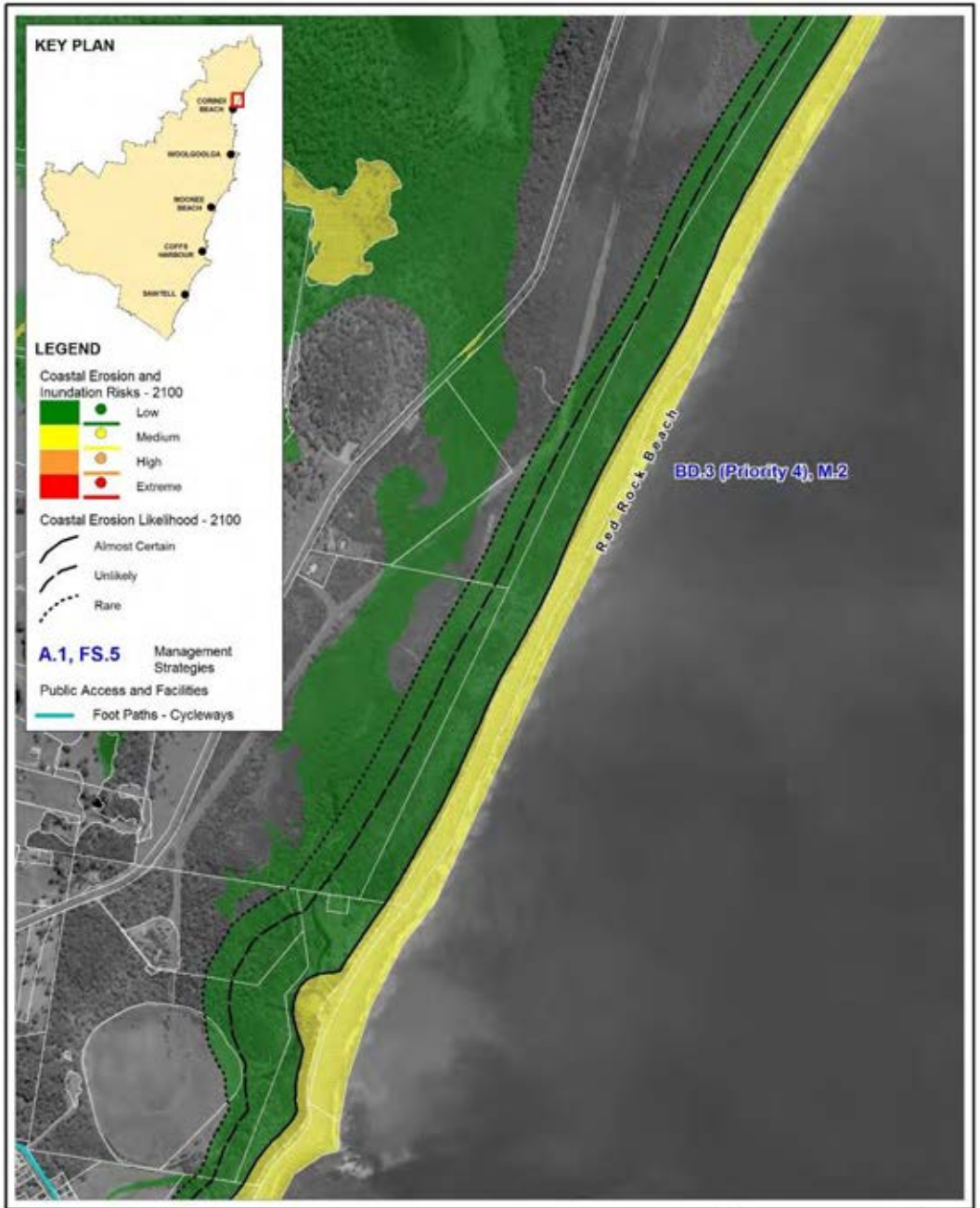


Title:
**Management Strategies**
**Red Rock Beach South**

Figure: G-4 Rev: A

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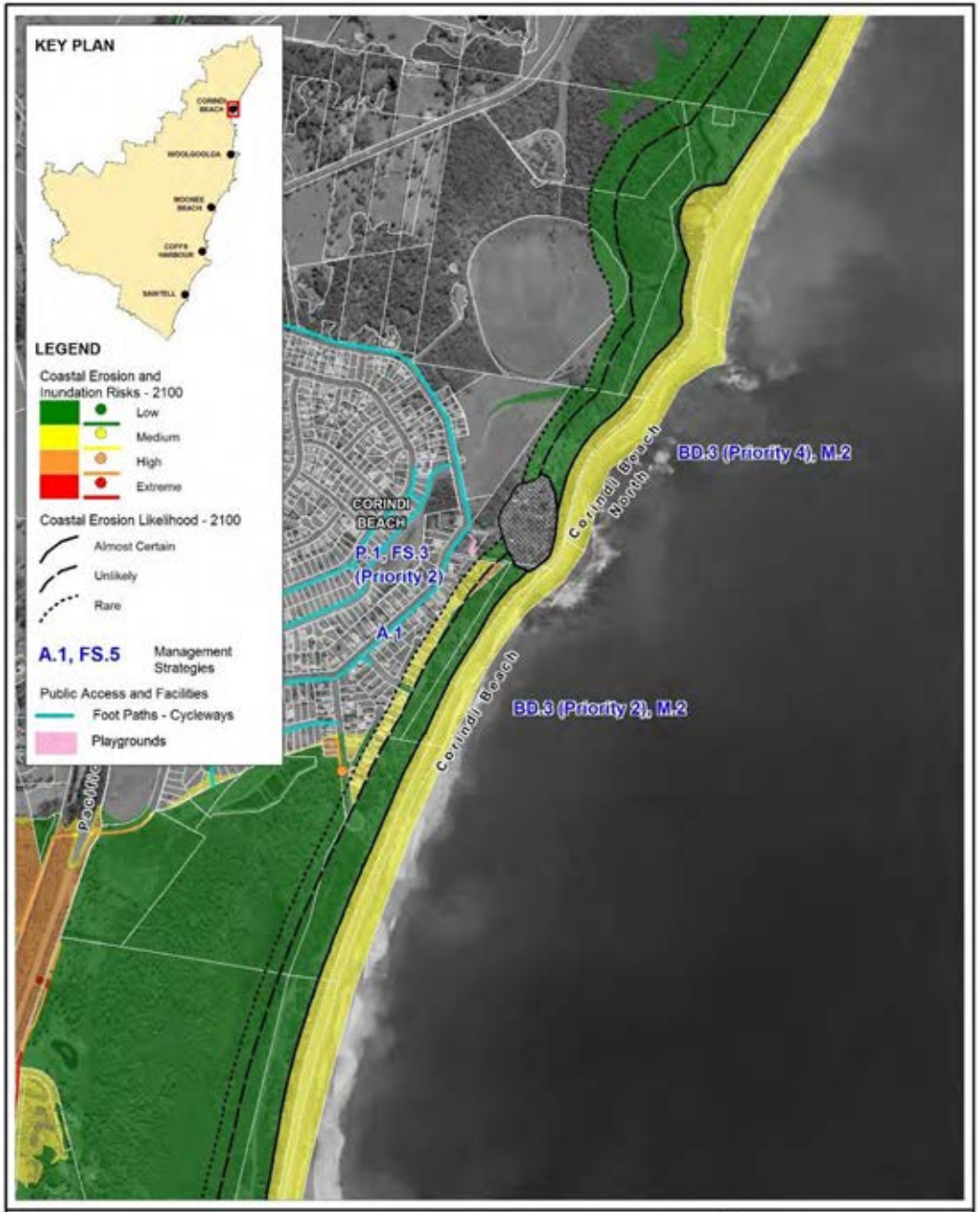


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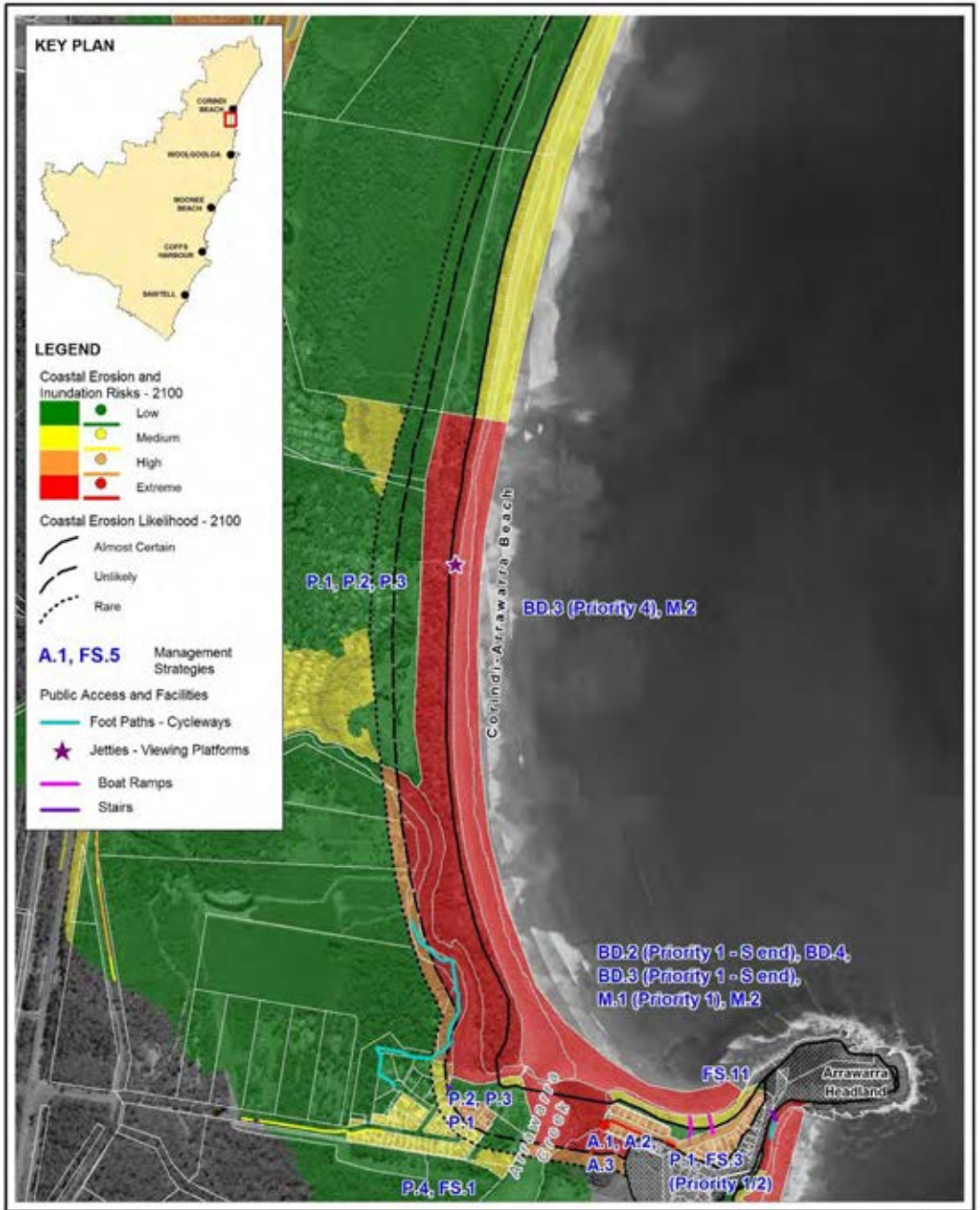


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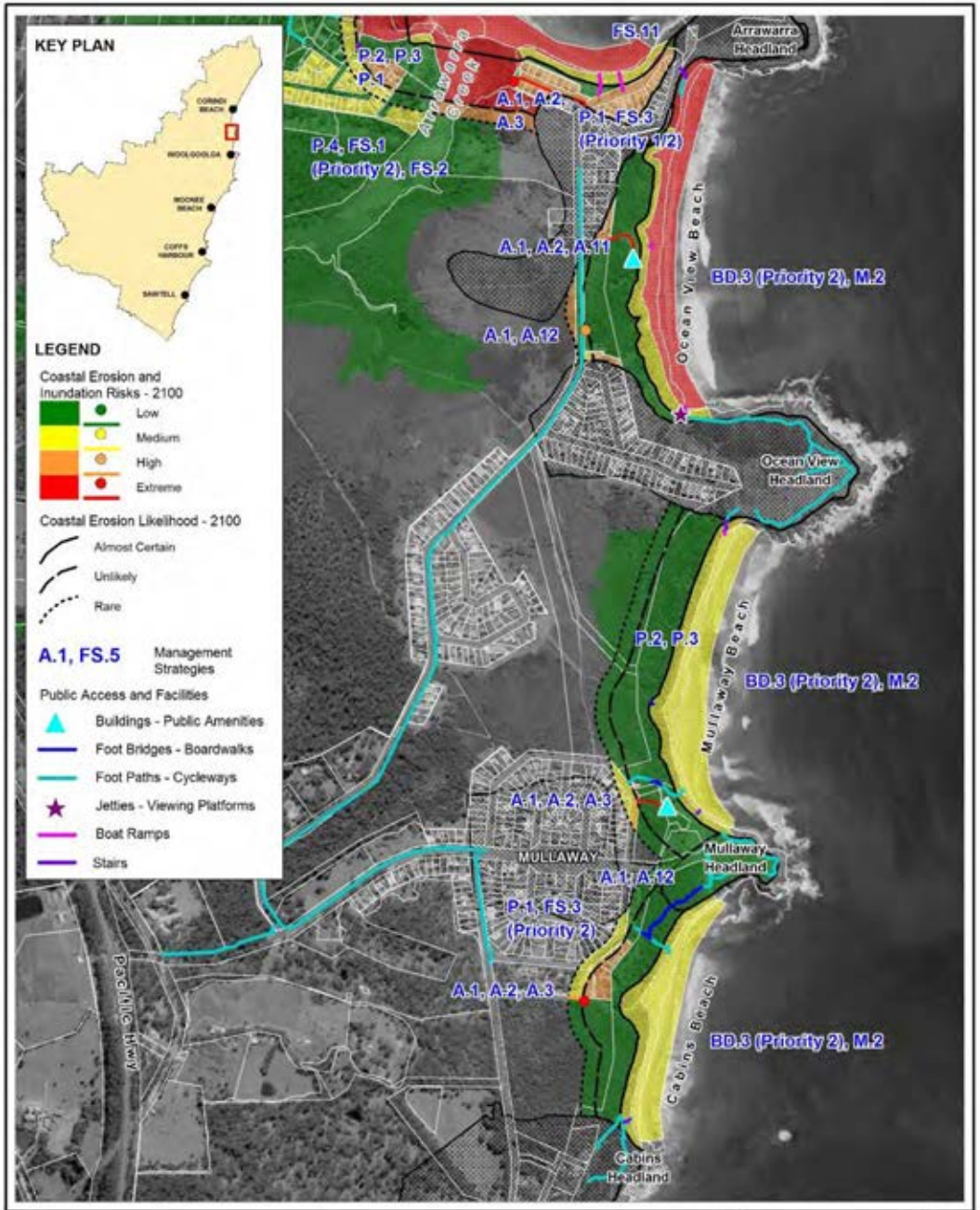


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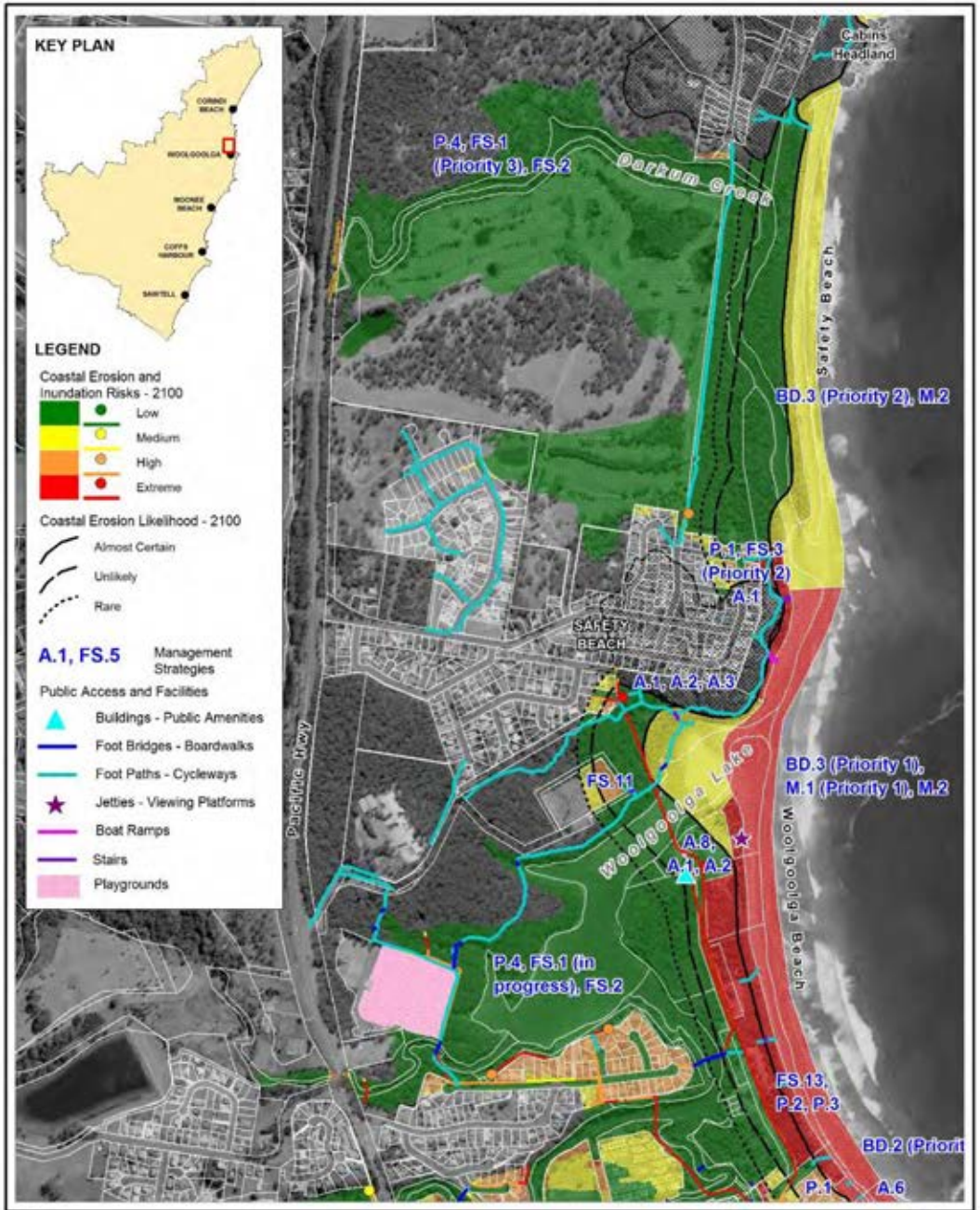


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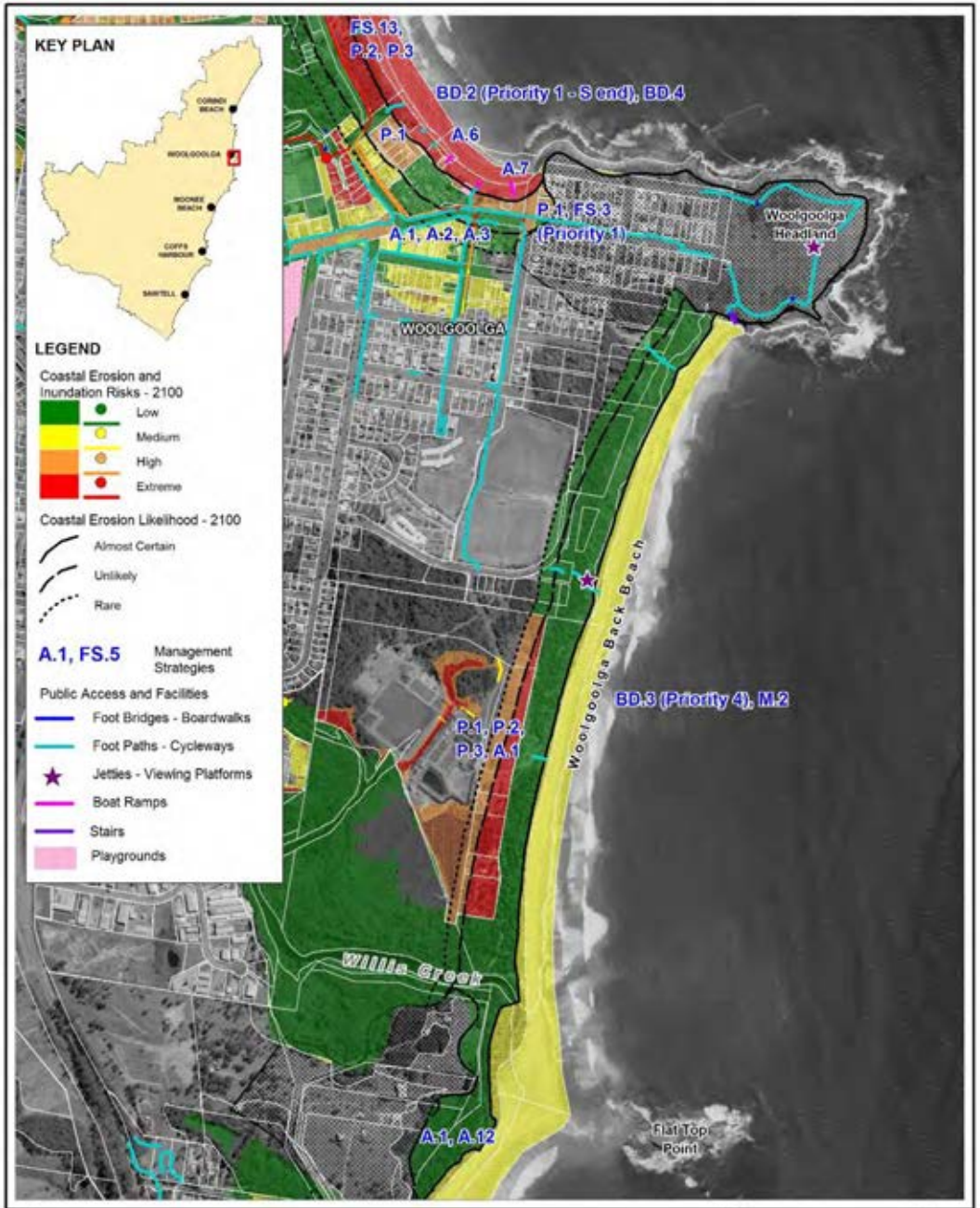


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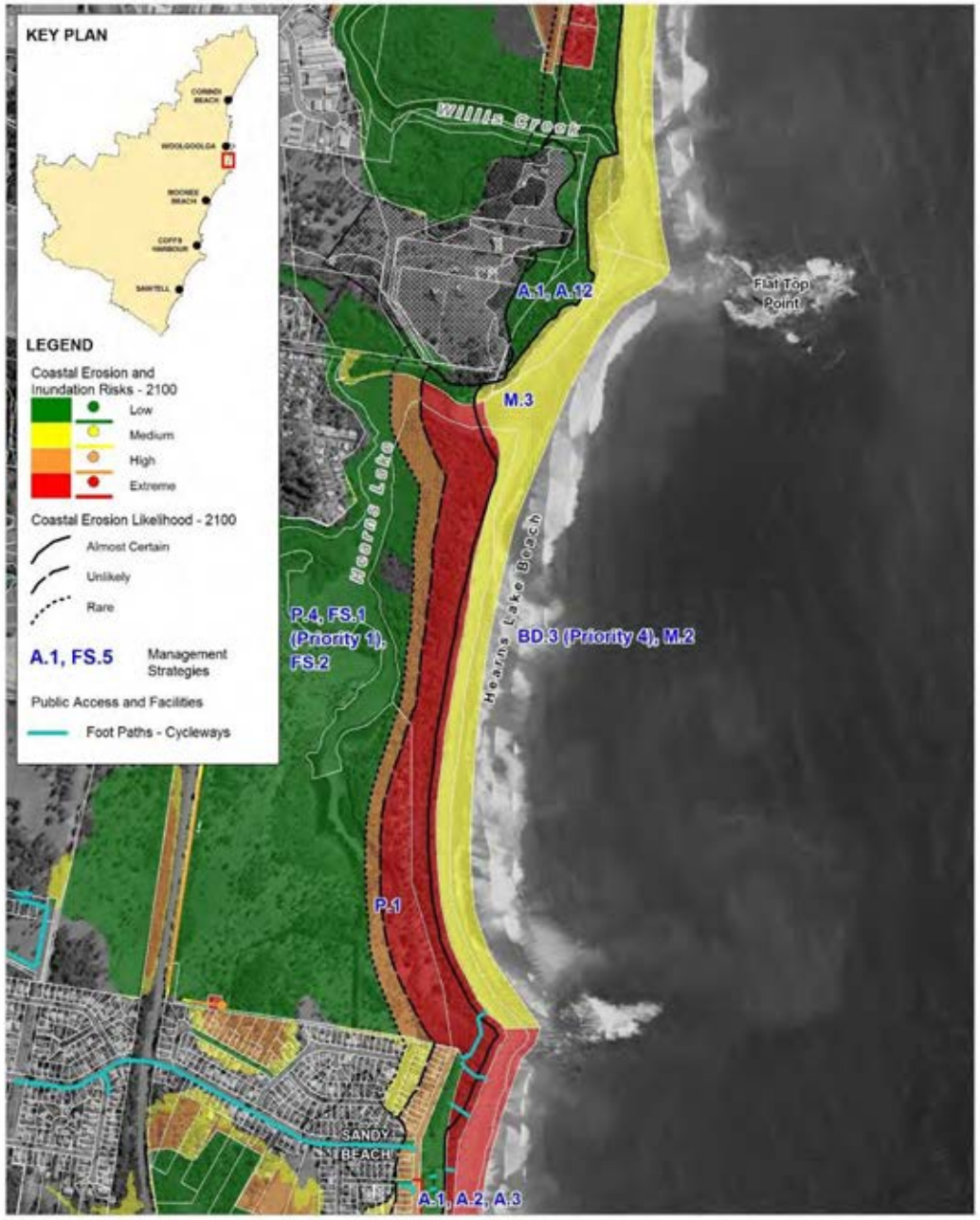


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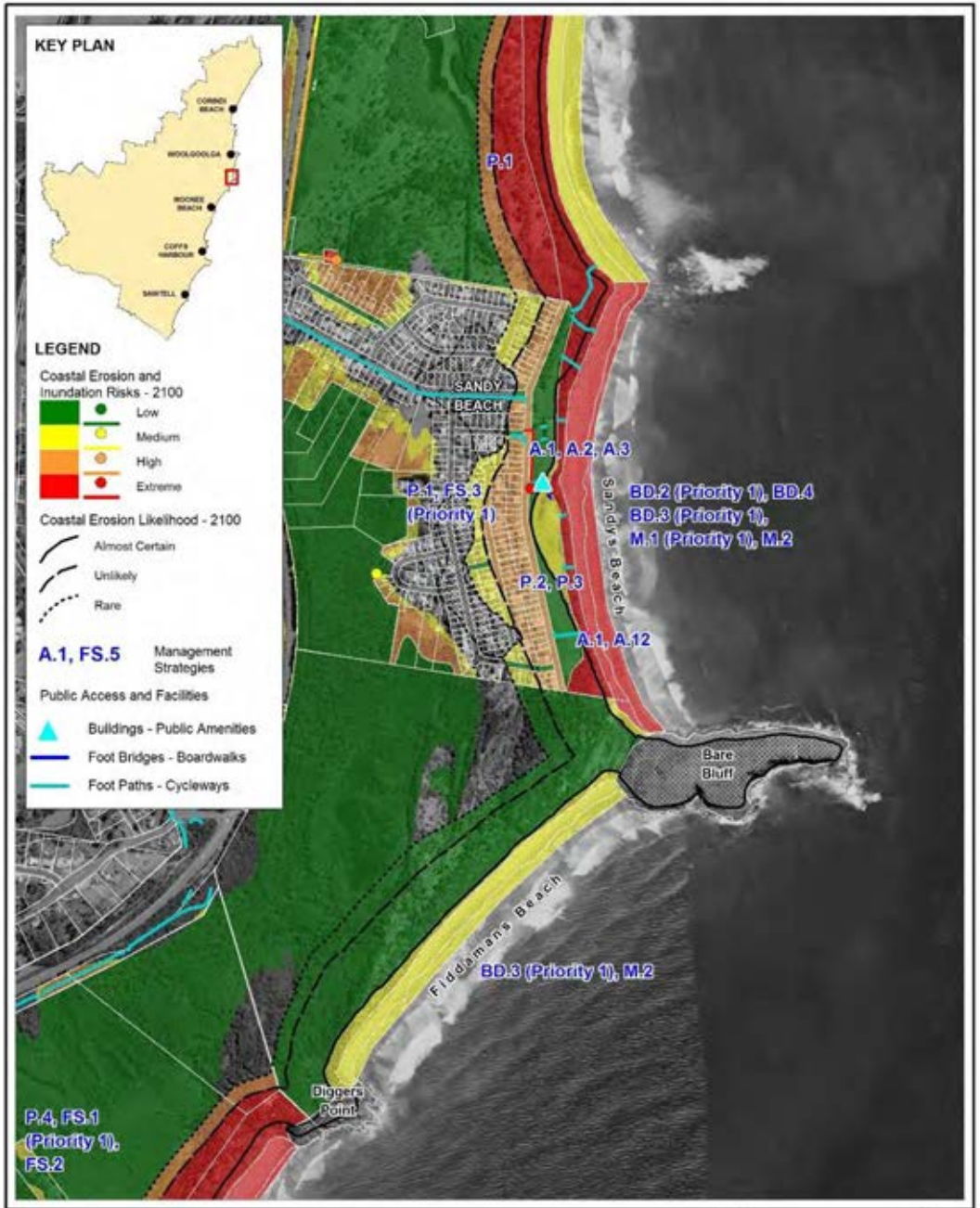


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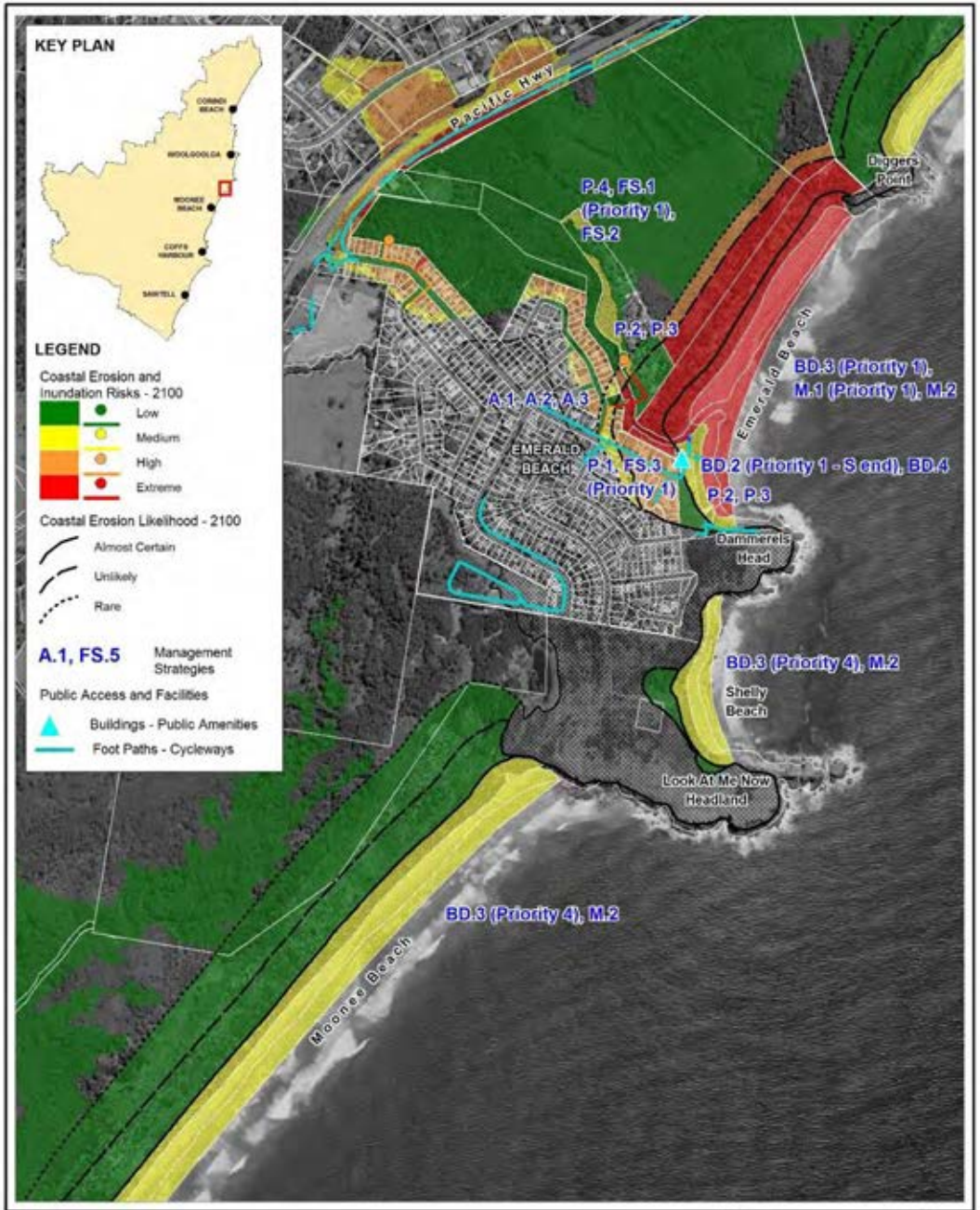


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**Emerald Beach**

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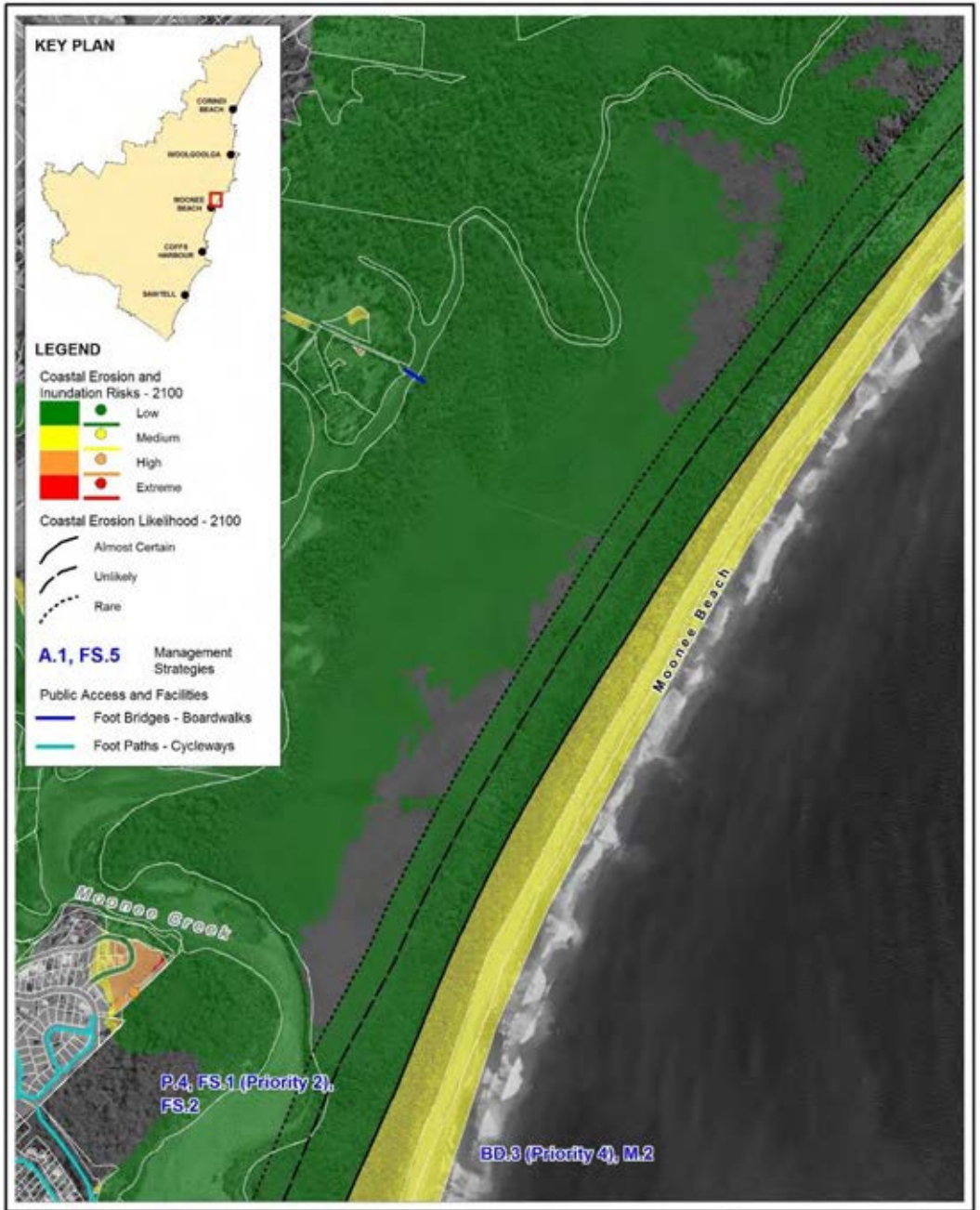


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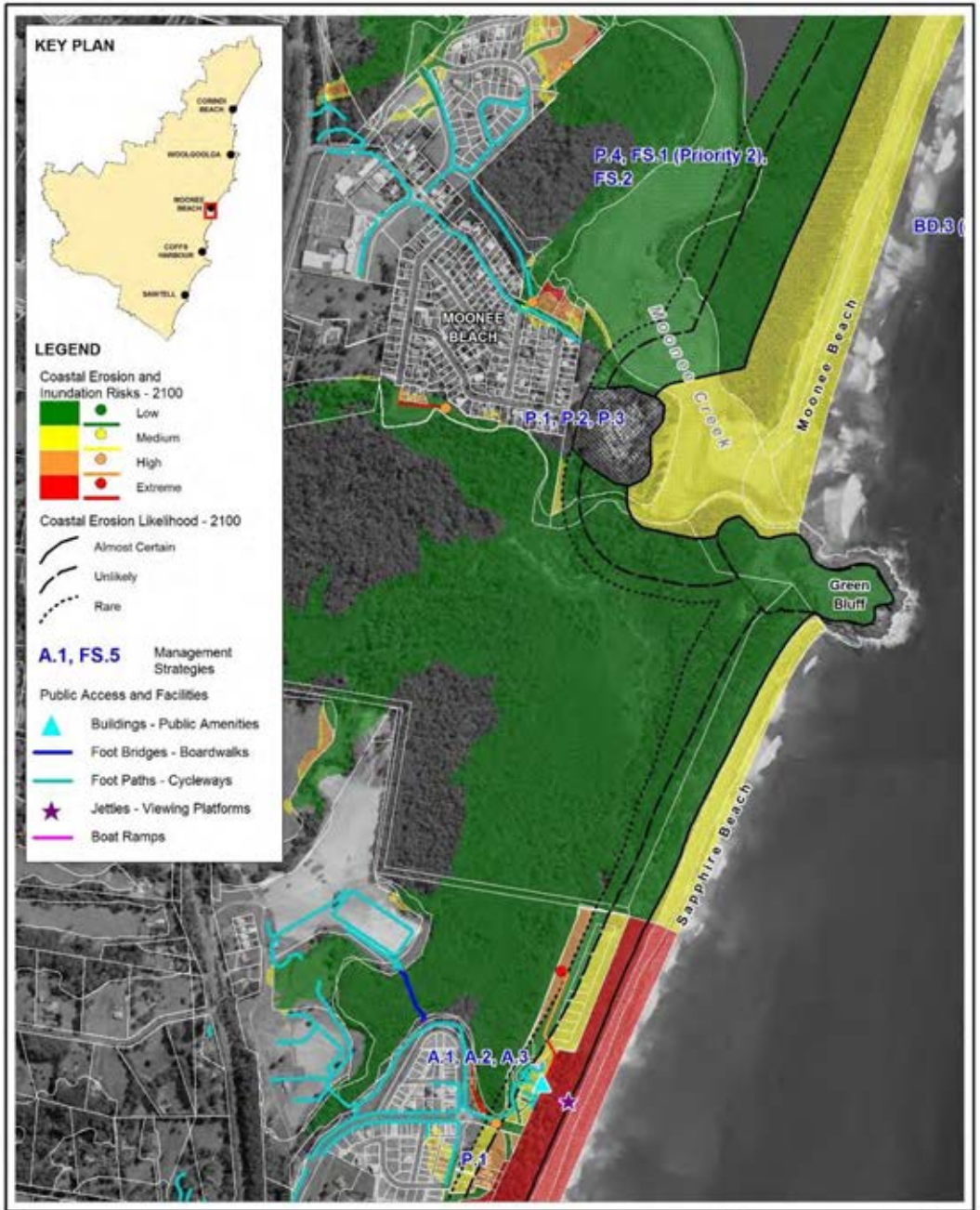


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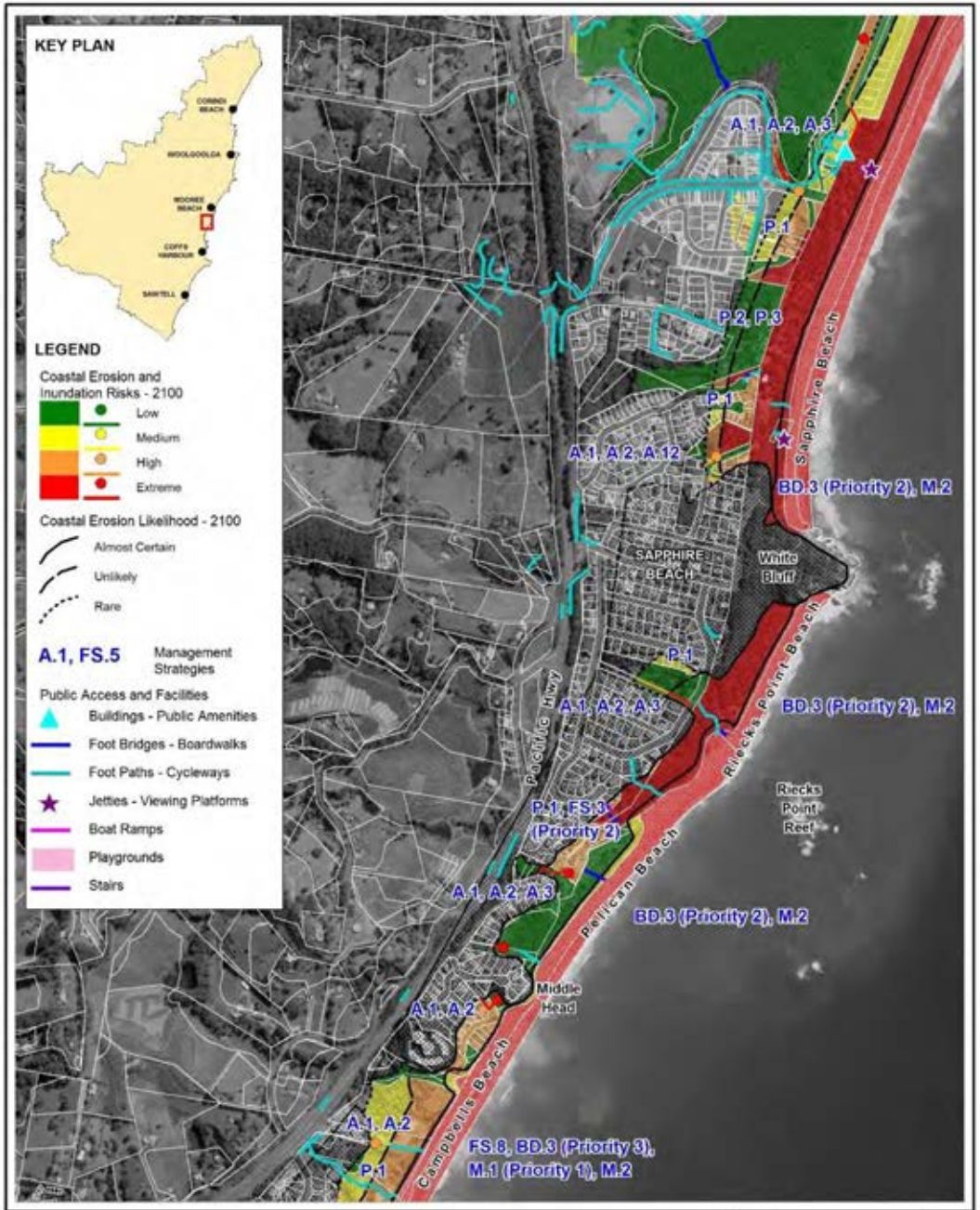


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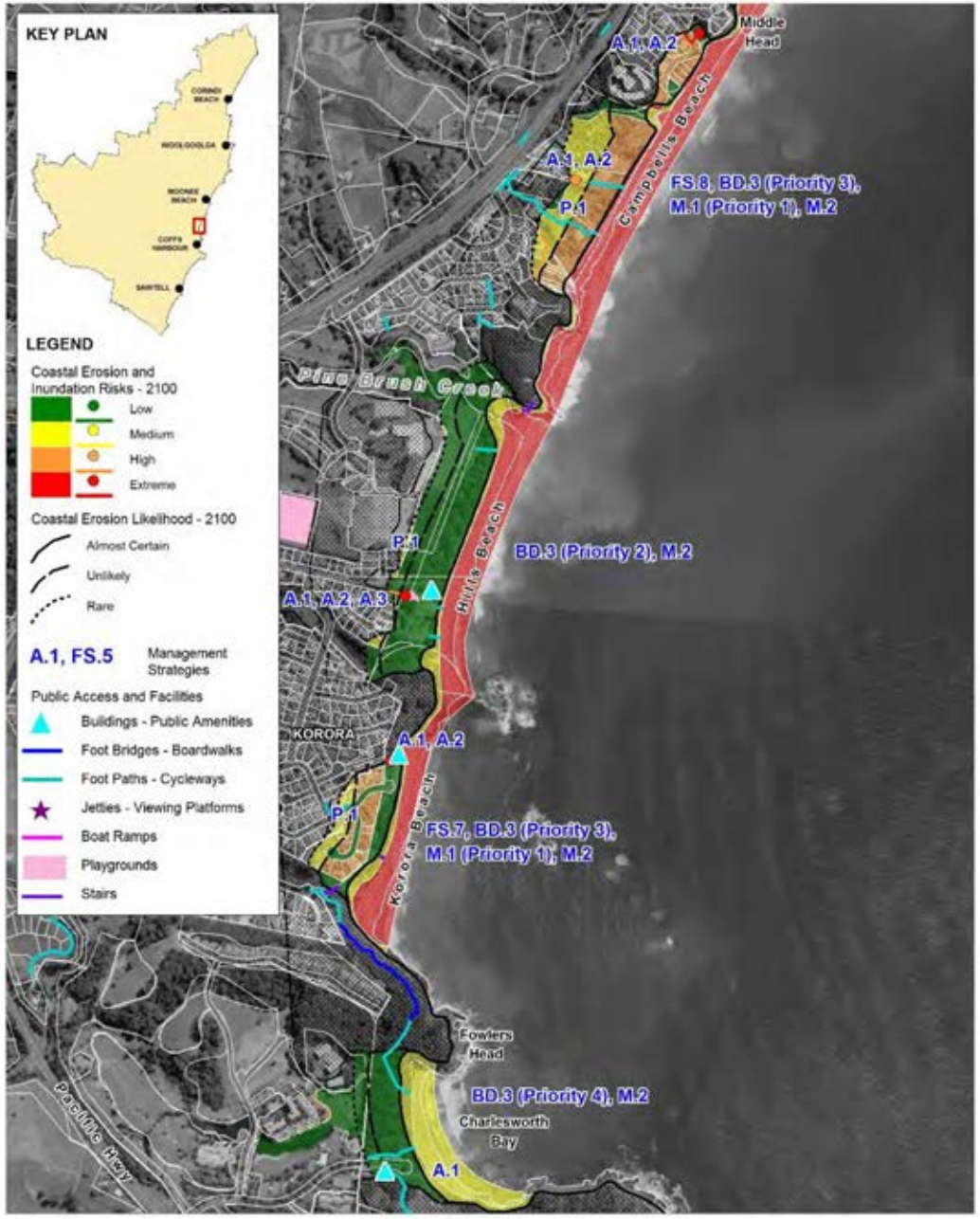


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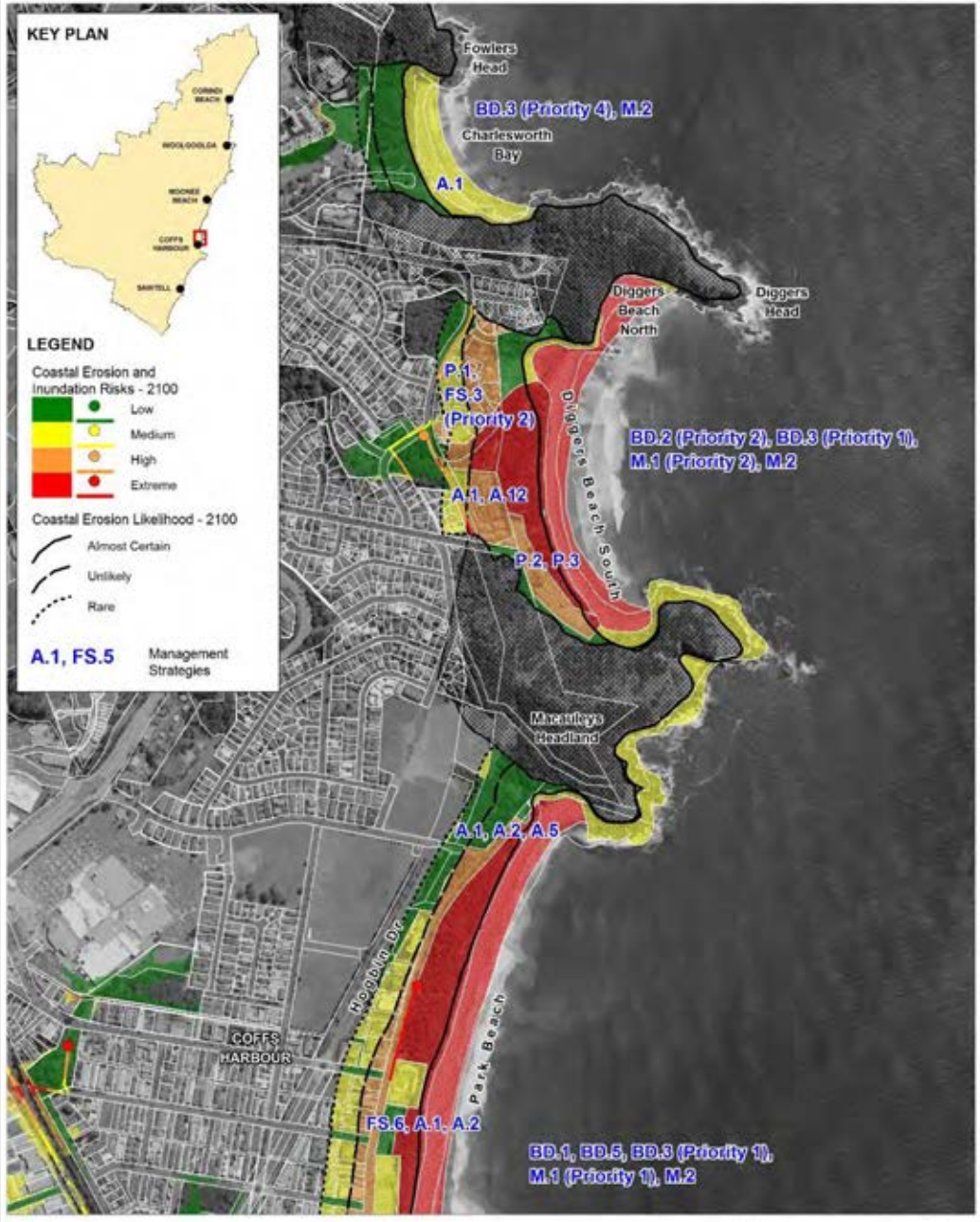


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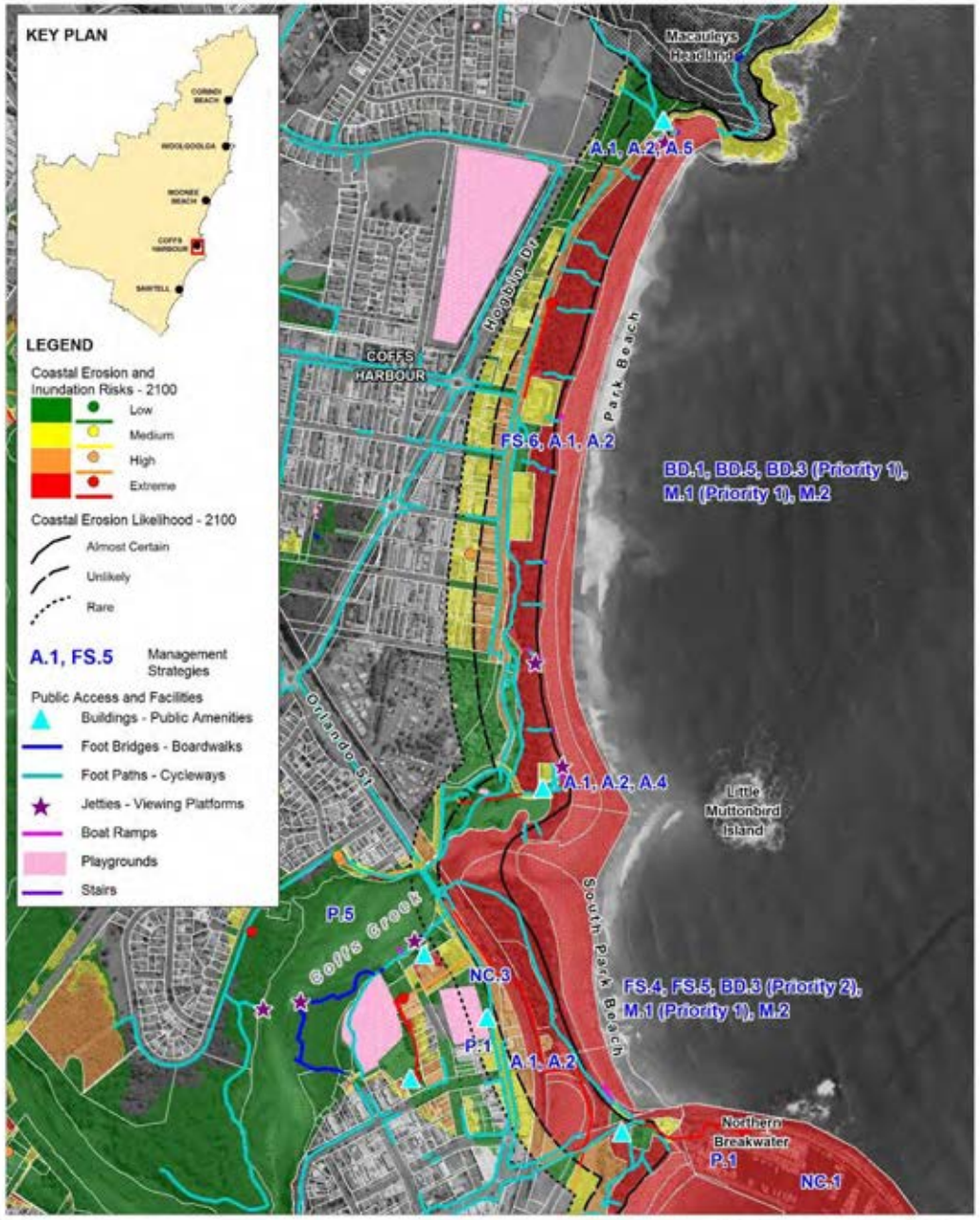


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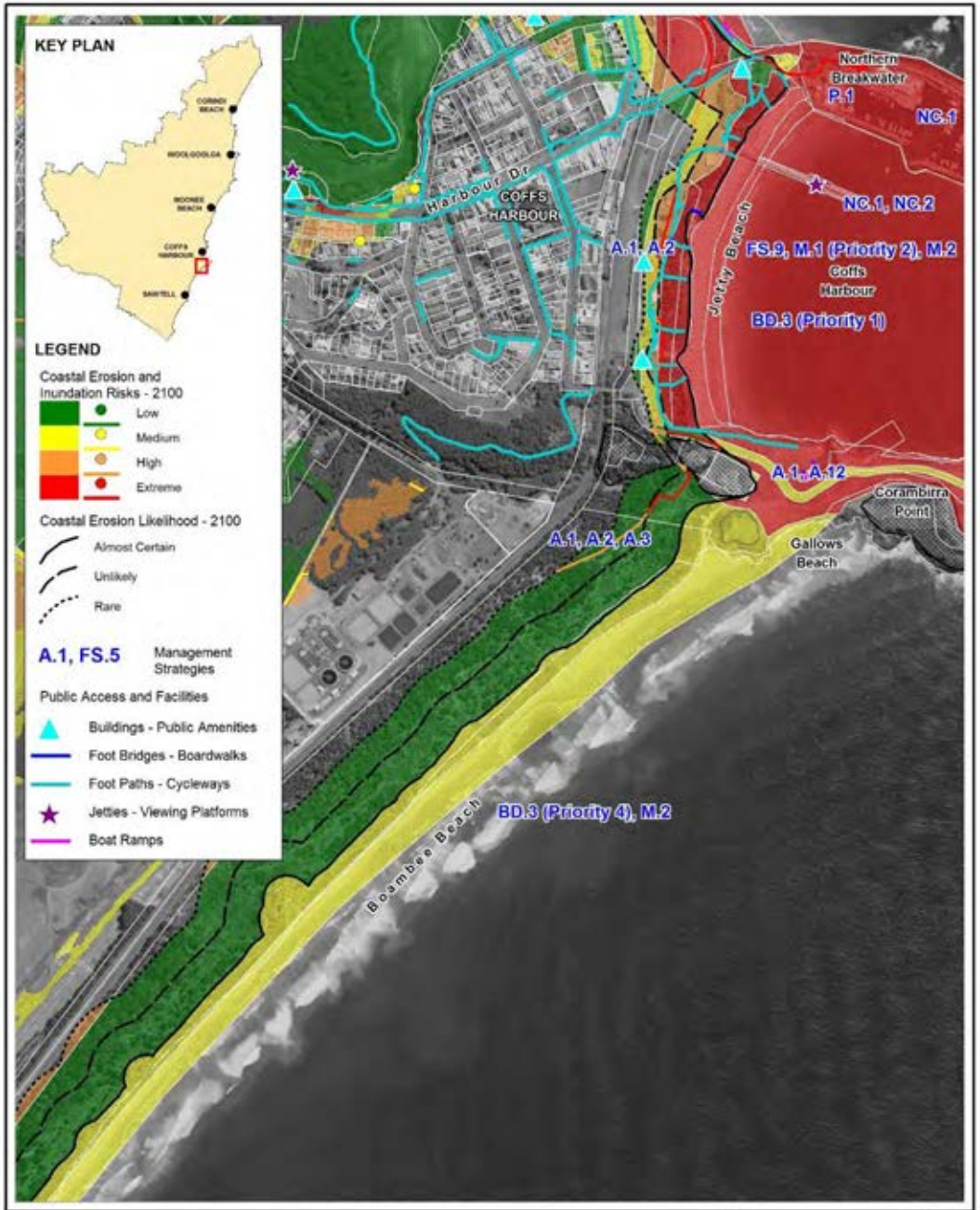


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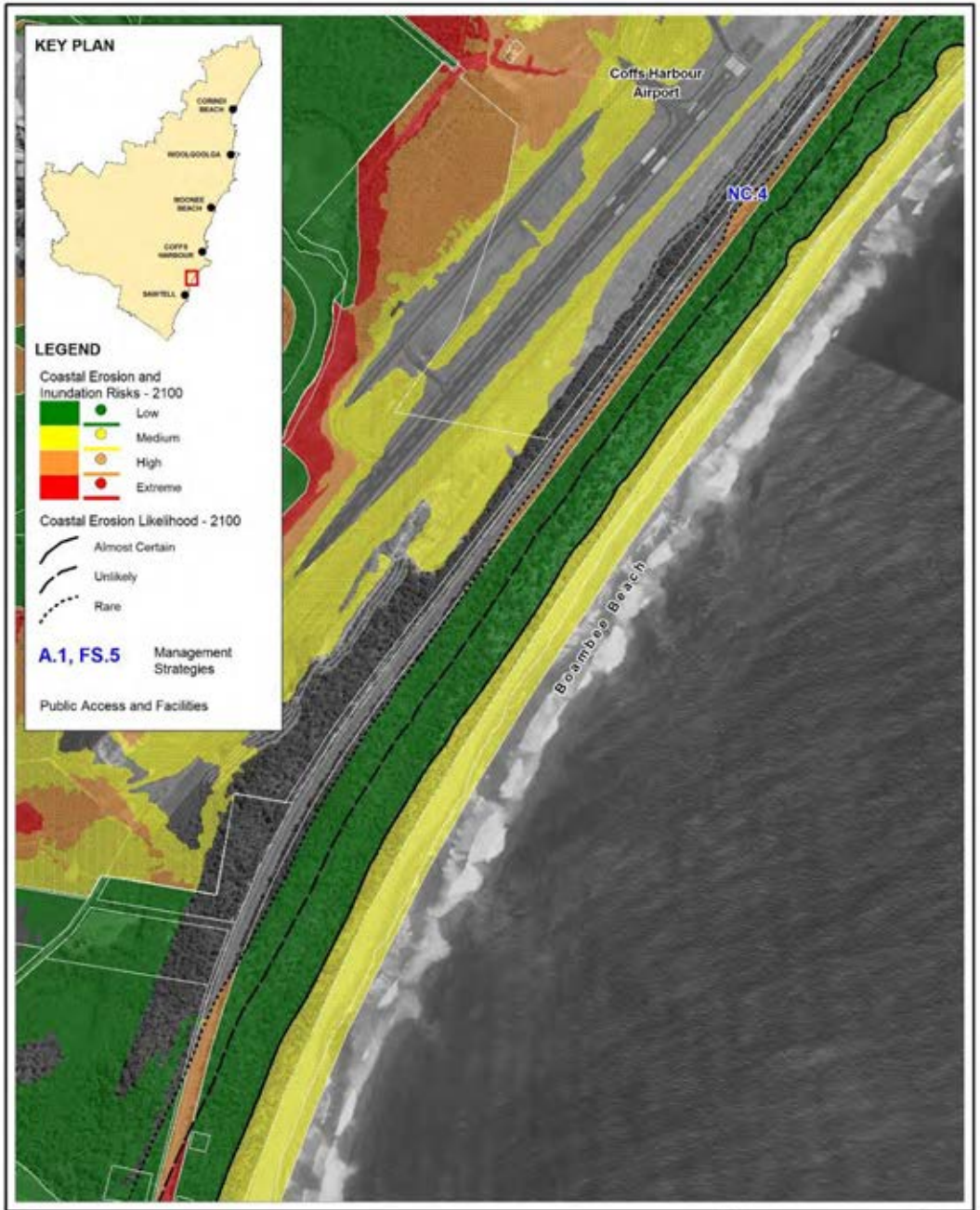


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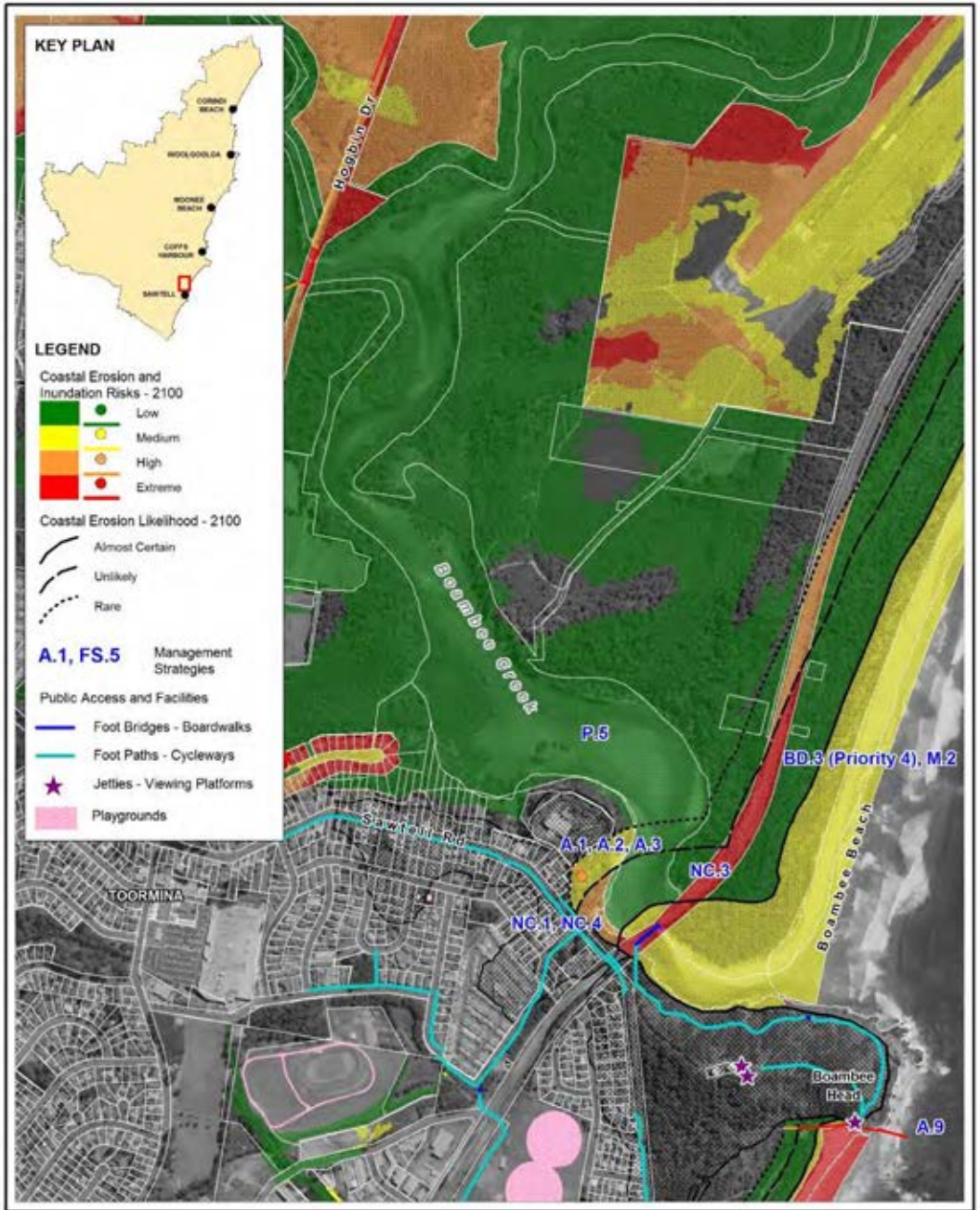


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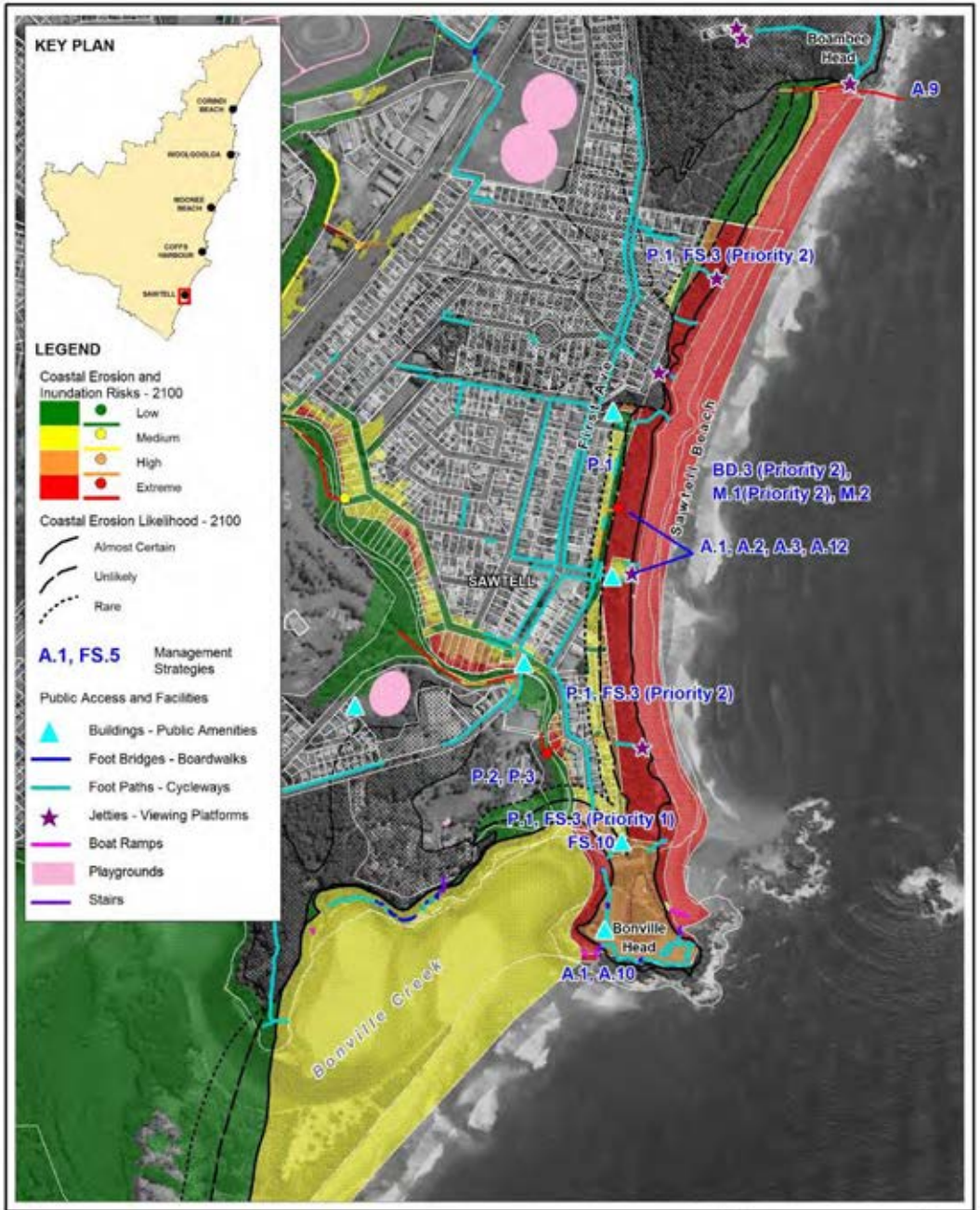


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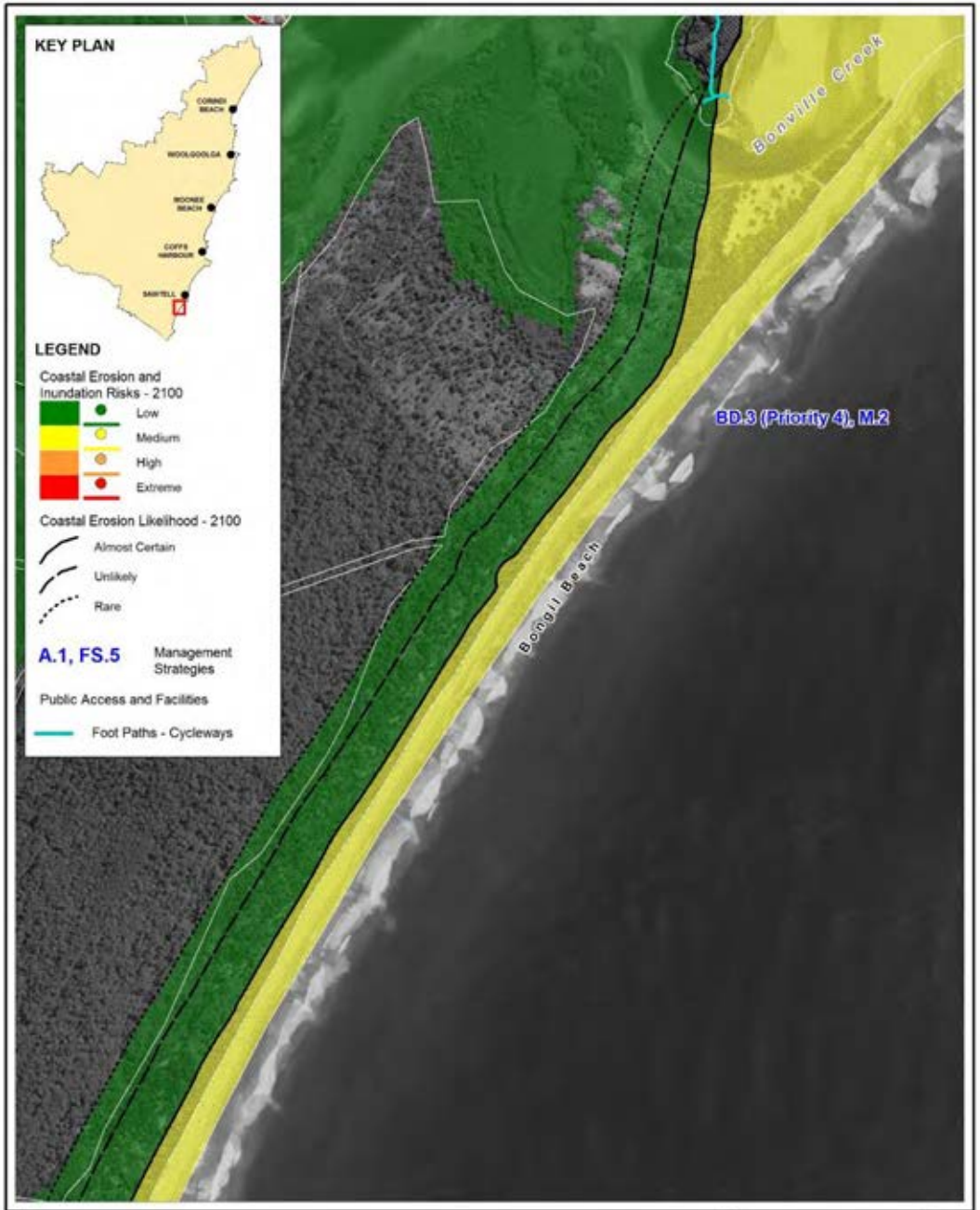


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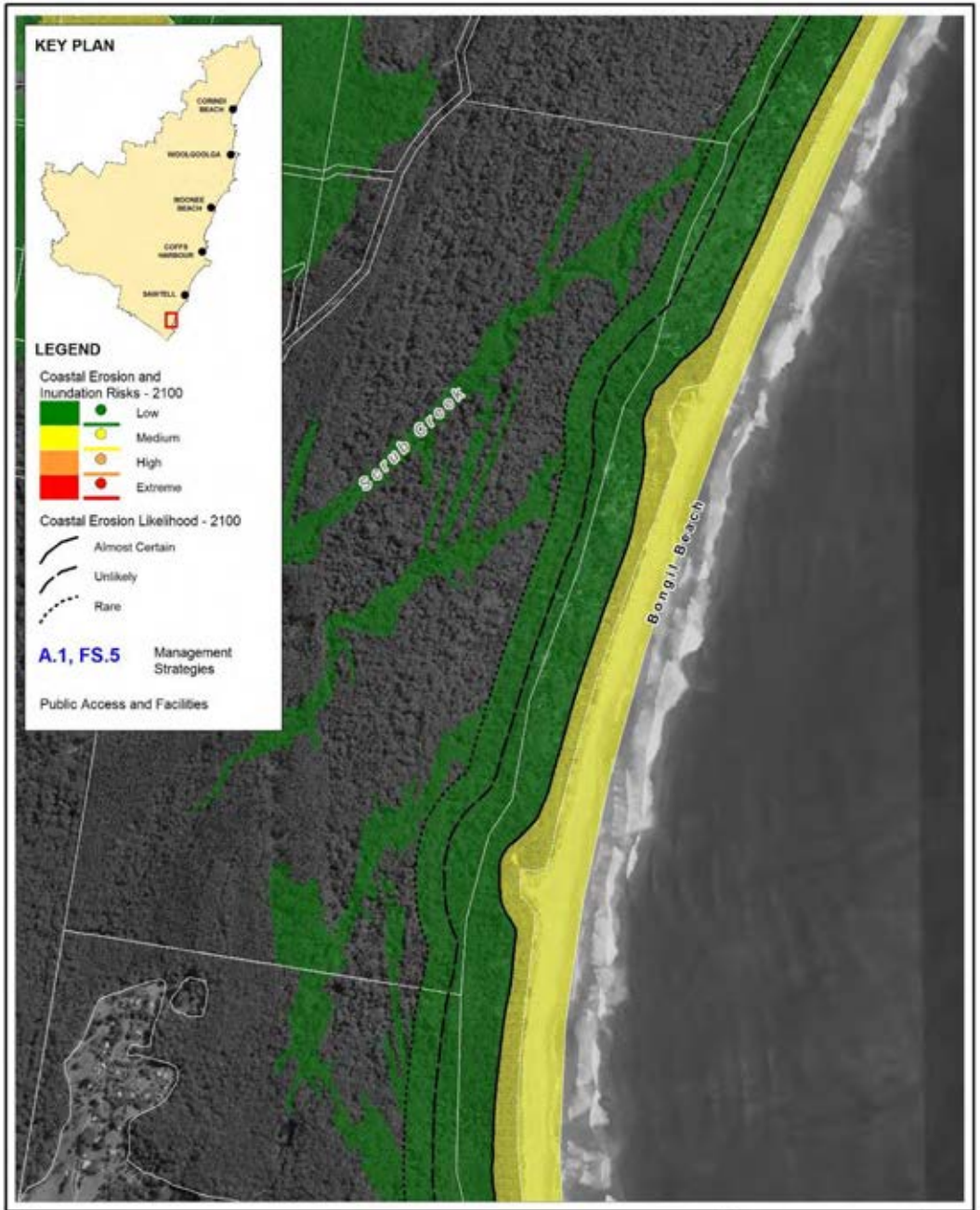


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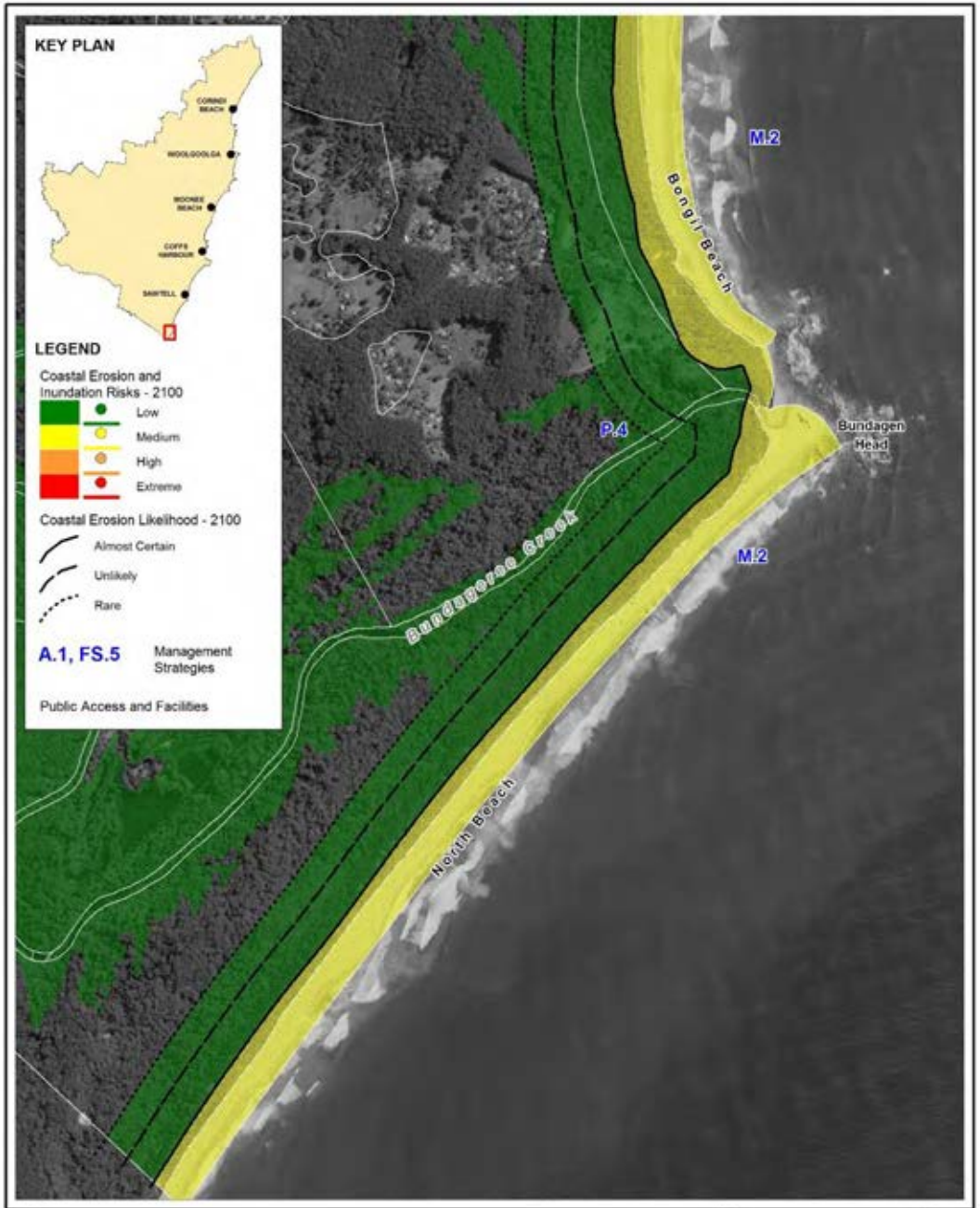


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# 4 Plan Evaluation and Review

The Coffs Harbour CZMP requires evaluation and reporting regarding the success of its implementation, and thus the success of managing existing and future coastal risks. Where implementation performance is sub-optimal, contingencies should be emplaced to remedy the situation. A series of performance measures to assist in the evaluation process are discussed below.

## 4.1 Internal Communication and Implementation Audit every 12 Months

The importance of internal communications within Council cannot be over emphasised in the success or otherwise of implementation of the CZMP. It is recommended that a workshop be held with all staff responsible for implementing the CZMP and the regional OEH representative, to provide a refresher regarding the contents (objectives, actions) of the CZMP. An update on the implementation status of the CZMP should also be given, based on the outcomes of the Annual Report (see Section 4.2).

## 4.2 Annual Report: Linking Review of Implementation of CZMP Actions with the IPR Framework

Actions from this CZMP should be fed into Council's Delivery Program and Operational Plan or longer term Financial Plan.

Council delivers an Annual Report to document its progress in implementing the Delivery Program and Operational Plan activities over each financial year, as part of Council's Integrated Planning and Reporting (IPR) Framework.

The performance measures for CZMP actions can then be used to gauge whether the actions have been implemented or not, and will be reported in the Annual Report. This provides a yearly evaluation of the implementation status of each action in the CZMP.

Where actions have not been included in the IPR Framework, a yearly evaluation of those CZMP actions by Council is recommended. If it is determined that an action has not being implemented in accordance with the nominated timeframe, then one or both of the following contingencies should be adopted:

- Determine the cause for the delay in implementation. If delays are funding based, then seek alternative sources of funding. If delays are resource-based, seek additional assistance from stakeholder agencies and / or consider using an external consultancy to coordinate implementation of the action(s); and
- Modify and update the CZMP to reflect a timeframe for implementation of the action that is more achievable. The revised Plan would need to be endorsed by all relevant stakeholders and agencies responsible for implementation.

## 4.3 Revision of CZMP into the new CMP Format

The NSW Government is currently undertaking reforms of the Coastal Management Framework in NSW, including a new Coastal Management Bill which was passed in April 2016 (not currently in force). While it is anticipated that these reforms will not be completed before this CZMP is certified, it will be necessary for this CZMP to be integrated into the Coastal Management Program (CMP) format (proposed in the new Act) by 2021.

The NSW Government has indicated that existing certified CZMPs will be able to be fast-tracked into the new CMP format, to avoid discarding the existing valid work and retain momentum for existing actions.

### 4.3.1 Revised Risk Assessment to Gauge Success of CZMP Actions in Mitigating Risk

At the time that the CZMP is being revised into a CMP (~ 5 years), a review should be conducted to measure the performance of the CZMP in terms of actually managing and reducing the risks to the community associated with existing and future coastal hazards. That is, 'how has the Plan made a difference? Has the level of risk been reduced?'. The main mechanism for gauging this is to re-evaluate the risks by repeating the risk reassessment. As for the first risk assessment, all relevant mechanisms in place that assist with managing future risks and increasing Council's and the community's resilience should be included when assessing the level of risk.

There are two specific questions to be answered:

- Has the level of risk changed? (including for those risks in this plan that are currently assessed as low); and
- Have the extreme or high risks been adequately managed / mitigated? (i.e., has the level of risk been reduced to a tolerable level through management?).

If it is determined that the risks have not been adequately managed / mitigated; or that new intolerable risks have arisen, then the following actions should be undertaken in order to develop the new CMP:

- Review the implemented management strategies to identifying possible avenues for increasing the effectiveness of the strategy in managing the risks along the coastline (including new risks);
- Reconsider the urgency of management for key risks. For example, accommodating future changes may no longer be feasible, and upscaling from passive to active management may be needed, e.g. shifting from development controls to planned retreat, asset relocation etc.; and.
- Review the potential effectiveness of actions that were recommended, but not implemented. Are such actions likely to be effective? If so, they should be included in the new CMP, and prioritised accordingly.

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Standards Australia (2009), *Risk Management Principles and Guidelines*, AS/NZS ISO 31000:2009.

# Appendix A Meeting the Minimum Requirements

## A.1 Coastal Management Principles

The CZMP Guidelines specify the requirements for preparing a CZMP in accordance with the *Coastal Protection Act 1979*, including requirements additional to those specified in the Act.

Under Section 733 of the *Local Government Act 1993*, Councils are taken to have acted in 'good faith' and thus receive an exemption from liability for land affected by coastal hazards where their actions substantially accord with the principles contained in the specified manual, in this case being the *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013). Table A-1 outlines each of the relevant principles and how they have been addressed by the Coffs Harbour CZMP. The technical process undertaken in developing the hazard zone mapping is detailed in the CHDS (BMT WBM, 2011).

## A.2 Minimum Requirements for Preparing a CZMP

Current requirements for preparing Coastal Zone Management Plans (CZMPs) are set out in Part 55C of the *Coastal Protection Act 1979* and the supporting *Guidelines for Preparing Coastal Zone Management Plans* (OEH 2013). How this Coffs Harbour CZMP has satisfied the minimum requirements for preparing a CZMP as given in the *Guidelines for Preparing Coastal Zone Management Plans* (OEH 2013) is detailed in Table A-2.

**Table A-1 Addressing the Coastal Management Principles**

| | Coastal Management Principles | Addressed by this document |
|---|---|---|
| **Principle 1** | Consider the objects of the *Coastal Protection Act 1979* and the goals, objectives and principles of the NSW Coastal Policy 1997. | These have been considered throughout the preparation of the all documents, refer Section 1.2 |
| **Principle 2** | Optimise links between plans relating to the management of the coastal zone | The implementation Action Plan aims to align with Council's IPR Framework, to aid its implementation. The Plan also incorporates existing controls, that is, actions already being undertaken in the coastal zone, as this is an intrinsic part of the risk assessment process. The Implementation Action plan is in Chapter 3. |
| **Principle 3** | Involve the community in decision-making and make coastal information publicly available. | Consultation with the community was undertaken throughout the course of the preparation of the CZMP, as summarised in Section 1.6. |
| **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 resources management because it incorporates the best available information and its uncertainty. The hazard assessment that underpins this CZMP explained hazards in a probabilistic manner, which is part of the risk assessment process. Management options recognise the overlap between flooding and oceanic processes through estuaries, streamlining management into one approach. |
| **Principle 5** | The priority for public expenditure is public benefit; public expenditure should cost effectively achieve the best practical long-term outcomes | Cost benefit analysis for management options has recognised the public benefit as priority for management options. Details of the cost-benefit analysis are available in the Coffs Harbour CZMS, which is a companion document to this CZMP. |
| **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 and assets have been analysed and mapped. The tolerability of risks has been evaluated. In certain cases, risks that cannot be reasonably treated must be accepted. A trigger based approach to implementation has been applied, see also Chapter 3. |

| | Coastal Management Principles | Addressed by this document |
|---|---|---|
| **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. A triggered 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 | Maintaining high value coastal ecosystems is supported within this CZMP, both during the cost benefit analysis of options where environmental impact of the options was considered. Specific actions to support and or rehabilitate priority habitat areas are also included in the plan, see Actions BD.13 and FS.12. |
| **Principle 9** | Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy | This CZMP supports the maintenance of the network of coastal reserves that cover Coffs' beaches. Safe public access is a consideration for a number of actions within the plan, for example, Action BD.3. The CZMP includes actions to incorporate coastal hazards into future plan-making/review for community access plans (i.e. POMs such as in Action FS.13). |
| **Principle 10** | Support recreational activities consistent with the goals of the NSW Coastal Policy | The CZMP supports the range of recreational activities pursued along the coast through ongoing improvements to facilities and access. Gazettal of the CZMP will provide mechanism for inclusion of coastal hazards and the outcomes of this CZMP when planning for recreational activities at the beaches. |

**Table A-2 How this CZMP Satisfies the Minimum Requirements for Preparing a CZMP**

| 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 A-1. |
| 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 Section 1.6 (with further details in the supporting Coffs CZMS). Outcomes of the consultation were used at various stages, such as when 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 the Community Education Action (refer Section 3.11). |
| A description of how the proposed management options were identified, the process followed to evaluate management options, and the outcomes of the process. | The process for identifying, comparing and selecting the management options is summarised in Section 3.1, with full details provided in the companion document, the Coffs Harbour CZMS. |
| Proposed management actions over the CZMP's implementation period are to be in a prioritised implementation schedule which contains:<br>• proposed funding arrangements for all actions, including any private sector funding<br>• actions to be implemented through other statutory plans and processes<br>• 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*).<br>• proposed actions to monitor and report to the community on the plan's implementation, and a review timetable | Refer to the Implementation Schedules provided in Chapter 3 of this document. |

| Minimum Requirement | Addressed by this CZMP |
|---|---|
| The CZMP is prepared using a process that includes:<br>• evaluating potential management options by considering social, economic and environmental factors, to identify realistic and affordable actions<br>• 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*)<br>• 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*). | The process for identifying, comparing and selecting the management options is summarised in Section 3.1, with full details provided in the companion document, the Coffs CZMS.<br>The selection process for options to be included in the CZMP included the feedback of the community, as provided through the various activities as listed in Section 1.6. |
| CZMPs are to achieve a reasonable balance between any potentially conflicting uses of the coastal zone | The process of preparation of this CZMP has allowed for a reasonable balance between potentially conflicting uses of the coastal zone to be achieved. Through application of a risk based process, preparation of this CZMP has:<br>• considered the coastal hazards in terms of their likelihood of occurrence (see summary in Section 2.3)<br>• considered the consequence to the society, environment and economy from coastal hazards (see summary in Section 2.5); then<br>• through the course of assessing the options, the impact of options to competing uses of the coastal zone such as recreational access and environmental values was also considered when selecting the preferred actions (see Section 3.1). |

# Appendix B Coffs Harbour Coastal Erosion Emergency Action Sub Plan

BMT WBM

# Coffs Harbour Coastal Erosion Emergency Action Sub Plan

Reference: R.N2017.003.04.EASP.docx
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# Document Control Sheet

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**Synopsis:** **This Coffs Harbour Coastal Erosion Emergency Action Sub Plan forms an Appendix to the Coffs Harbour Coastal Zone Management Plan. This sub-plan outlines the roles and responsibilities and the actions to be performed before, during and after a coastal erosion emergency event.**

## REVISION/CHECKING HISTORY

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| 3 | 02/05/2018 | VPR | | VPR | |
| 4 | 22/05/2018 | VPR | | VPR | |

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# Acronyms

| | |
|---|---|
| CEEASP Controller | Council's Coastal Erosion EASP controller |
| Council | Coffs Harbour City Council |
| CM Act | *Coastal Management Act 2016* |
| CP Act | *Coastal Protection Act 1979* |
| CZMP | Coastal Zone Management Plan |
| DECCW | Department of Environment Climate Change and Water (now OEH, see below) |
| DISPLAN | Local Disaster Plan |
| DoI – Crown Lands | NSW Department of Industry Lands and Water (Crown Lands Division) |
| EASP | Coastal Erosion Emergency Action Sub-plan |
| EMPLAN | Coffs Harbour and Bellingen Local Emergency Management Plan |
| LGA | Local Government Area |
| LEMC | Local Emergency Management Committee |
| LEMO | Local Emergency Management Officer |
| LEOCON | Local Emergency Operations Controller |
| NPSW | NSW Office of Environment and Heritage National Parks and Wildlife Service |
| NSW SES | NSW State Emergency Service |
| OEH | Office of Environment and Heritage |
| SERM Act | *State Emergency and Rescue Management Act 1989* |
| SES Act | *State Emergency Service Act 1989* |
| SEPP | State Environmental Planning Policy |
| SLSC | Surf Life Saving Club |

# Contents



# List of Tables

# 1 Introduction

## 1.1 Intent of the Coastal Erosion EASP

This Coastal Erosion Emergency Action Sub-Plan (Coastal Erosion EASP) applies to the Coffs Harbour Local Government Area (LGA) coastline. The Coffs Harbour LGA coastline extends for nearly 80 km from Tuckers Rocks (on North Beach) in the south to Pebbly Beach in the north. There are 38 beaches of small to medium length along the Coffs coastline.

Coffs Harbour's beaches are the subject of the Coffs Harbour Coastal Zone Management Plan (CZMP) (BMT WBM, 2017), which outlines practical actions for managing coastal erosion and other risks to the beaches, and 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 Coffs Harbour CZMP, but rather is aimed at complementing the CZMP in respect to event-specific response actions.

## 1.2 Legislative Requirements for the EASP

The NSW *Coastal Management Act 2016* (CM Act) and former NSW *Coastal Protection Act 1979* (the CP Act) outline the process for managing coastal hazards and coastal risks along the New South Wales coast, and which has resulted in the preparation of a Coffs Harbour Coastal Zone Management Plan (CZMP).

Under Clause 6 of Schedule 3 (Savings, transitional and other provisions) of the CM Act, councils that have submitted their draft CZMPs to the Minister for certification before the CM Act came into force have 6 months to finalise and certify their existing CZMPs under the former CP Act. Therefore, the governing legislation for preparing and certifying the Coffs Harbour CZMP and this associated Coastal Erosion EASP is the former CP Act.

Through the development and subsequent implementation of a CZMP, the coastal hazards are identified and, as appropriate, the risks are addressed through a range of planning, design and protection measures. The need for unplanned protection works to manage coastal erosion is reduced and the risk to life and property managed. In this way, the consequence of emergencies resulting from erosion during storm events is minimised (as is consistent with the risk management approach including prevention and mitigation measures, as typically detailed in the Local Emergency Management Plan (EMPLAN)).

A Coastal Erosion EASP is a required component of the preparation of a CZMP under Section 55C(1)(b) of the CP Act, which states a CZMP must make provision 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"*. Definitions provided in Section 4 of the CP Act state that "*emergency action subplan means that part of a coastal zone management plan that deals with the matter referred to in section 55C (1) (b) (emergency action during periods of beach erosion)*".

Therefore, a Coastal Erosion EASP aims 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 unforeseen circumstances resulting in significant and sudden coastal erosion (a non-storm coastal erosion emergency).

The CP Act also states in Section 55C (2) (a) that a coastal zone management plan must not include *"matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 in relation to the response to emergencies*". The roles and responsibilities of government agencies, councils and other relevant organisations during severe storm events (including events that cause erosion) are detailed in Part 2 of the NSW State Storm Plan (SEMC, 2015).

The *Coffs Harbour and Bellingen Local Emergency Management Plan December 2016* (EMPLAN) (Coffs Harbour and Bellingen LEMC, 2016a), Annexure C lists the sub and supporting plans that are supplementary to the EMPLAN. Annexure C will need to be updated to include this Coastal Erosion EASP, once it has been endorsed by the Coffs Harbour and Bellingen Local Emergency Management Committee (LEMC). Provided that this Coastal Erosion EASP is adopted as a sub plan to the EMPLAN, response operations for storms under the EMPLAN will trigger this Coastal Erosion EASP.

### 1.2.1 EASPs under the CM Act

EASPs remain a requirement of preparing a coastal management program (CMP) under the CM Act. Section 15 (1) (e) of the CM Act identifies matters to be dealt with in CMPs as follows: "*if the local council's local government area contains land within the coastal vulnerability area and beach erosion, coastal inundation or cliff instability is occurring on that land, include a coastal zone emergency action subplan*". The CM Act further states in Section 55 (3) that:

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

## 1.3 Area covered by this Coastal Erosion EASP

The extent of this Coastal Erosion EASP is defined as the coastal margins of the ocean beaches and headlands within the Coffs Harbour LGA boundaries, extending from Tuckers Rocks (on North Beach) in the south to Pebbly Beach in the north.

### 1.3.1 Assets and Development at Threat

The extent of coastal hazards within the Coffs Harbour LGA coastal zone is defined in the *Coffs Harbour Coastal Processes and Hazards Definition Study* (BMT WBM, 2011). This study maps the landward extent of erosion hazards that may be anticipated for various planning timeframes. Specifically, the landward extent of erosion hazards at present are defined in Maps (series A)

included in the Figures Compendium of the *Coffs Harbour Coastal Processes and Hazards Definition Study* (BMT WBM, 2011) and form the basis for defining the extent of the erosion hazard at present.

Along the Coffs Harbour LGA coastline the extent of erosion at present is typically restricted to the sandy beach, incipient dunes and foredune crest of the beaches. Significant encroachments of the storm erosion extent threatening existing development include the following locations:

- Park Beach;
- Diggers Beach;
- Korora Beach;
- Campbells Beach;
- Emerald Beach (southern end);
- Sandys Beach
- Woolgoolga Beach (southern end);
- Arrawarra Beach (southern end);
- Corindi Beach;
- Sawtell Beach.

At these locations, development and areas that may be impacted during an erosion emergency generally consist of:

- Roads and carparks;
- Stormwater assets (Park Beach, Sawtell Beach);
- defined beach and dune access tracks under the care and control of Council (in coordination with NPWS and DoI – Crown Lands for the Coffs Coast Regional and State Parks); and
- the beaches and dunes.

These exist within an area of known high hazard and are either designed to accommodate the erosion events (such as the stormwater outlets), or are temporarily affected by erosion, limiting their use by the community until such time as they can be repaired (such as beaches and accessways). In each case the opportunity to protect the asset prior to an erosion event is low and the risk to life at these assets during an event is low. Similarly, the viability of undertaking emergency works during an event is low and the preferred approach is to identify impacts then assess and repair the asset(s) after the event. In most instances this 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. The impacts on the future revisions of the Coastal Erosion EASP should take this into account at each plan review.

## 1.4 Minimum Requirements for a Coastal Erosion EASP

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 indicated in Table 1 which has been adapted from OEH, 2011 (page 14).

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 SERM Act relating to emergency response (sections 55C(1)(b) and (g) of the CP Act 1979),
- describing any site-specific requirements for landowner emergency coastal protection works, and
- describing the consultation carried out with the owners of land affected by a subplan.
- Consultation for the EASP was undertaken in conjunction with the public exhibition of the draft CZMP from 28 November 2012 to 22 January 2013. Owners of land affected by the EASP were notified regarding the consultation. This included a series of drop-ins for the community at Sawtell, Coffs Harbour and Woolgoolga.

**Table 1-1 Coastal Erosion EASPs and SERM Act Plan (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 Emergency Management Plan and the NSW State Storm Plan. |

## 1.5 Coastal Protection Works

### 1.5.1 Permanent Coastal Protection Works

There are no permanent coastal protection works (which require development consent) proposed for emergency management purposes under this Coastal Erosion EASP.

The need for permanent coastal protection works at specific locations in the Coffs Harbour LGA are being investigated through implementation of the Coffs Harbour CZMP (see BMT WBM, 2018).

### 1.5.2 Temporary Coastal Protection Works by Private Landholders

Clause 8 of Schedule 3 (Savings, transitional and other provisions) of the CM Act details the transition from the CP Act to the CM Act with respect to temporary coastal protection works, as follows.

*"8 Temporary coastal protection works*

*Part 4C (Temporary coastal protection works) of the former Act and the regulations made under that Part continue to have effect as if that Part and those regulations were not repealed in relation to temporary coastal protection works if:*

*(a) the works were placed on private land in accordance with that Part before the repeal date, and*

*(b) the owner of the land complied with section 55X (Notice to council and others of placement of temporary coastal protection works) of the former Act in respect of the placement of those works."*

The above provision indicates that, unless temporary coastal protection works were implemented by private landholders at the authorised location on Campbells Beach prior to the CM Act coming into force, the provisions for temporary coastal protection works for private landholders no longer apply.

### 1.5.3 Emergency Coastal Protection Works by a Public Authority

Section 19 (3) and (4) of the CM SEPP outlines the conditions for implementation of emergency coastal protection works by a public authority as follows:

*"(3) Development for the purpose of emergency coastal protection works carried out on land to which this Policy applies is exempt development if it is carried out by or on behalf of a public authority in accordance with a coastal zone emergency action subplan (or a coastal zone management plan under the Coastal Protection Act 1979 containing an emergency action subplan that continues to have effect under clause 4 of Schedule 3 to the Coastal Management Act 2016)..*

*(4) In this clause, emergency coastal protection works means works comprising the placement of sand, or the placing of sandbags for a period of not more than 90 days, on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land."*

Therefore, as required, public authorities including Council are permitted to place emergency coastal protection works temporarily, provided it is in accordance with this Coastal Erosion EASP.

# 2 Emergency Response Operations

## 2.1 Introduction

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 in Section 1.1.2 of the *NSW Storm Emergency Subplan* (Volume 1 of the NSW State Storm Plan) (SEMC, 2015). The various roles and responsibilities are outlined in Part 2 of the NSW Storm Emergency Subplan and within the EMPLAN (Coffs Harbour and Bellingen LEMC, 2016a).

## 2.2 Responsibilities for a Storm Coastal Erosion Emergency

The NSW State Emergency Service (NSW SES) is the designated Combat Agency for damage control for storms (*State Emergency Service Act 1989* (NSW), s8, and re-iterated in Annexure B of the EMPLAN (Coffs Harbour and Bellingen LEMC, 2016a) and Section 2 of the Coffs Harbour Bellingen LEMC Consequence Management Guide for Storm (herein referred to as "the CMG for Storm") (Coffs Harbour and Bellingen LEMC, 2016b)).

Damage control for storms includes damage control for coastal erosion and inundation from storm activity, specifically the protection of life (warning and evacuation) and the coordination of the protection of readily moveable household goods and commercial stock and equipment.

The NSW SES has no role in controlling, coordinating or constructing hazard mitigation for coastal erosion protection or temporary coastal protection works.

The CMG for Storm is provided under Annexure F of the EMPLAN, and details the responsibilities for command, control and coordination, and action to manage the Storm hazard, which will include coastal erosion events. Section 3 of the CMG for Storm states that in support of the Combat Agency Incident Controller, agencies (including Council) command their own resources under the coordination of the Coffs Harbour and Bellingen Local Emergency Operations Controller (LEOCON).

## 2.3 Responsibility for Coastal Erosion Emergency not triggered by a Storm

Coastal erosion emergencies may arise from events other than a declared storm event, for example, from a period of anomalous high ocean water levels (e.g. relating to a coastal trapped wave) combined with a large swell that results in substantial erosion to the back of the beach. For these conditions, it is likely that the resulting erosion would be substantially less than that which would result from a severe storm event, unless the non-storm coastal erosion event occurred immediately following a severe storm event. It is not possible to determine a trigger event for such an occurrence.

As a storm-based trigger is not applicable to this kind of coastal erosion emergency, the determination to invoke this Coastal Erosion EASP would be based on monitoring of the beach state. In such a case, the Coastal Erosion EASP may be implemented following a request from the designated Council Officer.

Emergency management of coastal erosion that is not caused by storm activity will be controlled and coordinated by the Local Emergency Operations Controller (LEOCON).

## 2.4 Communication

### 2.4.1 Storm Emergency

NSW SES Local Emergency Sub Plans are always active; however NSW SES response operations for storms including coastal erosion will begin on receipt of an Australian Government Bureau of Meteorology formal warning. This may be indicated by:

- Severe Weather Warning for hail, flash flooding, damaging surf; or
- Tropical Cyclone Watch or Warning

Alternatively, NSW SES response operations may begin following impact of a storm not covered by a formal warning (clause 7.1.4 (b), page 31, NSW State Storm Emergency Sub Plan, September, 2015).

NSW SES also has a lead role in issuing safety advice directly to the public. The NSW SES is also responsible for providing general advice and warnings to the LEOCON and relevant agencies.

### 2.4.2 Non-Storm Erosion Emergency

As a storm-based trigger is not applicable to this kind of coastal erosion emergency, the determination to invoke this Coastal Erosion EASP would be based on monitoring of the beach state. In such a case, the Coastal Erosion EASP may be implemented following a request from the designated Council Officer. The roles and responsibilities of Council in communicating the emergency to the community remain the same.

## 2.5 Preparedness for a Coastal Erosion Emergency

The CSG for Storm states the following details for the strategy of preparedness for storms: "*provide information to local community members on ways to build resilience and reduce the effects of storms as part of all agencies Community Engagement strategies*" (Coffs Harbour and Bellingen LEMC, 2016b).

The following activities should be undertaken by Council to improve preparedness for coastal erosion emergencies:

- 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;
- Implement actions from the Coffs Harbour CZMP that may reduce the consequence or likelihood of coastal erosion impacts to assets. For example, the Coffs Harbour 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.

### 2.5.1 Emergency Coastal Protection Works

Under the CM Act and CM SEPP, emergency coastal protection works may be implemented by a public authority, including Council, as specified in this Coastal Erosion EASP, as follows.

Emergency coastal protection works comprise the placement of sand, or the placing of sandbags on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land. Emergency coastal protection works shall be in place for a period of not more than 90 days.

When the beach is in an accreted state there is no need for emergency coastal protection works as sand reserves are available should a storm occur.

Prior to a coastal erosion emergency and as determined through routine beach monitoring conducted by Council from time to time, locations may be identified where emergency coastal protection works may reduce the risk to back beach land and assets and /or public safety. Such locations may include:

- where an existing erosion escarpment poses a risk to beach users (both to persons on the beach and to persons on the dune above the eroded scarp) or to assets from collapse of the erosion scarp (for example, onto people digging into the scarp base); and / or
- where the natural sand reserves fronting key assets is measured to be eroded or depleted to less than half of the trigger distance specified in the CZMP (see Table 2-1) as suitable to protect that asset from a consequent storm.

It should be noted that alternative activities aside from emergency coastal protection works are available to public authorities to manage coastal erosion, and may be more suitable in many cases (refer to SEPP (Infrastructure) 2007 Division 25 Waterway or foreshore management activities).

In placing the emergency coastal protection works:

- alternative options to reduce the risk have been investigated, and found unsuitable to address the risk at the site over the next 90 days (i.e. refer to SEPP (Infrastructure) 2007 Division 25 Waterway or foreshore management activities);
- an assessment must be undertaken to determine that the works are very unlikely to result in adverse environmental impact (e.g. enhance erosion to adjacent land), and are very unlikely to increase the public safety risk to beach users or back beach assets; and if this cannot be ensured, the emergency coastal protection works should not be installed;
- confirmation is needed that the proposed works are in accordance with the Coffs Harbour CZMP;
- the works are to comprise only sand and / or sandbags;
- a process for monitoring the works is in place, and contingency arrangements to remove the works should adverse impacts occur have been made; and
- arrangements for the removal of the works not more than 90 days after they are installed are in place.

Over the 90 days that the emergency coastal protection works are in place, Council (or the responsible public authority) should investigate more permanent arrangements for reducing the potential risk at the eroded site.

Table 2-1 Trigger Distance to Structures for Each Beach

| Beach | Contour alignment (m AHD) for defining erosion escarpment | Adopted Trigger Distance (m) | *Beach Erosion Hazard (m)* | |
|---|---|---|---|---|
| | | | *Almost Certain* | *Unlikely* |
| **Bongil** | **4** | **80** | *50* | *120* |
| **Sawtell** | **4** | **30** | *15* | *50* |
| **Boambee** | **4** | **80** | *50* | *120* |
| **Jetty** | **2** | **30** | *15* | *50* |
| **South Park** | **4** | **30** | *15* | *50* |
| **Park** | **4** | **30** | *15* | *50* |
| **Diggers** | **4** | **30** | *15* | *50* |
| **Charlesworth** | **2** | **30** | *40* | *75* |
| **Korora** | **4** | **30** | *15* | *50* |
| **Hills** | **4** | **30** | *15* | *50* |
| **Campbells** | **4** | **30** | *15* | *50* |
| **Pelican** | **4** | **30** | *15* | *50* |
| **Riecks** | **4** | **30** | *15* | *50* |
| **Sapphire** | **4** | **30** | *15* | *50* |
| **Moonee** | **4** | **80** | *50* | *120* |
| **Emerald** | **4** | **35** | *20* | *55* |
| **Fiddamans** | **4** | **35** | *20* | *55* |
| **Sandys** | **3** | **30** | *15* | *50* |
| **Hearnes** | **4** | **30** | *15* | *50* |
| **Woolgoolga Back** | **4** | **30** | *15* | *50* |
| **Woolgoolga** | **4** | **35** | *20* | *55* |
| **Safety Beach** | **4** | **35** | *20* | *55* |
| **Cabins** | **4** | **35** | *20* | *55* |
| **Mulloway** | **4** | **35** | *20* | *55* |
| **Ocean View** | **4** | **30** | *15* | *50* |
| **Arrawarra - Corindi South** | **4** | **30** | *15* | *50* |
| **Corindi Mid** | **4** | **35** | *20* | *55* |
| **Corindi North - Red Rock** | **4** | **35** | *25* | *60* |
| **Station Creek** | **4** | **110** | *70* | *150* |
| **Pebbly Beach** | **4** | **30** | *15* | *50* |

## 2.6 Response during a Coastal Erosion Emergency

Section 6 of the CMG for Storm identifies the role of Council in relation to engineering actions to be to "*assist with property protection. Provide engineering advice regarding the integrity of damaged structures. Assist the SES with damage assessment. Coordinate the restoration of critical public facilities*." In relation to water and sewage, council is to "*Manage and protect council-owned water and sewerage infrastructure and facilities including the restoration of services following [storm] events*" (Coffs Harbour and Bellingen LEMC, 2016b).

In the case of a non-storm coastal erosion emergency, the Council Coastal Erosion EASP controller (CEEASP Controller) will undertake the following activities also.

During a coastal erosion emergency (storm or non-storm), as consistent with the CMG for Storm, Council should undertake the following activities:

- Where storm warnings, damaging wave warnings or dangerous surf predictions are issued by the BoM, Council lifeguards or appropriate council representative will inform the various SLSCs, and the lifeguards will then take the appropriate action to close the beaches and Bonville Ocean Pool;
- notify NSW SES and Surf Life Saving NSW of the closure of beaches;
- provide information to NSW SES / LEOCON about the current state of beaches and areas of greatest potential for impacts on assets, development, beach accesses etc as appropriate.
- Where difficulties / damages 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 of the impacts of erosion on assets and development potentially at threat, provided the safety of Council staff can be maintained; and
- As the emergency progresses Council is required to continue monitoring these areas and provide updates through the LEOCON as appropriate.
- 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 LEOCON and for distribution through the media or directly to community as appropriate;
- 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;

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

### 2.6.1 Emergency Coastal Protection Works

It is recommended that emergency coastal protection works are not undertaken during storm conditions. The storm conditions are very likely to be unsafe for personnel and equipment. Furthermore, it is unlikely that during a storm a proper assessment can be undertaken of the potential for the works to result in adverse environmental impact and / or increase public safety risks, or confirmation made that the works proposed are in accordance with the certified Coastal Zone Management Plan.

## 2.7 Recovery after a Coastal Erosion Emergency

Following the emergency during the recovery phase of the event, the Coffs Harbour and Bellingen LEMC will be informed by an impact assessment that will include an assessment of erosion and damage to beaches (see Section 7 of the CMG for Storm, Coffs Harbour and Bellingen LEMC, 2016b). For Council, this should follow on from their monitoring role during the event, and damage to beach accessways, beaches, and other assets should be documented and reported to the LEOCON.

At this stage, Council is responsible for advising the current state of beaches, coastal recreation areas, and the ocean pool in the Council area, and 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 of access closures, signage, and the release of media bulletins via the NSW SES.

For non-storm coastal erosion emergencies, at the appropriate time the CEEASP controller will declare the emergency has finished and the Coastal Erosion EASP is no longer operative.

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;
- 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 digging into the scarp base);
- Where the risk is deemed unacceptable, at the earliest opportunity undertake appropriate mitigation works which may include:
  - re-grading 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.

[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.

### 2.7.1 Emergency Coastal Protection Works

During the recovery phase after the coastal erosion emergency event, erosion escarpments may be identified that pose a risk to beach users (both to persons on the beach and to persons on the dune above the eroded scarp) or to assets from collapse of the erosion scarp (for example, onto people digging into the scarp base). At these eroded scarps, it may be suitable to place emergency coastal protection works to reduce the potential risk.

It should be noted that alternative activities aside from emergency coastal protection works are available to public authorities to manage coastal erosion, and may be more suitable in many cases (refer to SEPP (Infrastructure) 2007 Division 25 Waterway or foreshore management activities).

In placing the emergency coastal protection works:

- alternative options to reduce the risk have been investigated, and found unsuitable to address the risk at the site over the next 90 days (i.e. refer to SEPP (Infrastructure) 2007 Division 25 Waterway or foreshore management activities);
- an assessment must be undertaken to determine that the works are very unlikely to result in adverse environmental impact (e.g. enhance erosion to adjacent land), and are very unlikely to increase the public safety risk to beach users or back beach assets; and if this cannot be ensured, the emergency coastal protection works should not be installed;
- confirmation is needed that the proposed works are in accordance with the Coffs Harbour CZMP;
- the works are to comprise only sand and / or sandbags;
- a process for monitoring the works is in place, and contingency arrangements to remove the works should adverse impacts occur have been made; and
- arrangements for the removal of the works not more than 90 days after they are installed are in place.

Over the 90 days that emergency coastal protection works are in place, Council (or the responsible public authority) should investigate more permanent arrangements for reducing the potential risk at the eroded site.

# 3 Responsibilities

Specific responsibilities under the Coastal Erosion EASP are tabulated in Table 3-1.

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 3-1 Specific Responsibilities in implementation of the Coastal Erosion EASP**

| Position | Responsibilities |
|---|---|
| Combat Agency<br>NSW State Emergency Service | Damage control for coastal erosion and/or inundation from storm activity, specifically the protection of life (warning and evacuation) and the coordination of the protection of readily moveable household goods and commercial stock and equipment. |
| 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).<br>Responsible for temporary coastal protection works on public land at Campbells Beach, in accordance with the CP Act. |
| Local Emergency Operations Controller (LEOCON) | Execution of the 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<br>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 emergencies. |

# 4 Plan Review

This 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 Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011) to redefine the extent of the area covered by the Plan;
- revision of the NSW State Storm Plan, the EMPLAN or the coastal management legislation 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 Coastal Zone Management Plan.

# 5 References

BMT WBM (2011). *Coffs Harbour Coastal Processes and Hazards Definition Study* Final Report, prepared for Coffs Harbour City Council by BMT WBM, March 2011.

BMT WBM (2017). *Coffs Harbour Coastal Zone Management Plan*, prepared for Coffs Harbour City Council, September 2017.

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Coffs Harbour and Bellingen Local Emergency Management Committee [LEMC] (2016a). *Coffs Harbour and Bellingen Local Emergency Management Plan December 2016*, prepared by the Coffs Harbour and Bellingen LEMC in compliance with the State Emergency and Rescue Management Act, 1989.

Coffs Harbour and Bellingen Local Emergency Management Committee [LEMC] (2016b). Coffs Harbour and Bellingen LEMC Consequence Management Guide Storm, prepared under Annexure F of the *Coffs Harbour and Bellingen Local Emergency Management Plan December 2016.*

NSW Department of Planning and Environment [DPE] (2016) Public consultation draft *State Environmental Planning Policy (Coastal Management) 2016*.

NSW Office of Environment and Heritage [OEH] (2011). *Coastal Zone Management Guide note – Emergency action subplans,* NSW Office of Environment and Heritage, ISBN 978 1 74293 300 9. OEH 2011/0631. July 2011.

NSW Office of Environment and Heritage [OEH] (2013). *Code of Practise under the Coastal Protection Act 1979*, NSW Office of Environment and Heritage, August 2013.

State Emergency Management Committee [SEMC] (2015). *NSW State Storm Plan*, September 2015.

*State Environmental Planning Policy (Infrastructure) 2007*. Accessed 1 November 2017, available: https://www.legislation.nsw.gov.au/#/view/EPI/2007/641/full

# Appendix C UPDATED EROSION HAZARD AND RISK MAPS (ADDENDUM TO THE COFFS HARBOUR COASTAL HAZARD STUDY AND MANAGEMENT STUDY/PLAN)

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Our Ref: PD: L.N20847.003_CZMP_Mapping_Addendum

20 December 2018

Coffs Harbour City Council
EMAILED

Attention: Kyran Crane

Dear Kyran,

**RE: UPDATED EROSION HAZARD AND RISK MAPS (ADDENDUM TO THE COFFS HARBOUR COASTAL HAZARD STUDY AND MANAGEMENT STUDY/PLAN)**

Recent coastal geotechnical work completed for Coffs Harbour City Council has resulted in a series of coastal management maps being revised. This letter documents the series of changes that have been made. The new published maps and GIS datasets that accompany this letter report (and summarised herein) form an addendum to BMT WBM (2011)[1] BMT WBM (2013)[2] and BMT WBM (2018a)[3].

## Background

The Coffs Harbour City Council (Council) has undertaken a series of studies to help understand threats from coastal hazards and plan for future coastal climate risks. These studies are briefly summarised below:

- The *Coffs Harbour Coastal Processes and Hazard Definition Study* (BMT WBM, 2011) investigated the coastal processes and defined the extent of coastal hazards occurring across the Coffs Coast, under current conditions and future timeframes. Coastal erosion, shoreline recession and coastal inundation hazard maps were prepared. There were several geological unknowns when defining the erosion and recession hazards at a regional scale across the local government area coastline.
- The *Coffs Harbour Coastal Zone Management Study* (BMT WBM, 2013) *and Plan* (BMT WBM, 2018a) was prepared to provide strategic guidance on the coordinated, integrated and ecologically sustainable development of the coastline affected by coastal hazards. Risk mapping was prepared in *Coffs Harbour Coastal Zone Management Study*, based on the coastal erosion and inundation hazard mapping and coastal asset mapping across the coastline. The risk maps were used to develop a register of assets that identified their level of risk over the immediate to 2100 timeframe for coastal planning purposes.

  Coastal hazard and risk mapping from the above two studies incorporated areas of 'approximate bedrock control' that constrained erosion and recession mapping extents. Bedrock mapping was based on simple assumptions relating to Quaternary geology maps and topography. To address several geological unknowns, a key action in the *Coffs Harbour Coastal Zone Management Plan* (BMT WBM, 2018a) was to undertake a detailed geotechnical investigation at four priority beaches.

[1] BMT WBM (2011) *Coffs Harbour Coastal Processes and Hazard Definition Study*. Report prepared for Coffs Harbour City Council.
[2] BMT WBM (2013) *Coffs Harbour Coastal Zone Management Study*. Report prepared for Coffs Harbour City Council.
[3] BMT WBM (2018a) *Coffs Harbour Coastal Zone Management Plan*. Report prepared for Coffs Harbour City Council.

- The *Geomorphological Field Study of Four Coffs Coast Beaches (BMT WBM, 2018b)*[4] investigated the geomorphology and geotechnical characteristics of four priority beaches in the Coffs Coast Region: Arrawarra Headland Beach, Woolgoolga Beach, Sandy Beach and Emerald Beach. The field based study mapped three broad geological conditions that are considered to either exclude or reduce the erosion potential at those sites. The three geotechnical conditions were: (i) erosion limiting bedrock landforms; (ii) erosion influencing bedrock outcrops/subcrops; and (iii) partially resistant coastal substrates.

  A series of options were provided to Council on how to incorporate the new geotechnical information and improve the coastal erosion hazard maps and erosion risk maps. A key recommendation was to revise the existing erosion hazard and risk mapping, by updating the 'approximate bedrock control' areas with the 'erosion limiting bedrock landforms' mapping.

## Approach

As per the BMT WBM (2018b) recommendation outlined above, Council initiated an update of the coastal erosion hazard and coastal risk maps to improve the erosion hazard and risk mapping in areas with new geotechnical information. Erosion maps have been updated at Arrawarra Headland Beach, Woolgoolga Beach, Sandy Beach and Emerald Beach as follows.

**GIS mapping updated**

GIS processing was undertaken to incorporate the new geotechnical information into the existing coastal management mapping datasets. Council wide mapping of 'approximate bedrock control' was revised to include the new field based information. This updated bedrock control (geological) mapping was then incorporated into:

- Erosion and recession hazard lines from the *Coffs Harbour Coastal Processes and Hazard Definition Study* (BMT WBM, 2011), for the immediate, 2050 and 2100 timeframes; and
- Erosion risk polygons, lines and points from the *Coffs Harbour Coastal Zone Management Study* (BMT WBM, 2013) for the immediate, 2050 and 2100 timeframes.

**Revised maps**

An updated series of coastal management maps for Arrawarra Headland, Woolgoolga Beach, Sandy Beach and Emerald Beach were produced using the geologically revised GIS datasets. Thirty two maps were published in total to cover the mapped extent of the four priority beaches, including (see attached also):

- Eighteen revised erosion hazard maps (six map extents across three planning timeframes). The new hazard maps update their corresponding maps in the *Coffs Harbour Coastal Processes and Hazard Definition Study* (BMT WBM, 2011).
- Eighteen revised erosion risk maps (six map extents across three planning timeframes). These new risk maps update the corresponding maps in the *Coffs Harbour Coastal Zone Management Study* (BMT WBM, 2013) *and Plan* (BMT WBM, 2018a).

[4] BMT WBM (2018b) *Geomorphological Field Study of Four Coffs Coast Beaches.* Report prepared for Coffs Harbour City Council.

## Outputs

The revised mapping products that accompany this letter report are as follows:

- Updated coastal management GIS package for Council;
- Updated coastal hazard mapping compendium for *Coffs Harbour Coastal Processes and Hazard Definition Study* (BMT WBM, 2011); and
- Updated coastal risk mapping compendium for *Coffs Harbour Coastal Zone Management Study* (BMT WBM, 2013) *and Plan* (BMT WBM, 2018a).

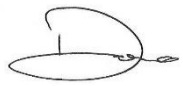
I trust that the information presented within this letter is sufficient. Please do not hesitate to contact Paul Donaldson on (02) 4940 8882, should any questions arise out of this report.

Yours Faithfully
**BMT**

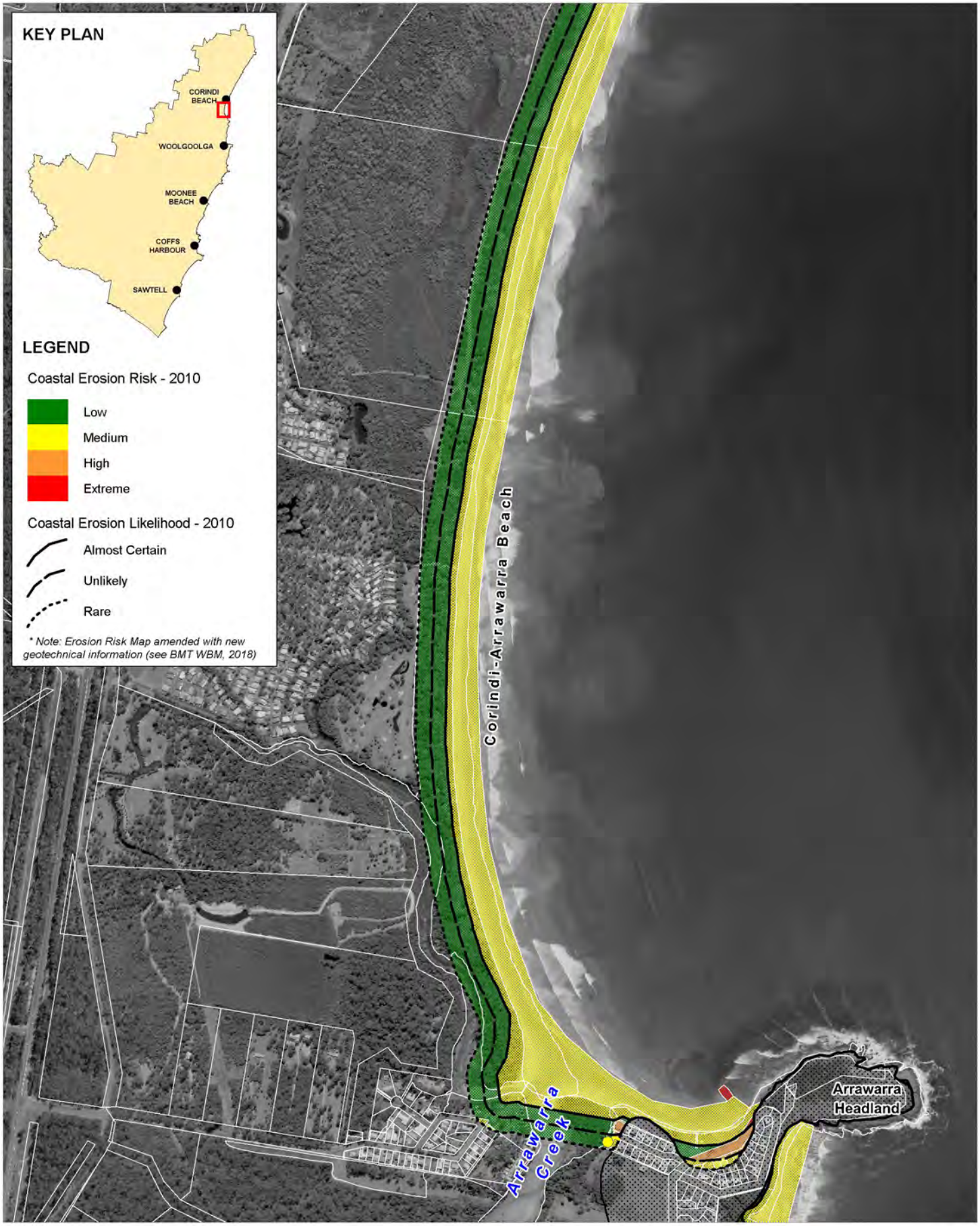
C.Frankel

**Carla Frankel**
**Environmental Engineer**

Reviewed by
**BMT**



**Paul Donaldson**
**Senior Coastal Scientist**




Title:

# Erosion and Recession Risk Map
# Immediate Planning Horizon - Corindi Beach South

Drawing: A-6

Rev: A

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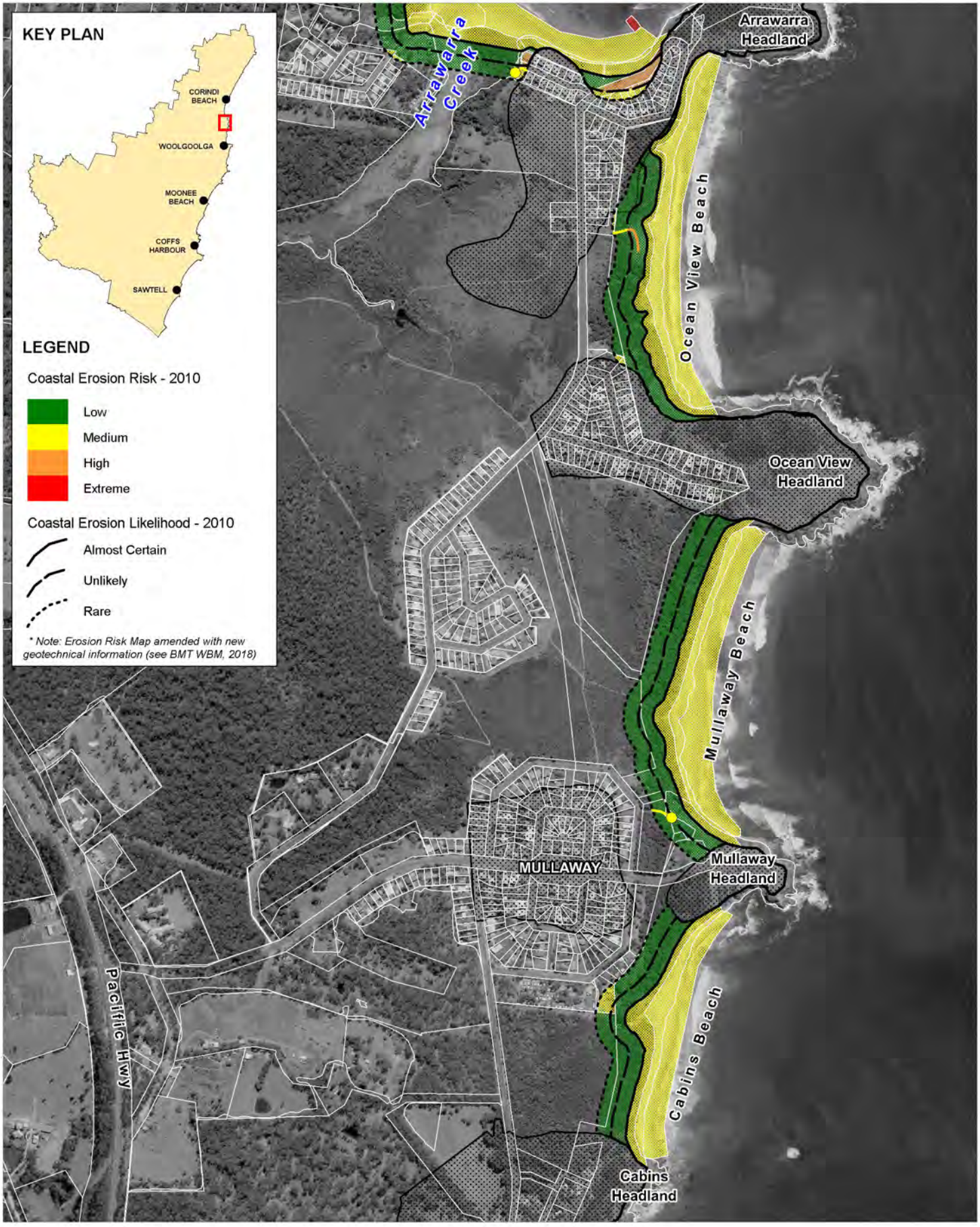


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# Erosion and Recession Risk Map
# Immediate Planning Horizon - Mullaway Beach

Drawing: A-7

Rev: A

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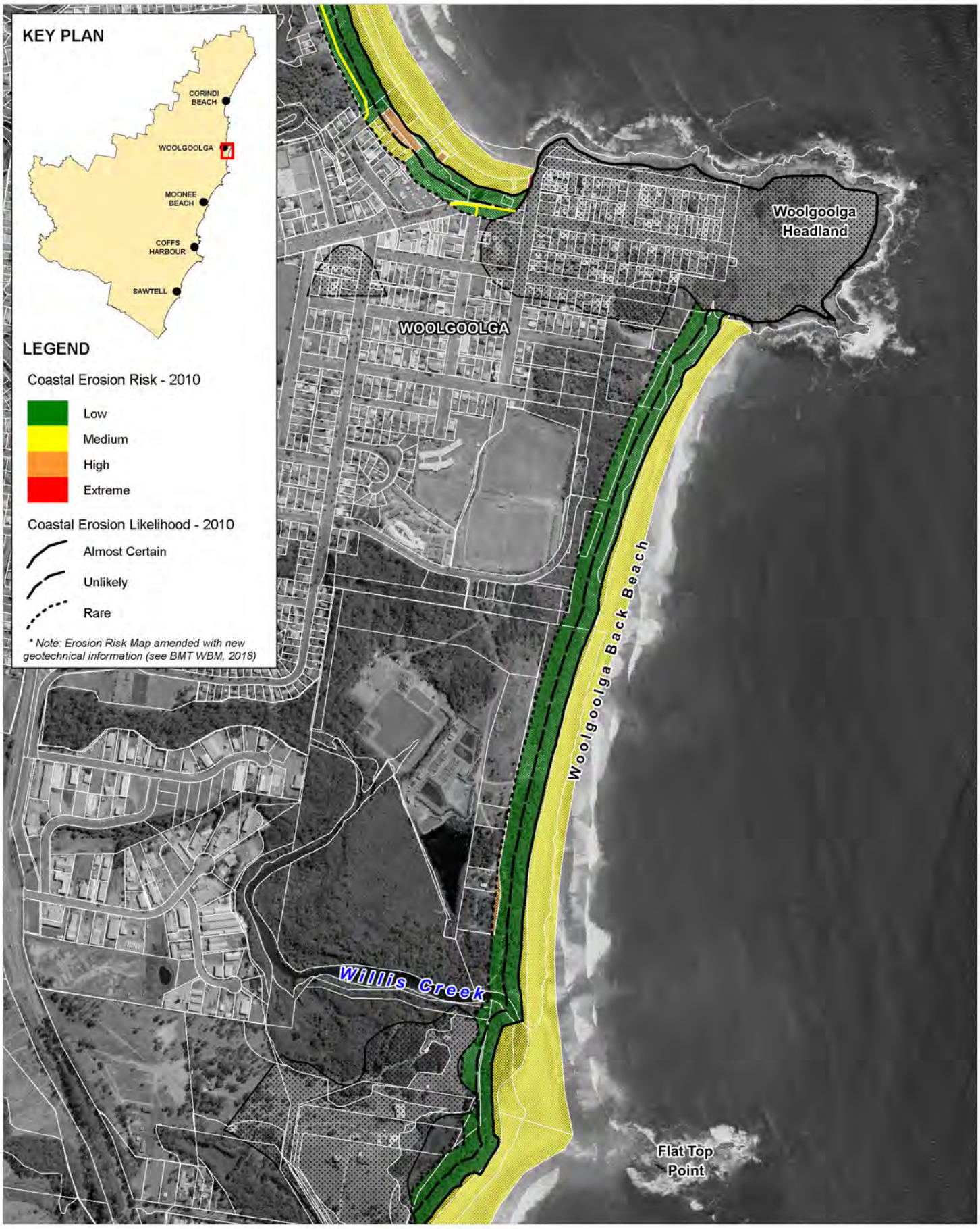


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# Erosion and Recession Risk Map
# Immediate Planning Horizon - Woolgoolga

Drawing: **A-9**

Rev: **A**

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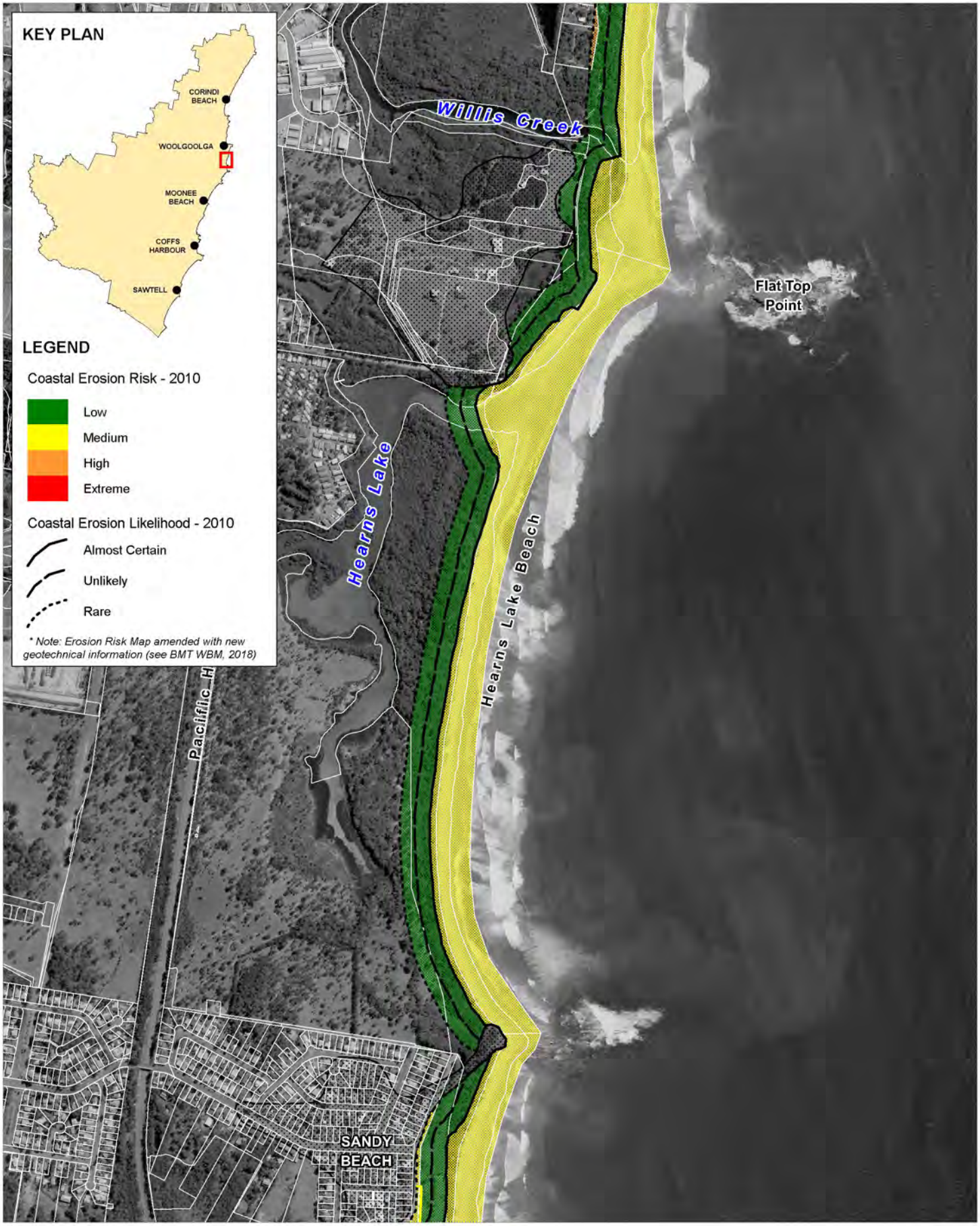


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# Erosion and Recession Risk Map
# Immediate Planning Horizon - Hearns Lake Beach

Drawing: A-10

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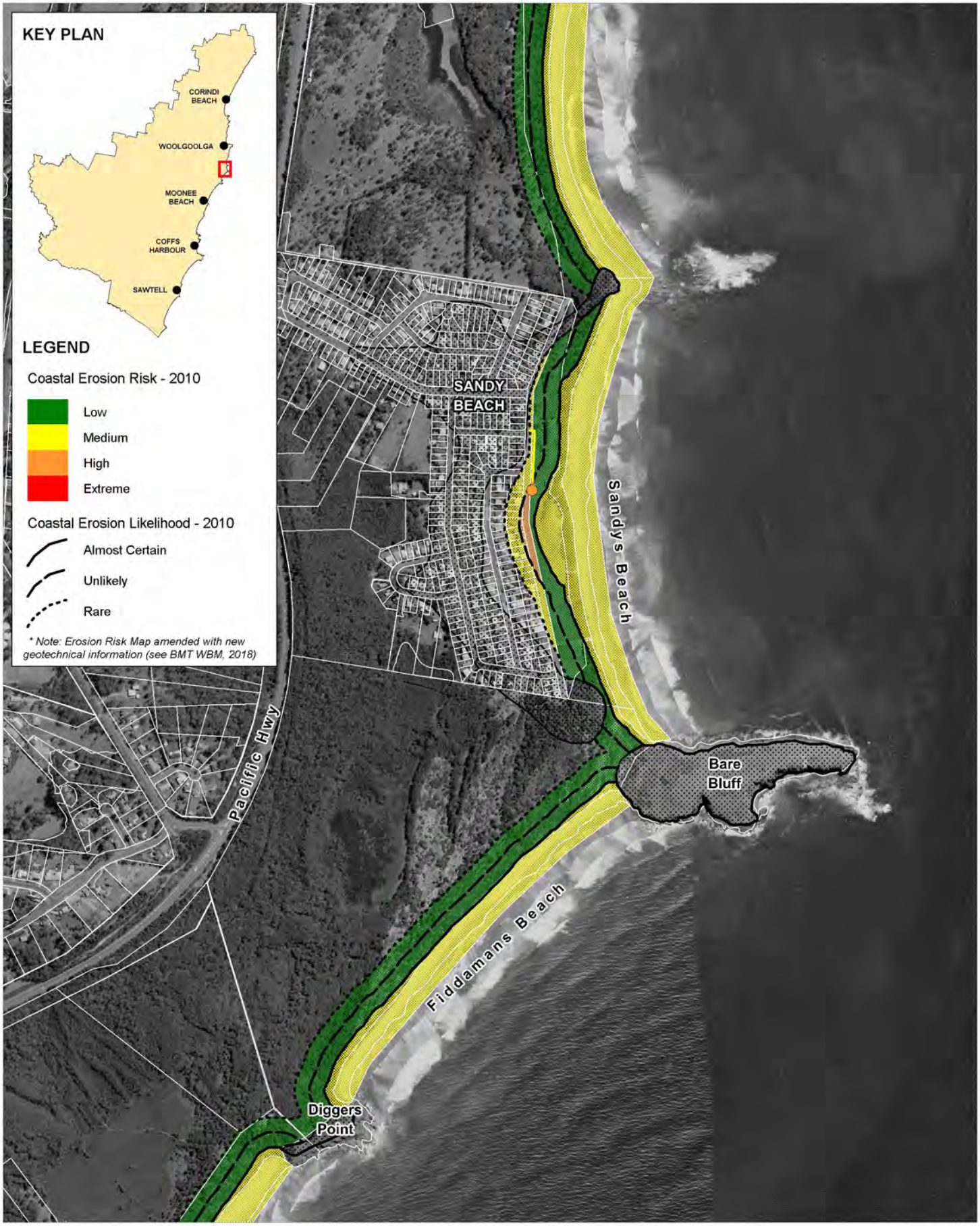


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# Erosion and Recession Risk Map
# Immediate Planning Horizon - Sandy Beach

Drawing: A-11

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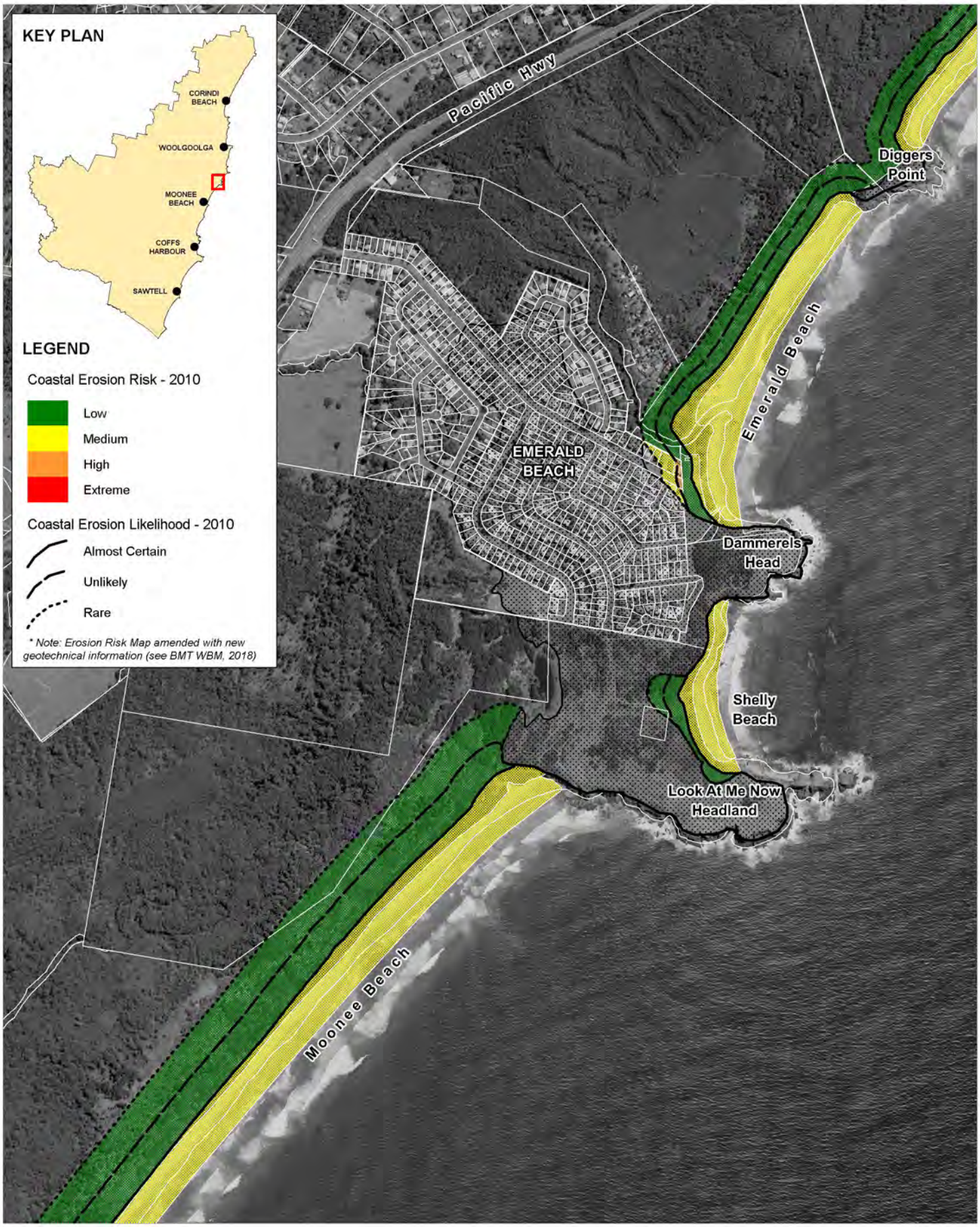


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# Erosion and Recession Risk Map
# Immediate Planning Horizon - Emerald Beach

Drawing: A-12

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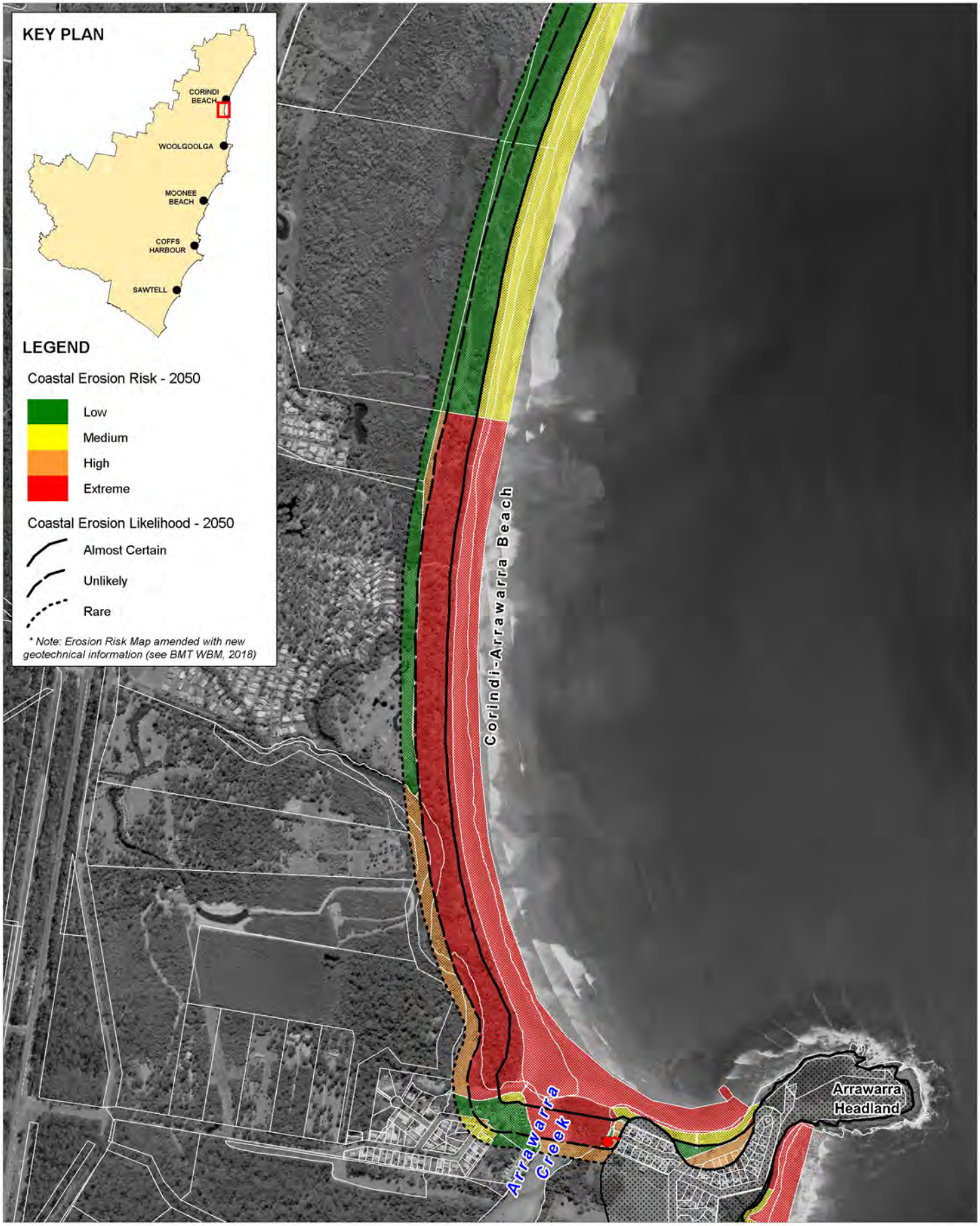


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# Erosion and Recession Risk Map
# 2050 Planning Horizon - Corindi Beach South

Drawing: B-6

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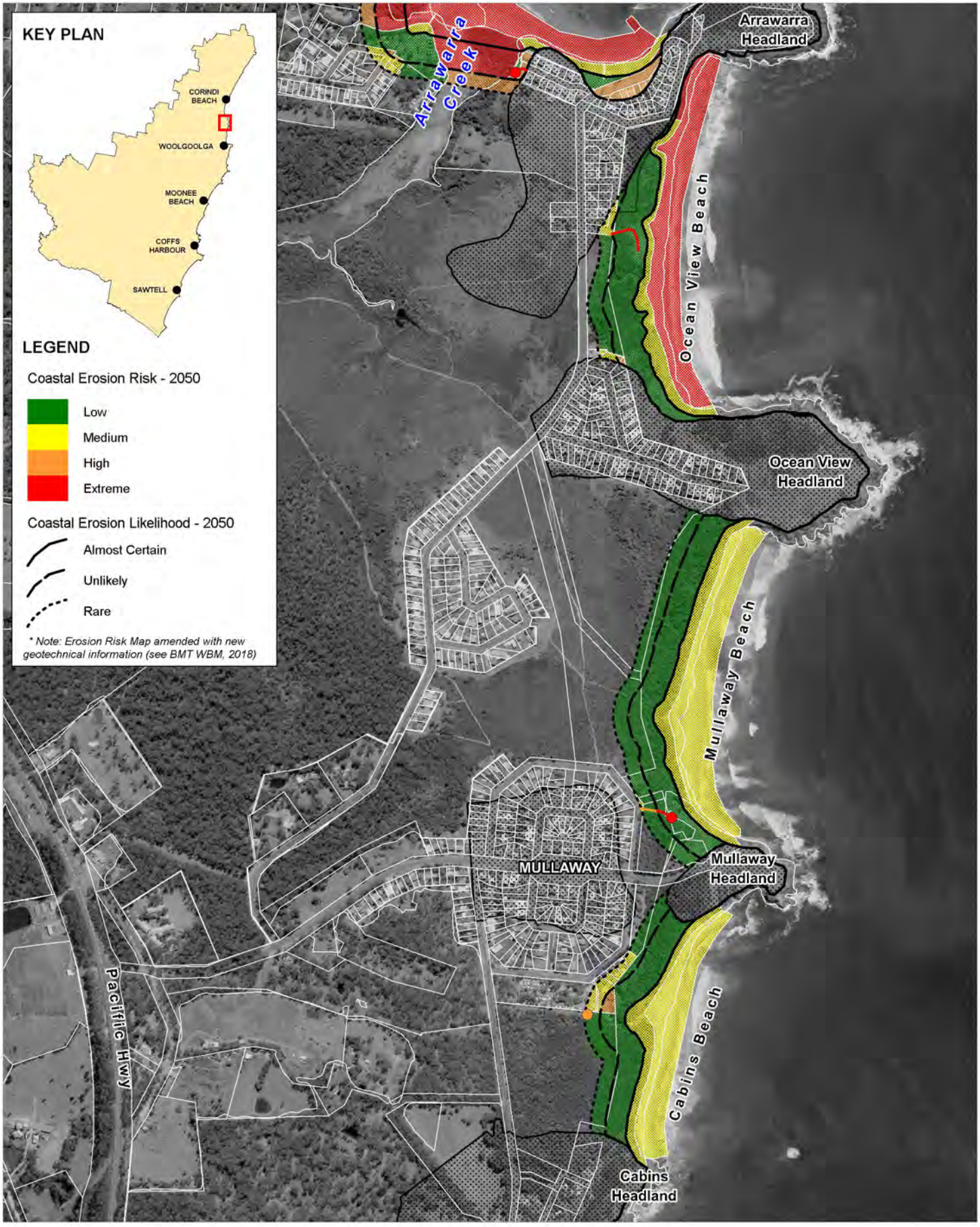


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# Erosion and Recession Risk Map
# 2050 Planning Horizon - Mullaway Beach

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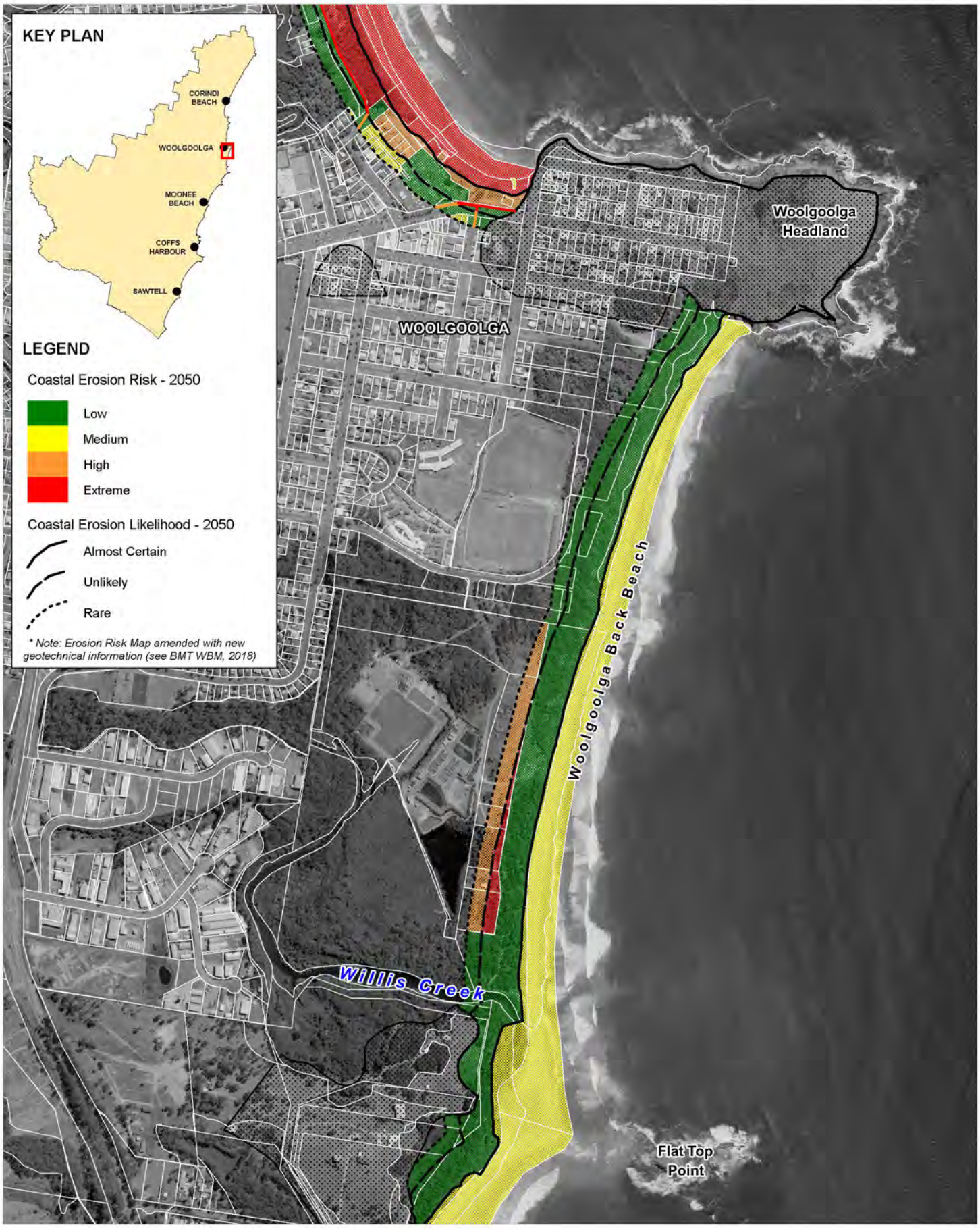


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# Erosion and Recession Risk Map
# 2050 Planning Horizon - Woolgoolga

Drawing: B-9

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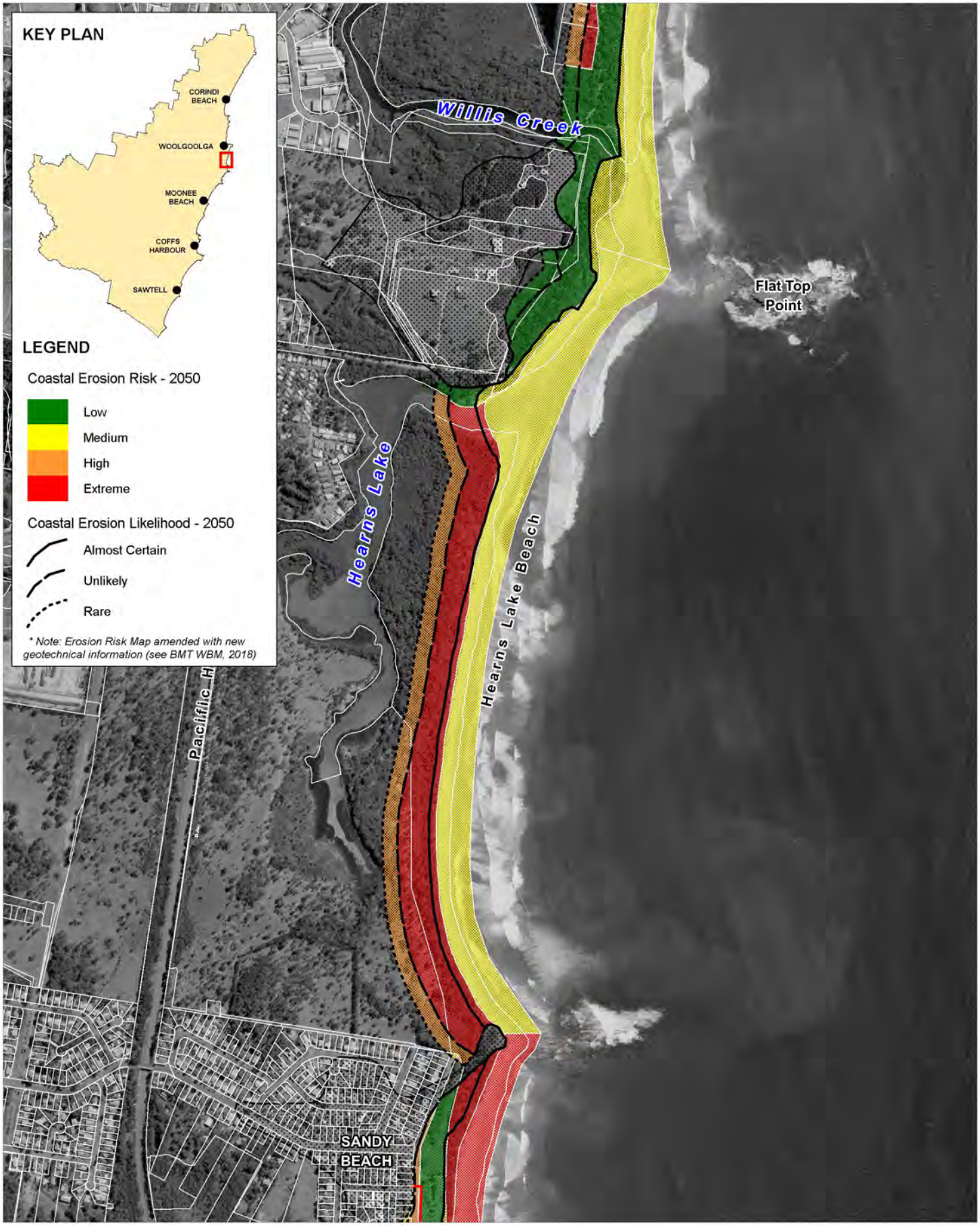


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# Erosion and Recession Risk Map
# 2050 Planning Horizon - Hearns Lake Beach

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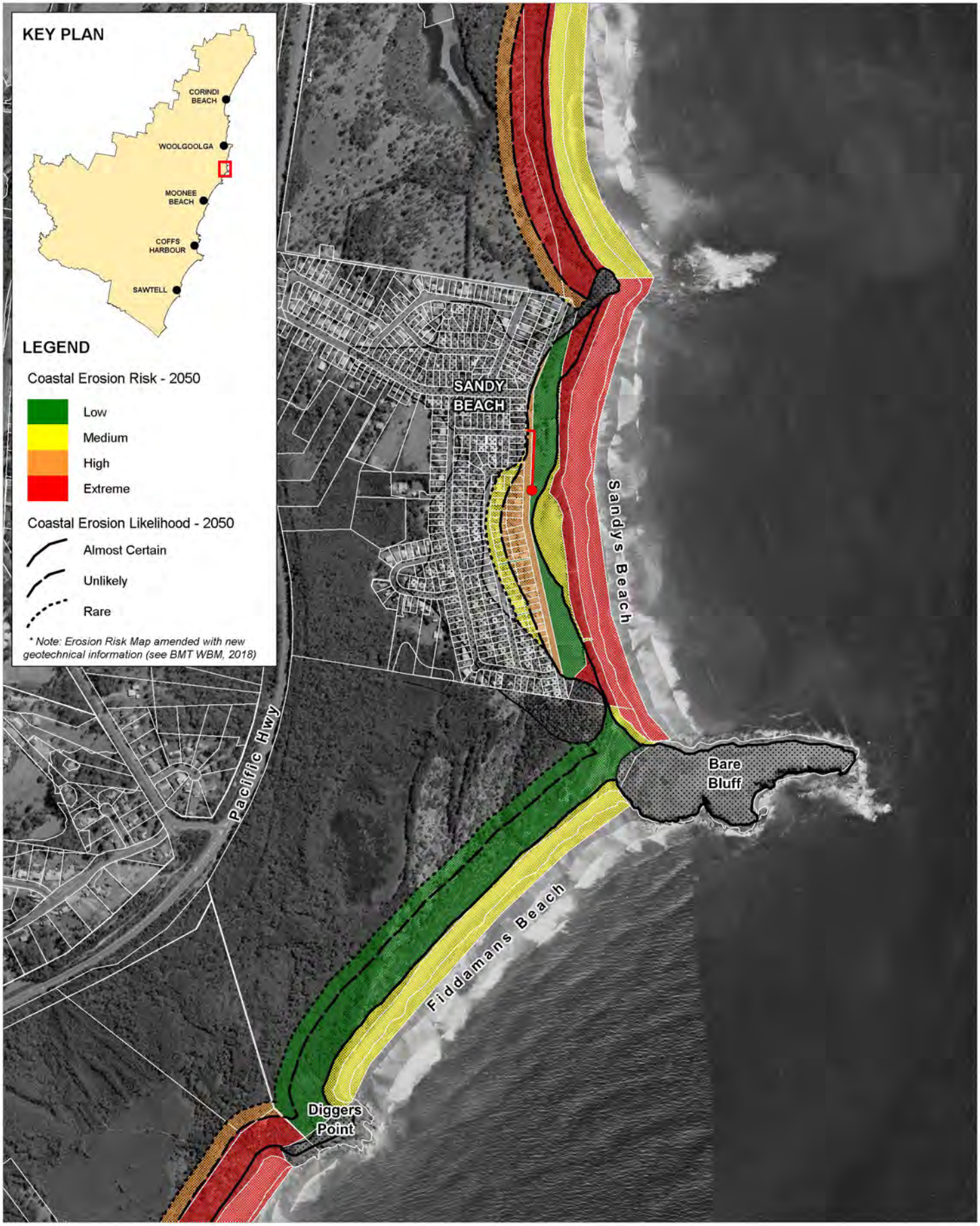


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# Erosion and Recession Risk Map
# 2050 Planning Horizon - Sandy Beach

Drawing: B-11

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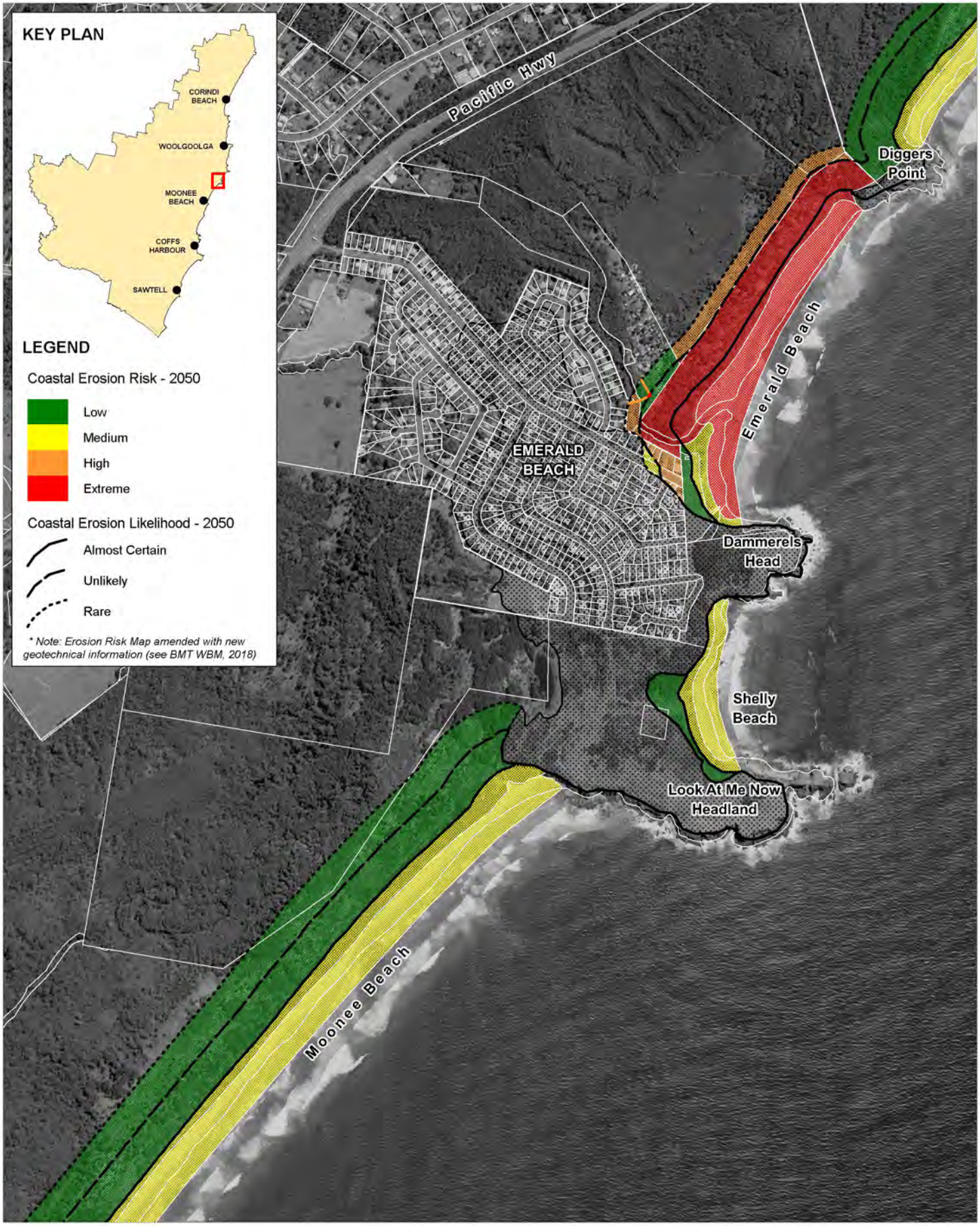


Title:

# Erosion and Recession Risk Map
# 2050 Planning Horizon - Emerald Beach

Drawing: **B-12**

Rev: **A**

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N

0 250 500m

Approx. Scale

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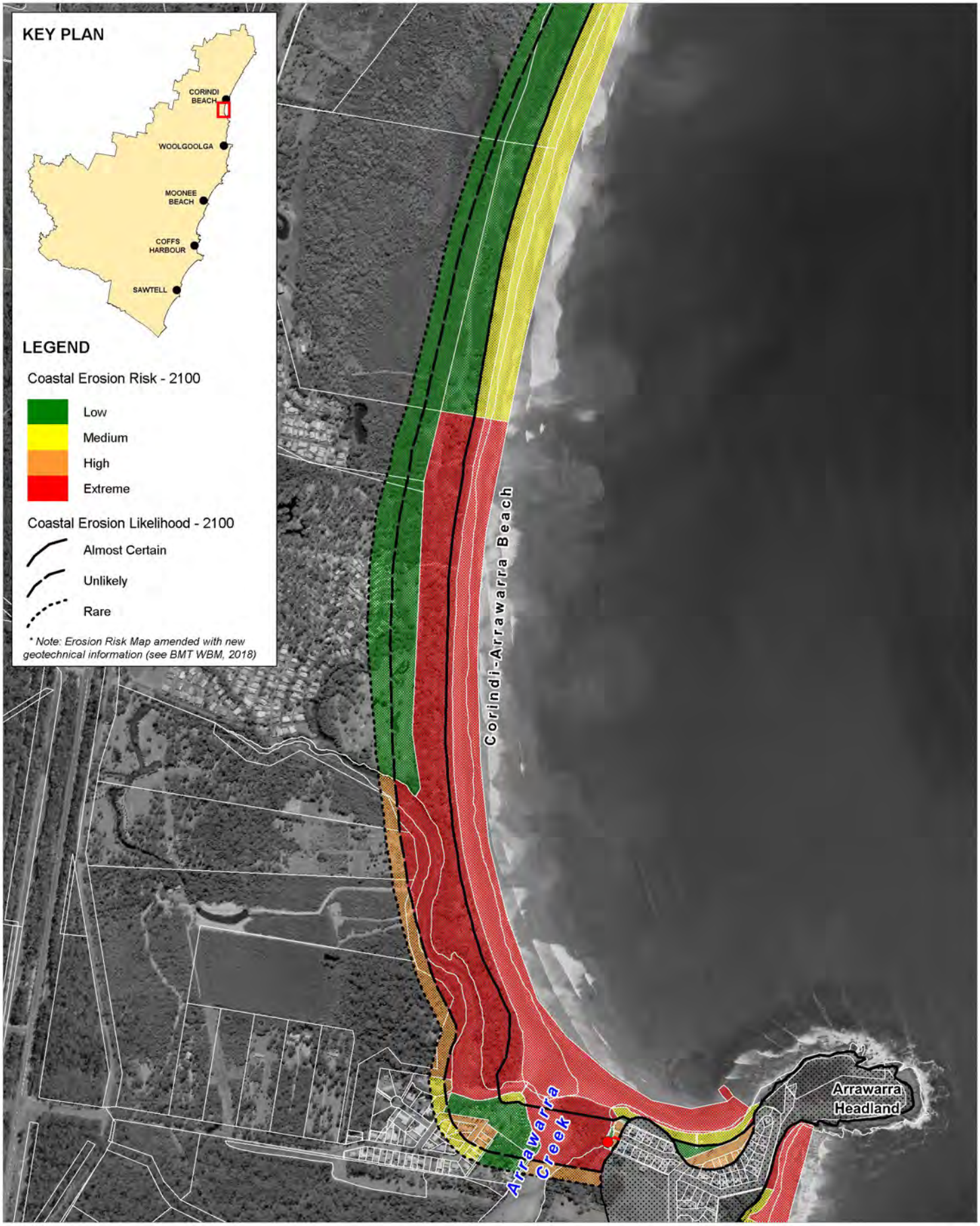


Title:

# Erosion and Recession Risk Map
# 2100 Planning Horizon - Corindi Beach South

Drawing: C-6

Rev: A

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N

0 250 500m

Approx. Scale

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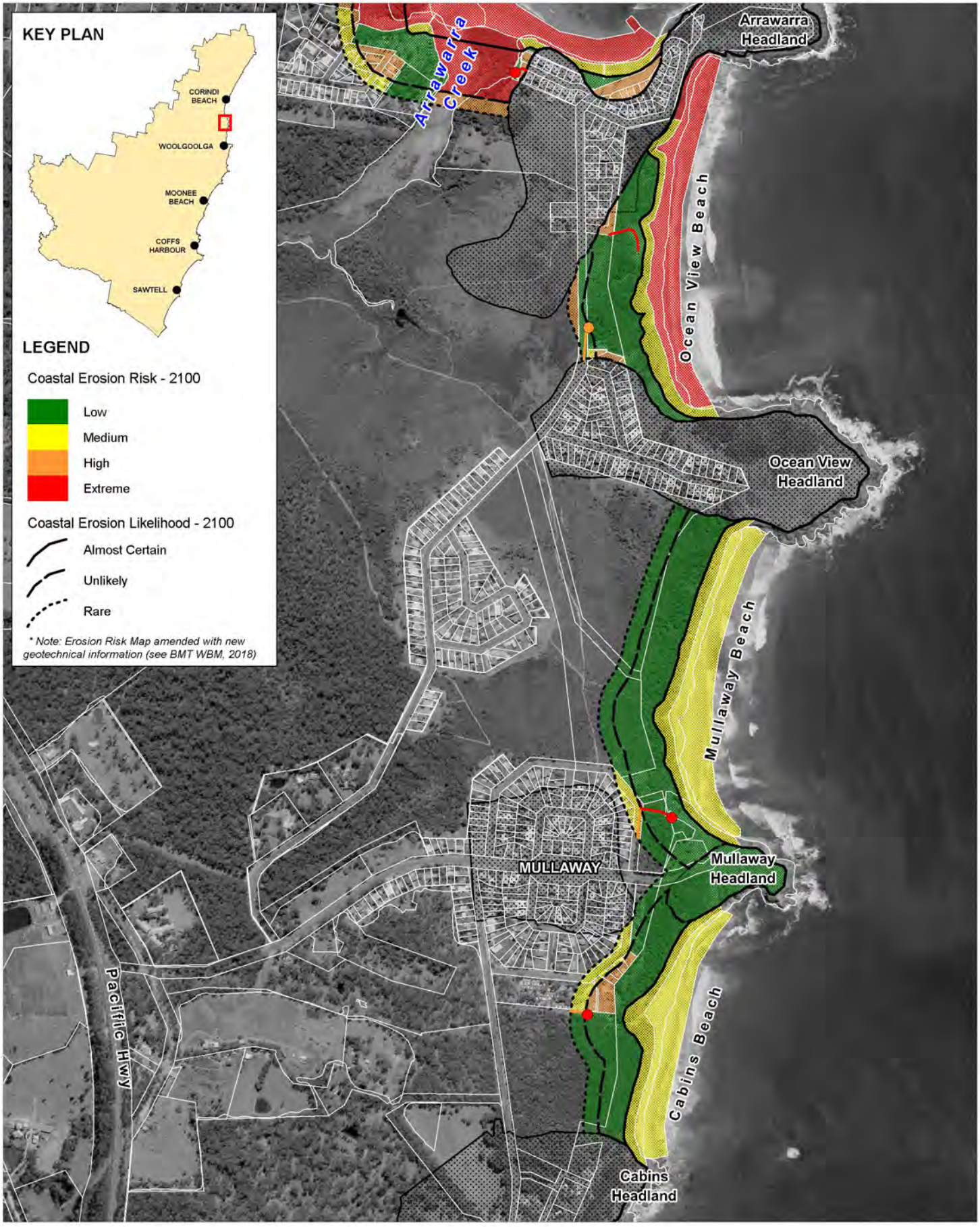


Title:

# Erosion and Recession Risk Map
# 2100 Planning Horizon - Mullaway Beach

Drawing: C-7

Rev: A

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N

0 250 500m

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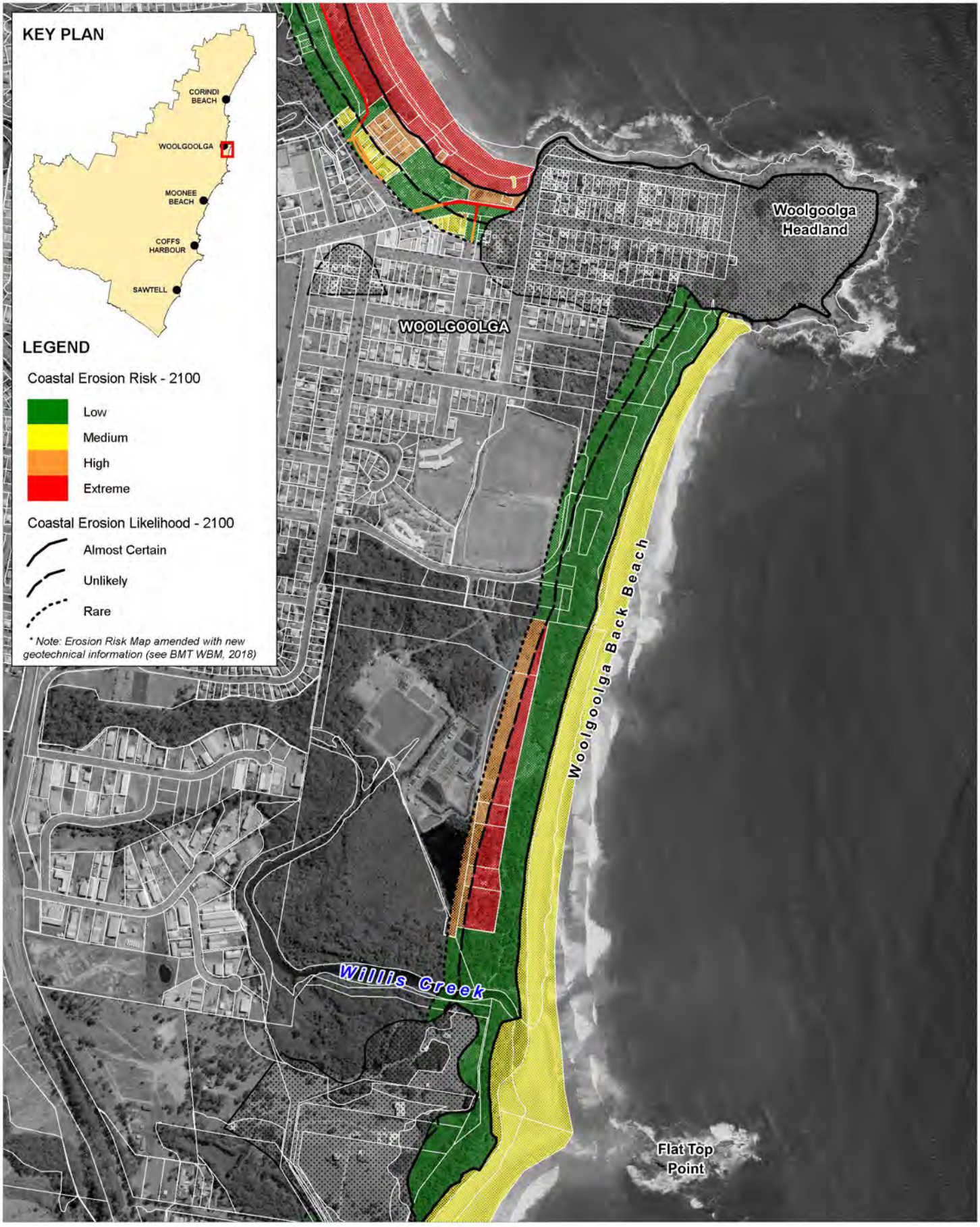


Title:

# Erosion and Recession Risk Map
# 2100 Planning Horizon - Woolgoolga

Drawing: C-9

Rev: A

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N

0 250 500m

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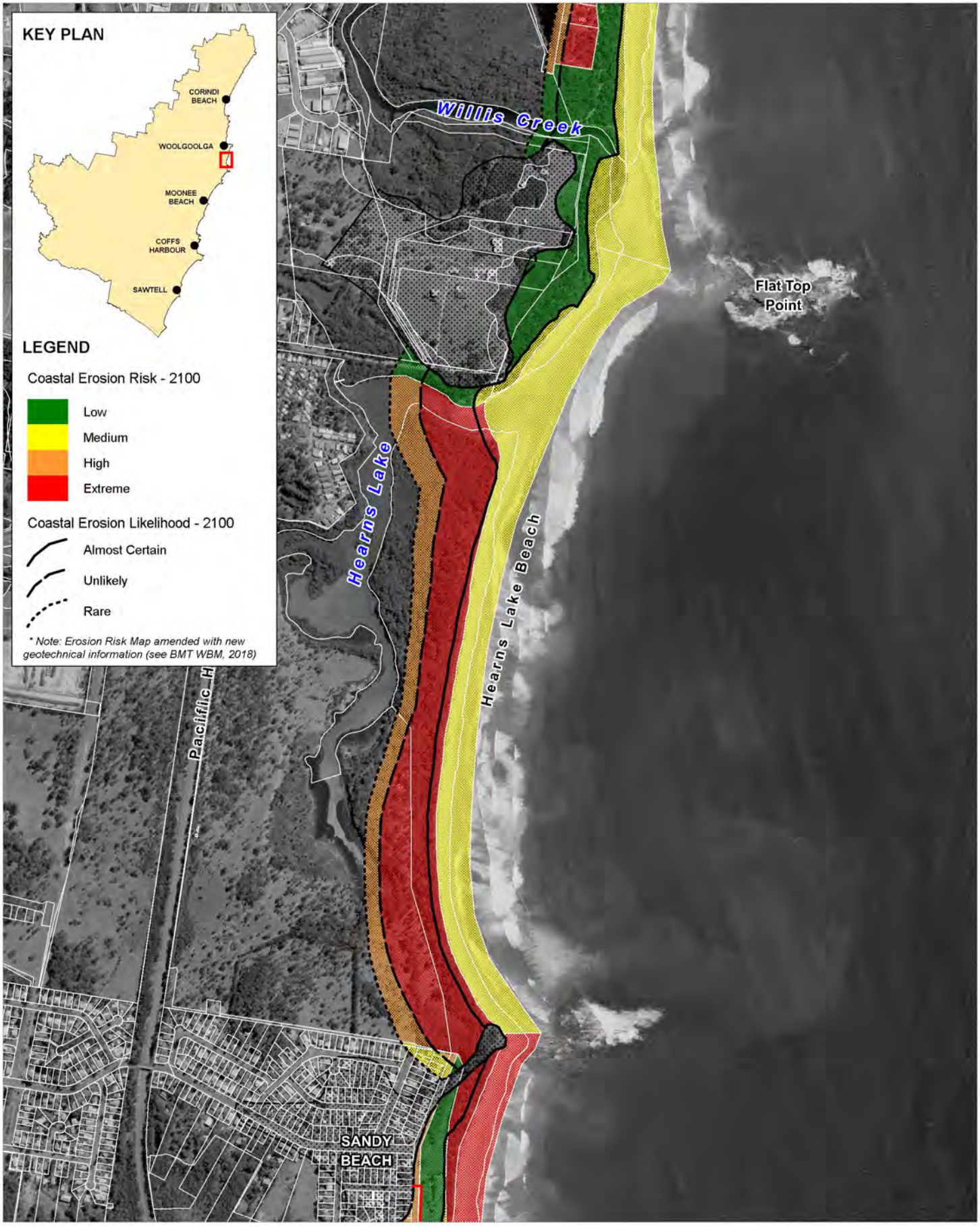


Title:

# Erosion and Recession Risk Map
# 2100 Planning Horizon - Hearns Lake Beach

Drawing: C-10

Rev: A

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N

0 250 500m

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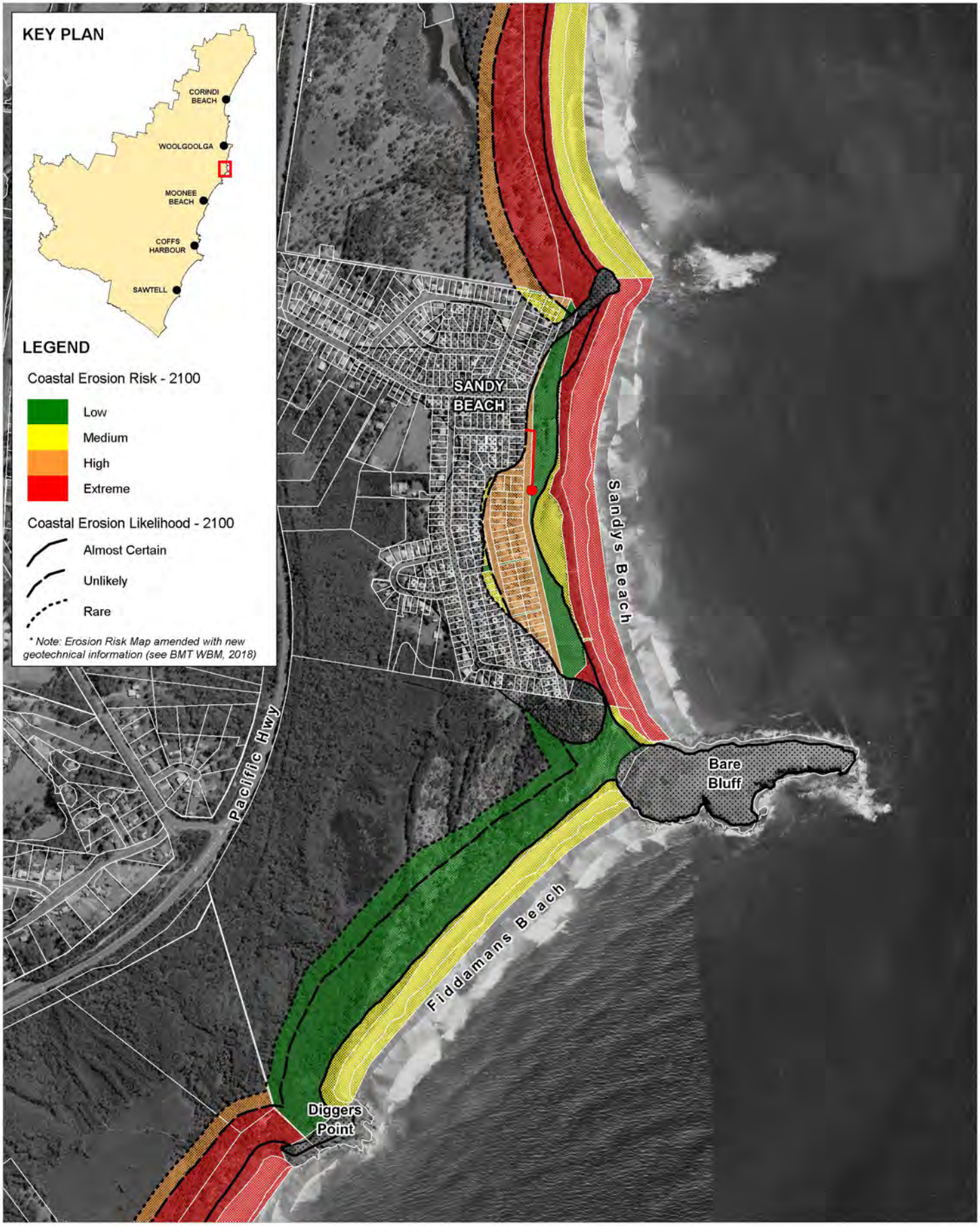


Title:

# Erosion and Recession Risk Map
# 2100 Planning Horizon - Sandy Beach

Drawing: C-11

Rev: A

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N

0 250 500m

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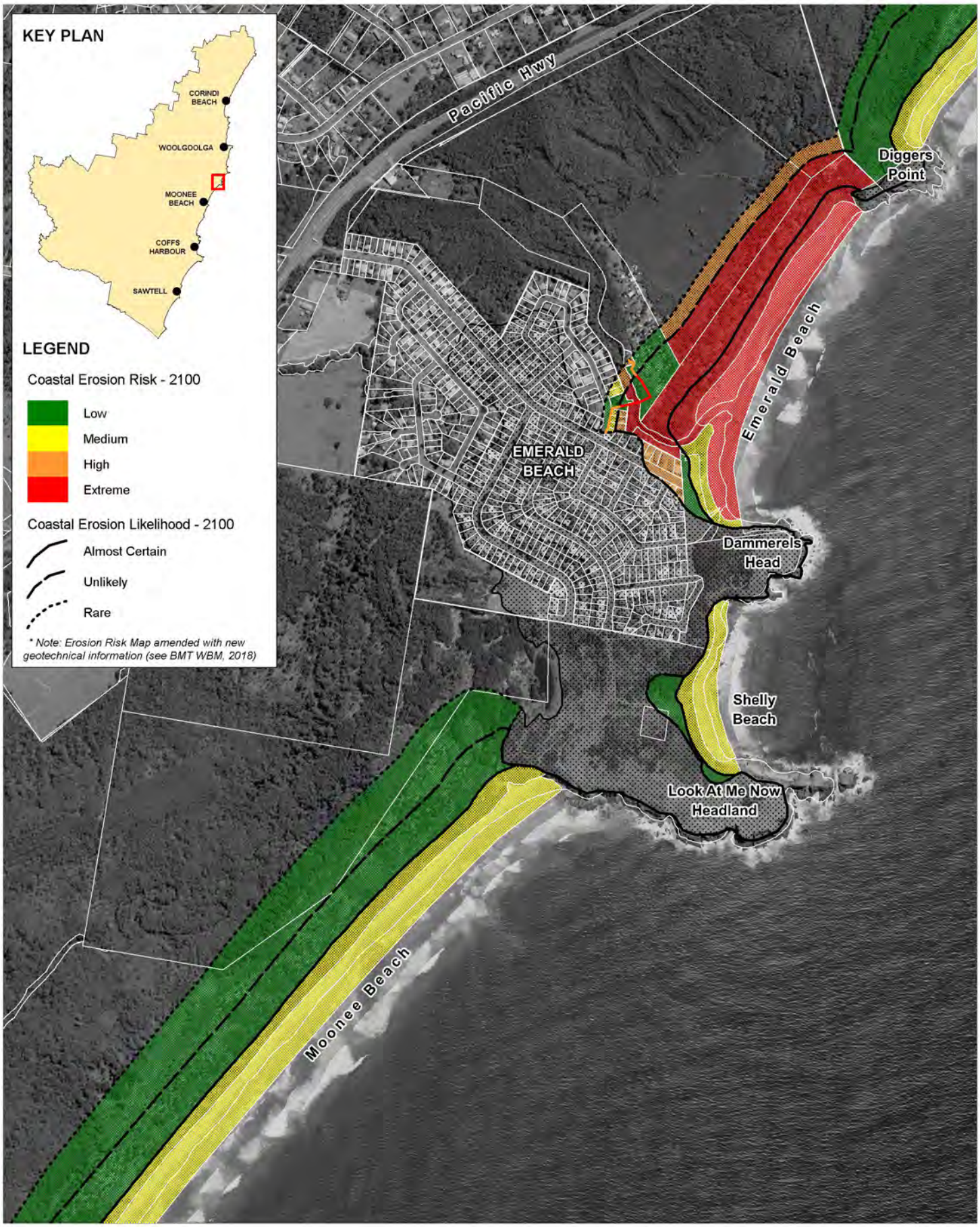


Title:

# Erosion and Recession Risk Map
# 2100 Planning Horizon - Emerald Beach

Drawing: C-12

Rev: A

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0 250 500m

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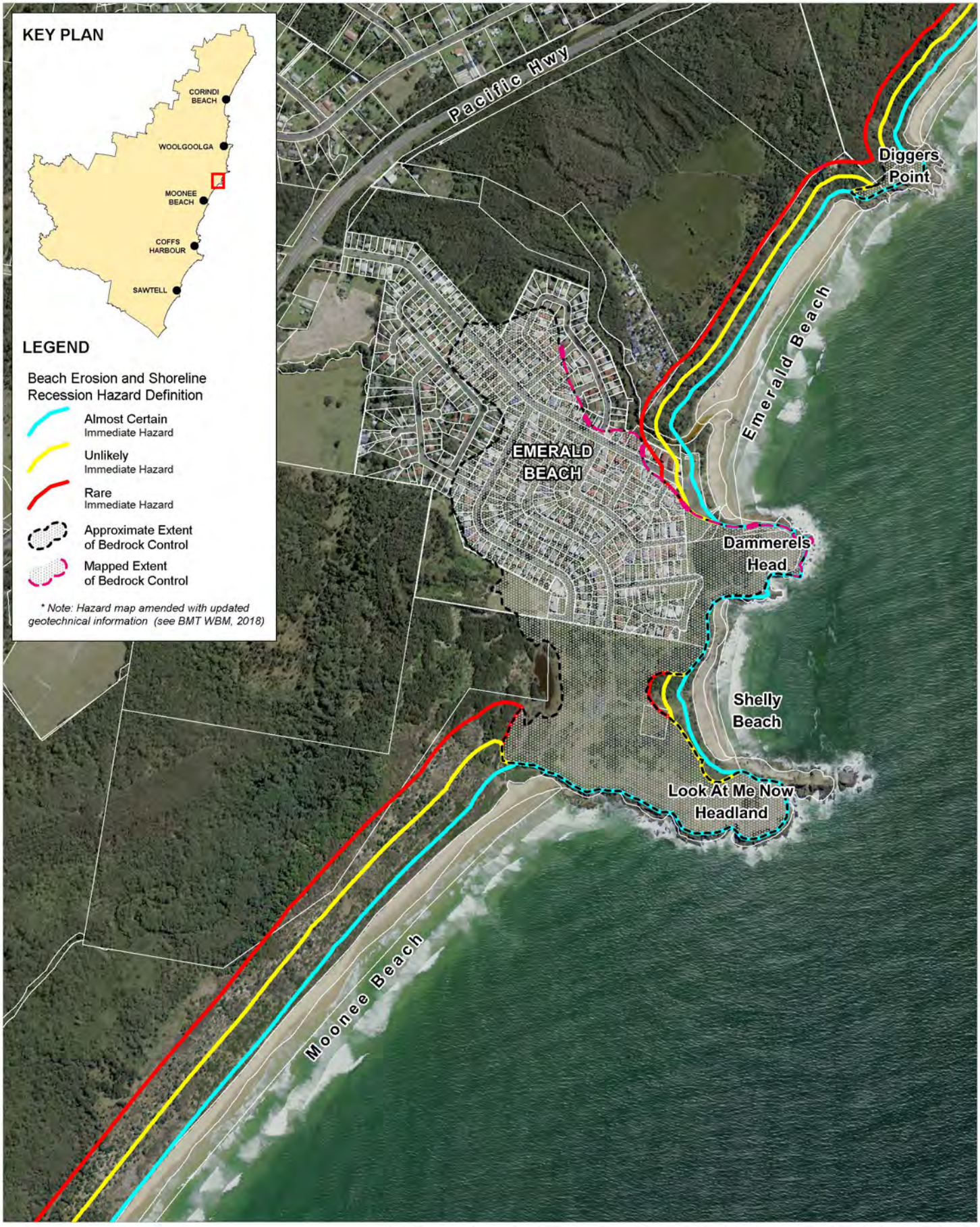


Title:

# Coastal Process Hazard Definition
# Immediate Planning Horizon - Emerald Beach

Drawing: A-14

Rev: A

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0 250 500m

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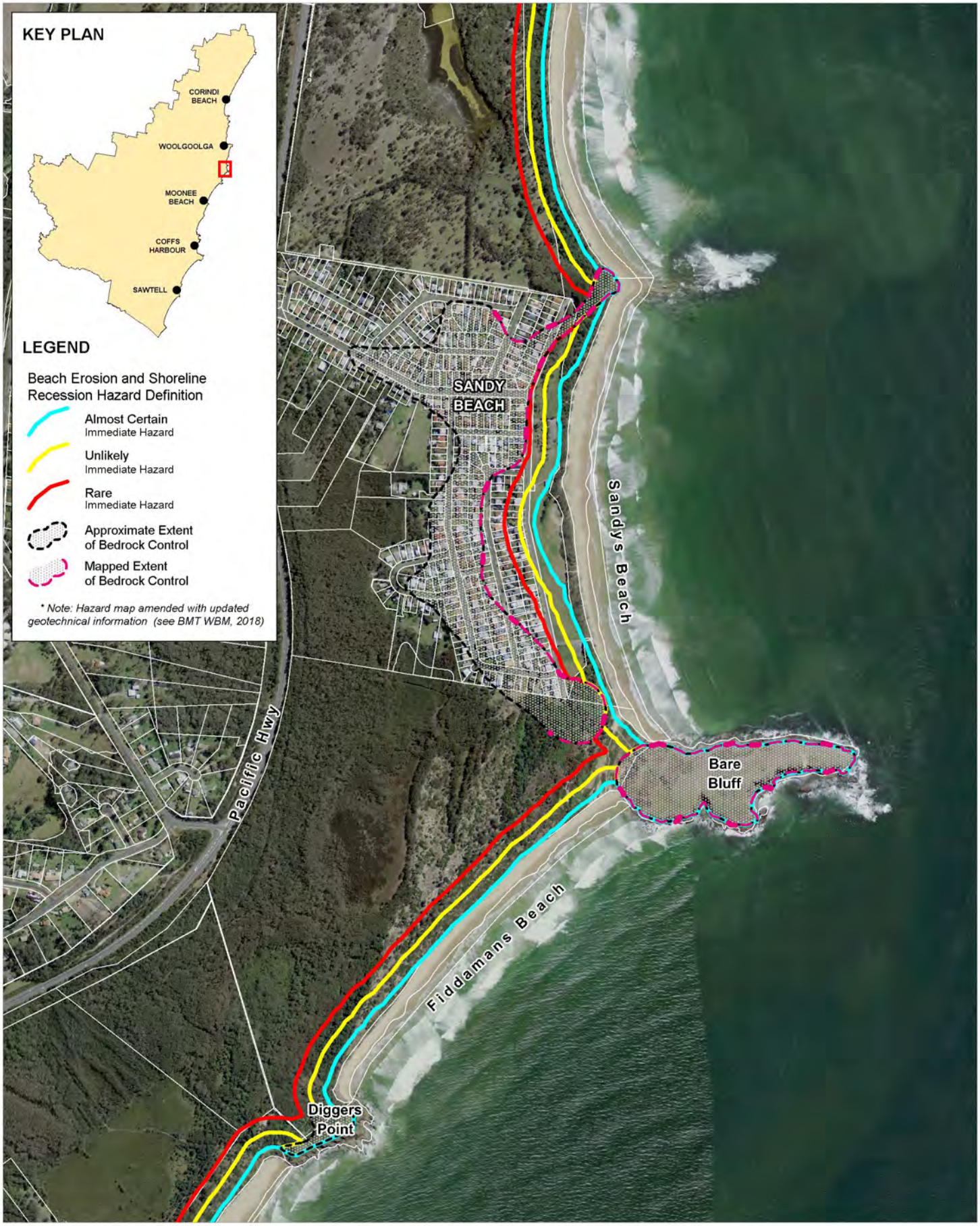


Title:

# Coastal Process Hazard Definition
# Immediate Planning Horizon - Sandy Beach

Drawing: A-15

Rev: A

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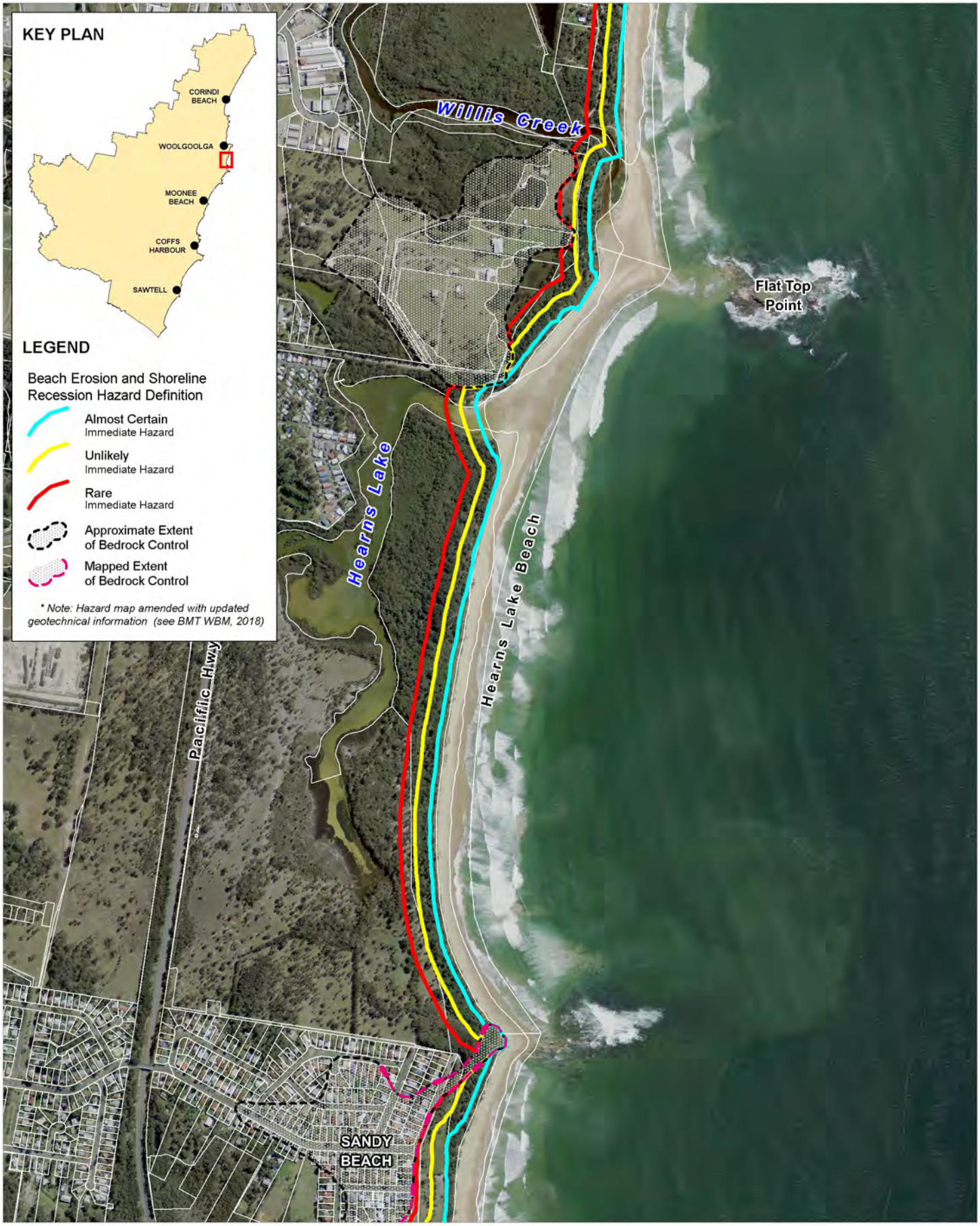


Title:

# Coastal Process Hazard Definition
# Immediate Planning Horizon - Hearns Lake Beach

Drawing: A-16

Rev: A

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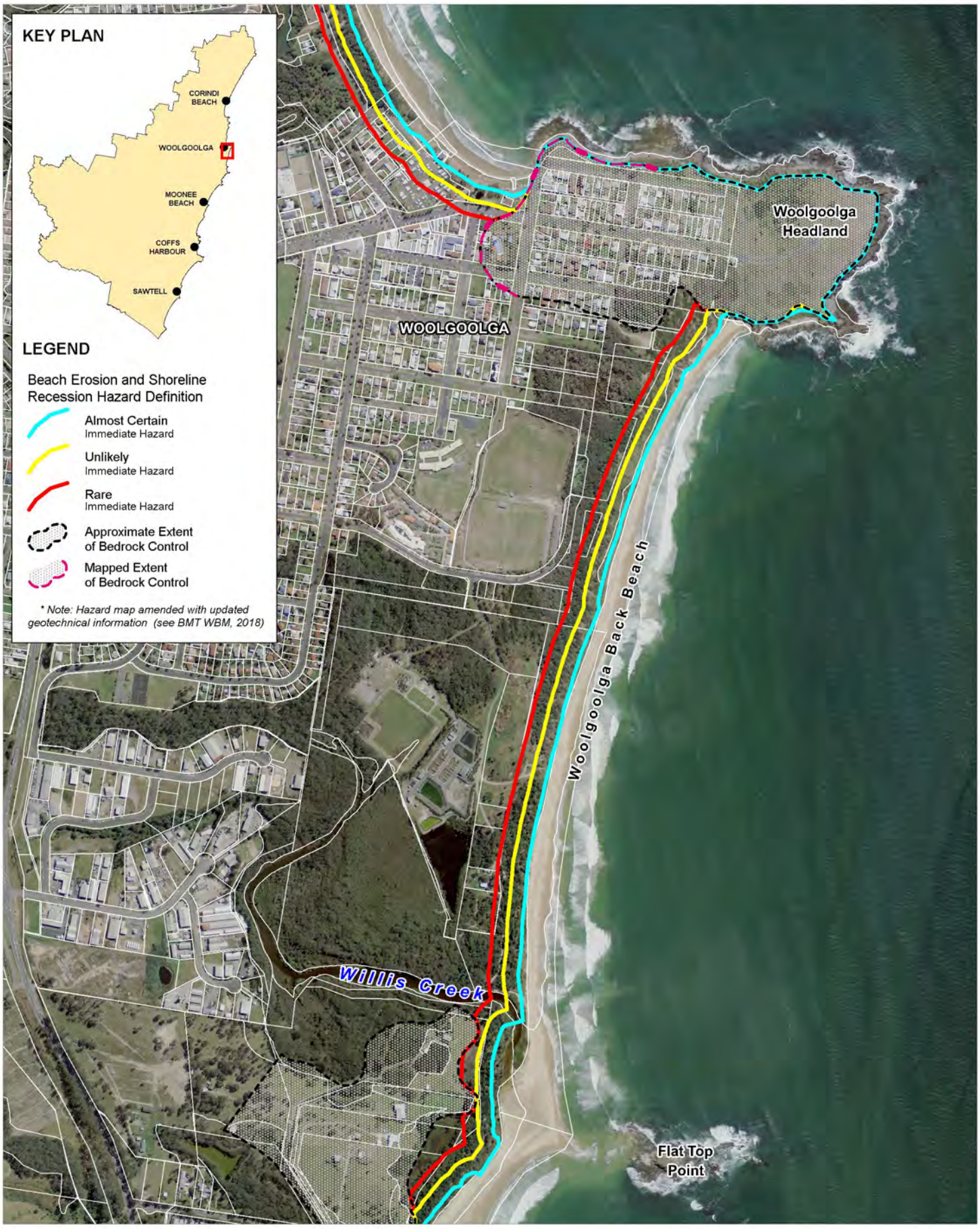


Title:

# Coastal Process Hazard Definition
# Immediate Planning Horizon - Woolgoolga

Drawing: A-17

Rev: A

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N

0 250 500m

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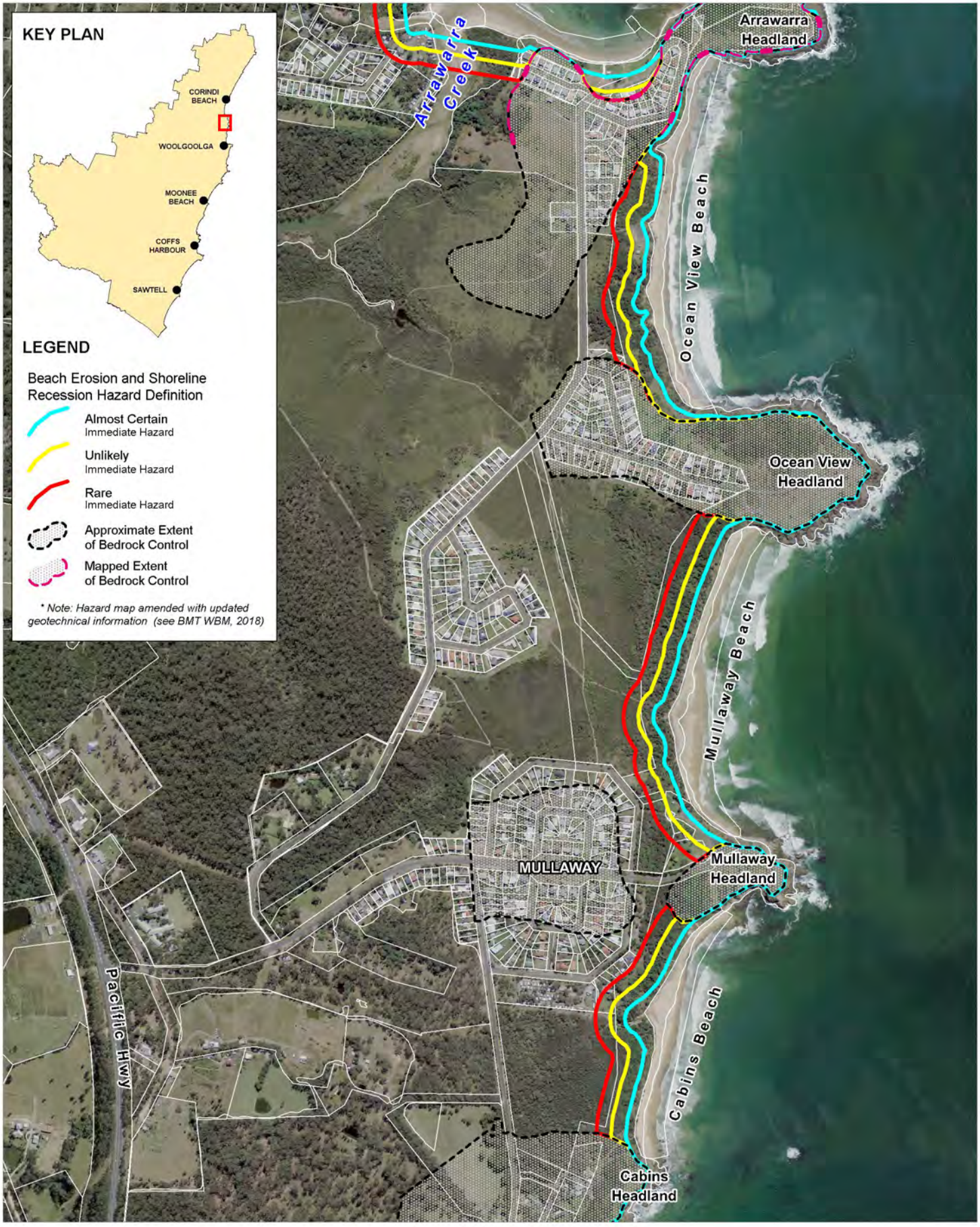


Title:

# Coastal Process Hazard Definition
# Immediate Planning Horizon - Mullaway Beach

Drawing: A-19

Rev: A

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N

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Approx. Scale

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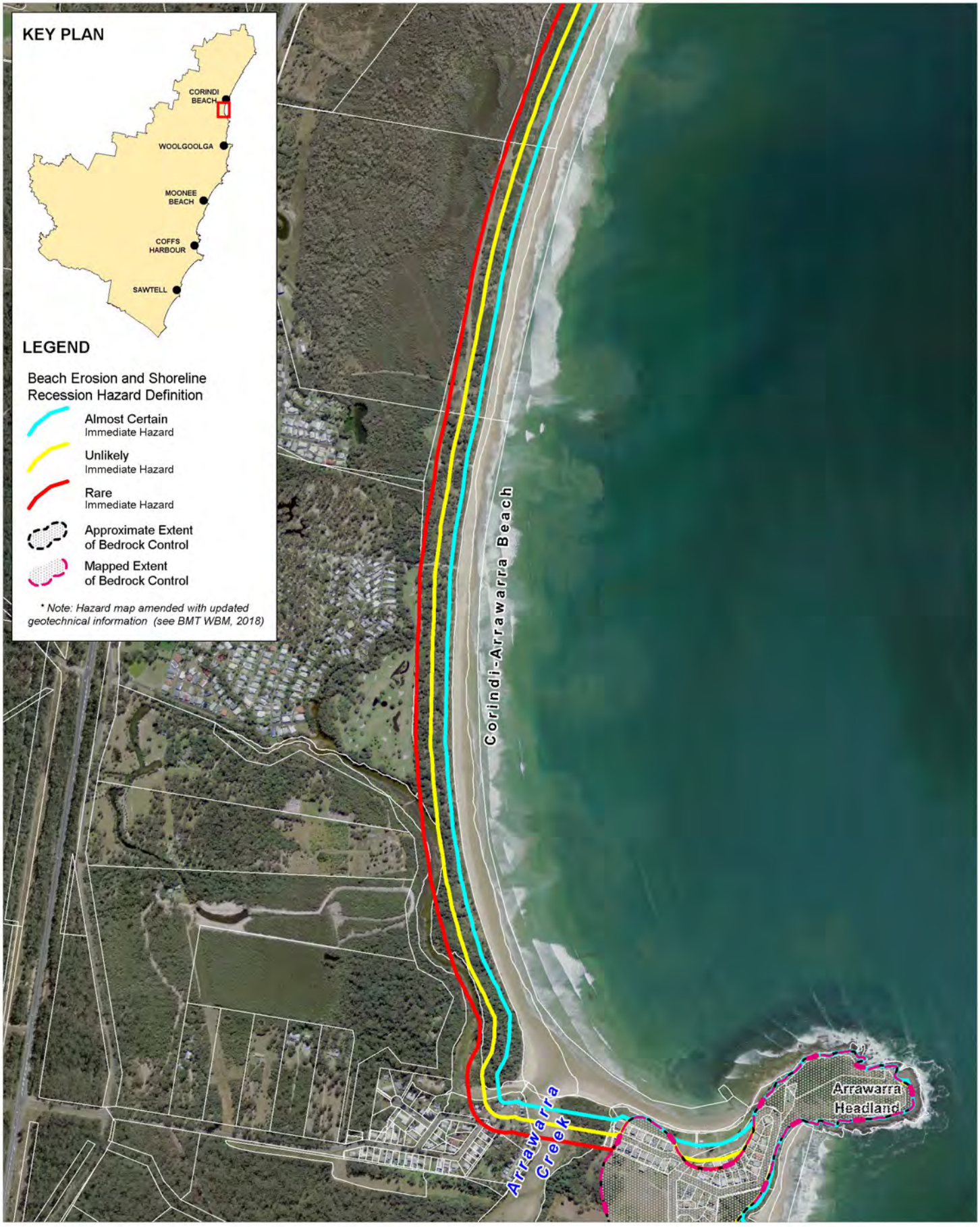


Title:

# Coastal Process Hazard Definitions
# Immediate Planning Horizon - Corindi Beach South

Drawing: A-20

Rev: A

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N

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Approx. Scale

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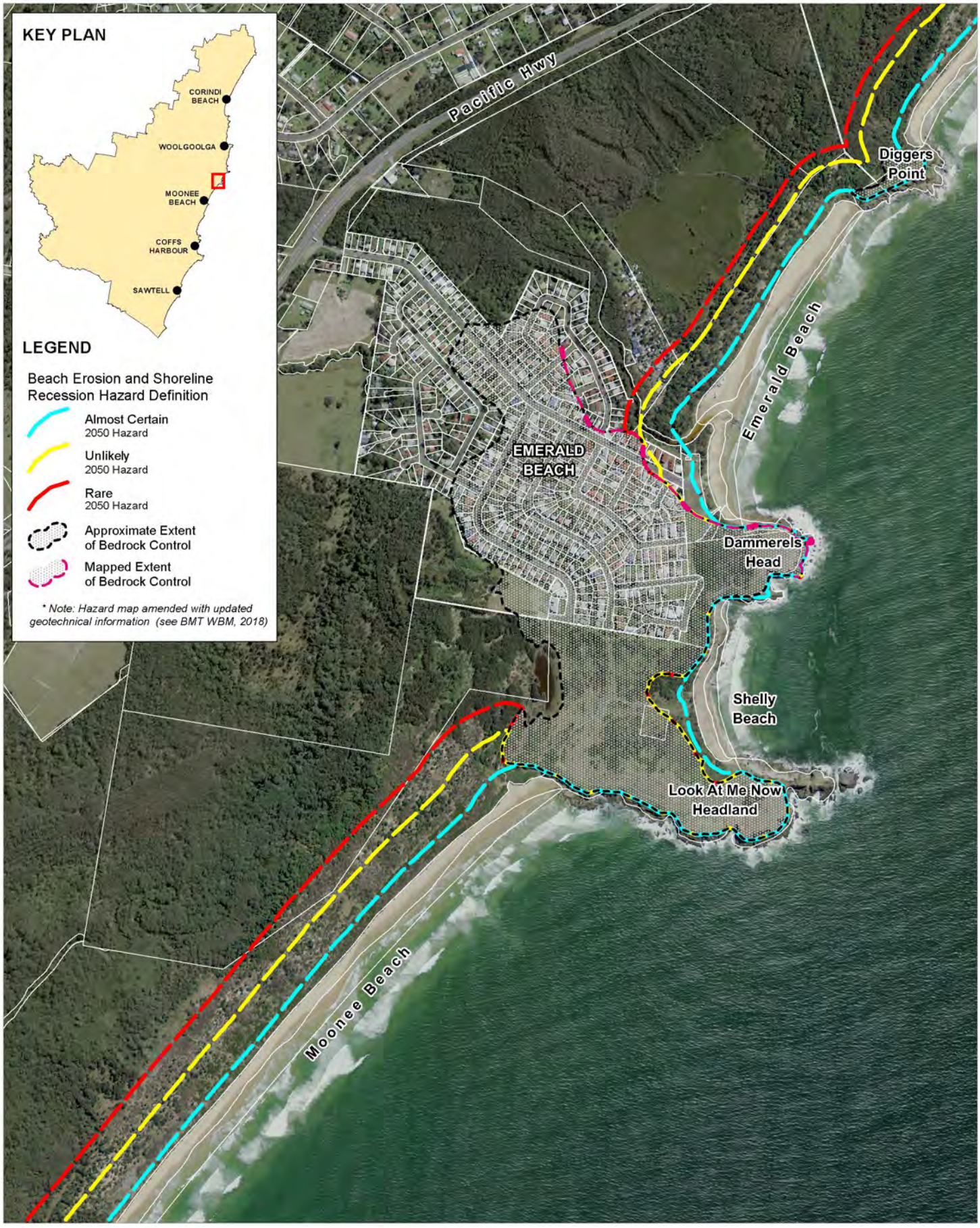


Title:

# Coastal Process Hazard Definition
# 2050 Planning Horizon - Emerald Beach

Drawing: B-14

Rev: A

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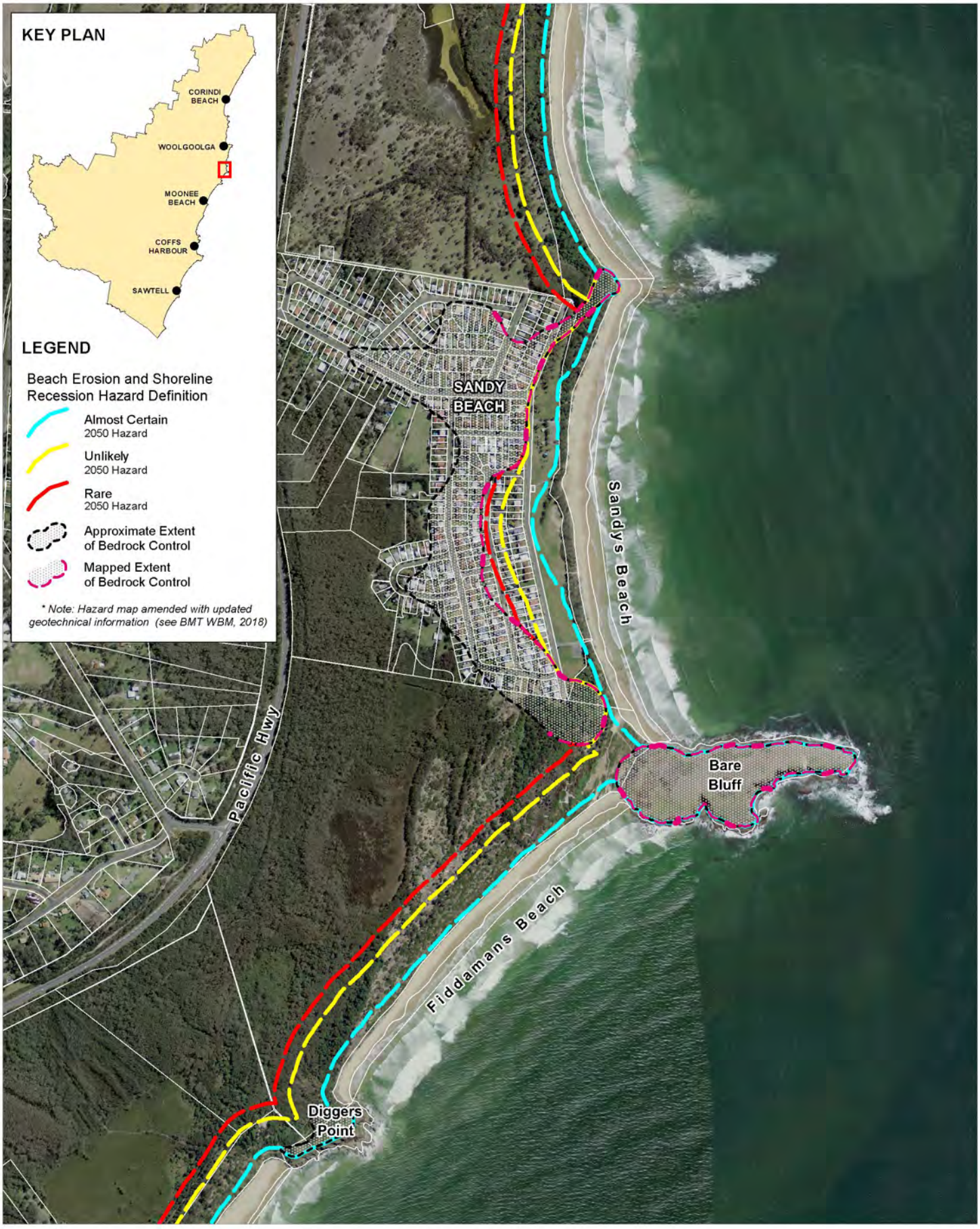


Title:

# Coastal Process Hazard Definition
# 2050 Planning Horizon - Sandy Beach

Drawing: B-15

Rev: A

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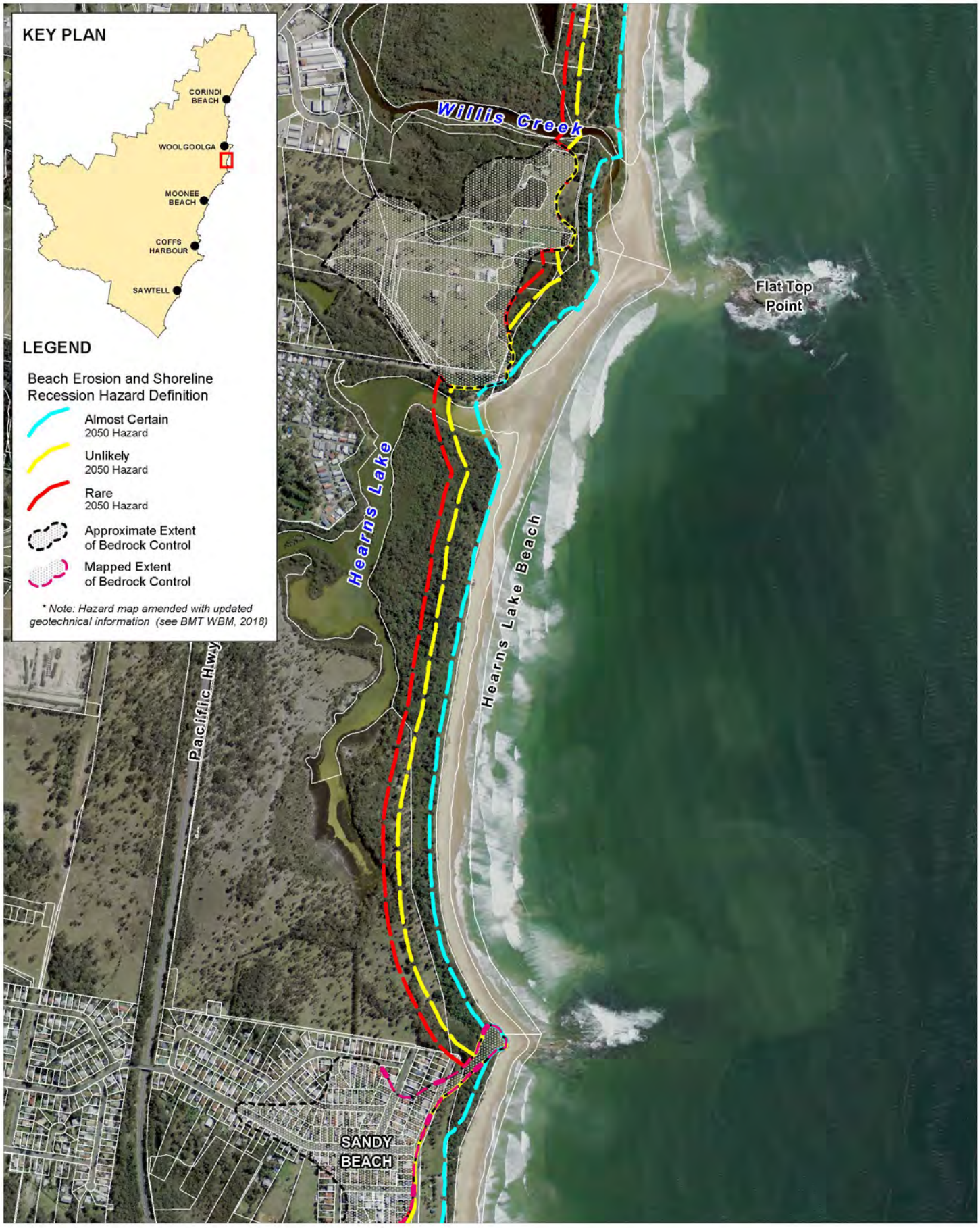


Title:

# Coastal Process Hazard Definition
# 2050 Planning Horizon - Hearns Lake Beach

Drawing: A-16

Rev: A

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N

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Approx. Scale

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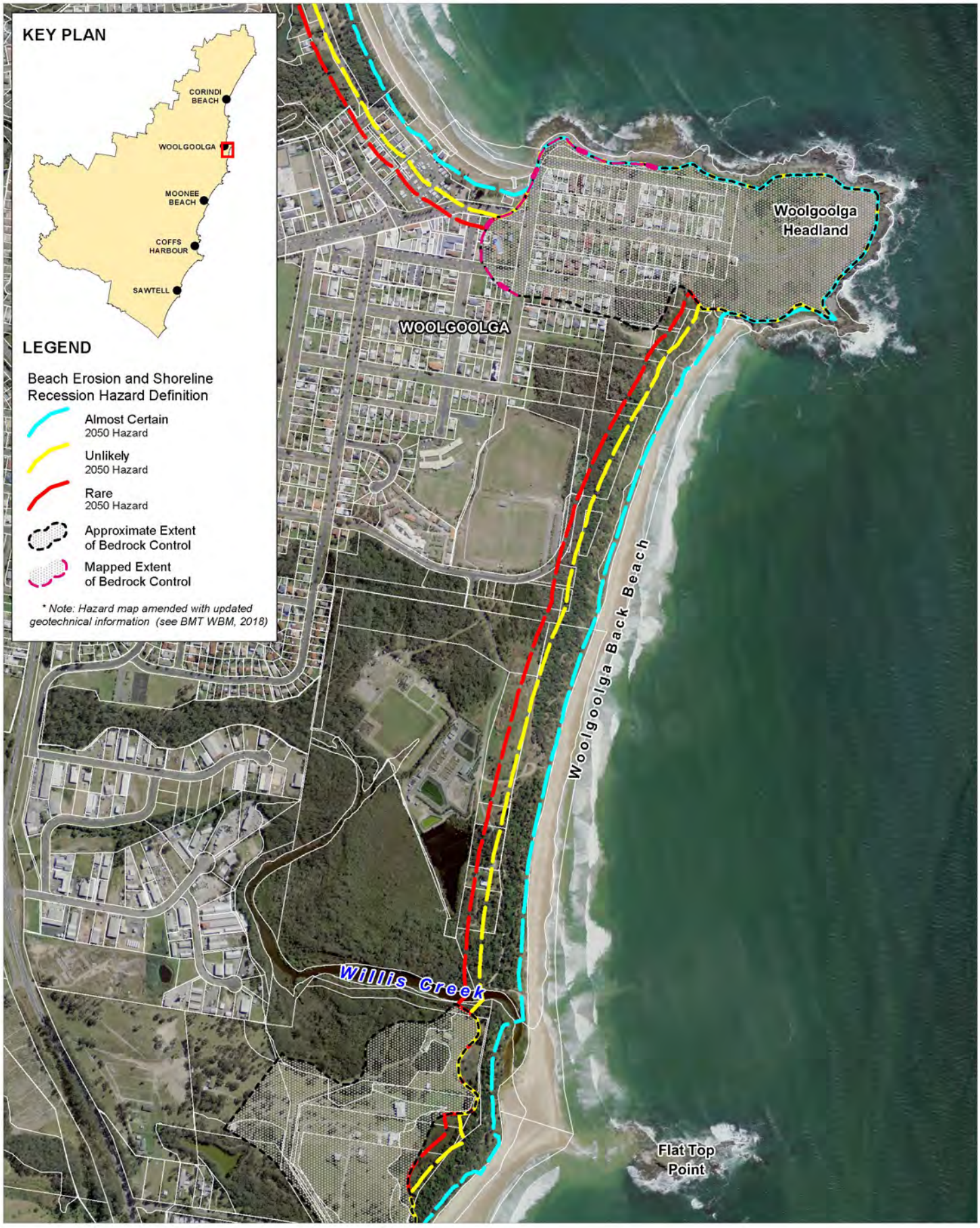


Title:

# Coastal Process Hazard Definition 2050 Planning Horizon - Woolgoolga

Drawing: B-17

Rev: A

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Approx. Scale

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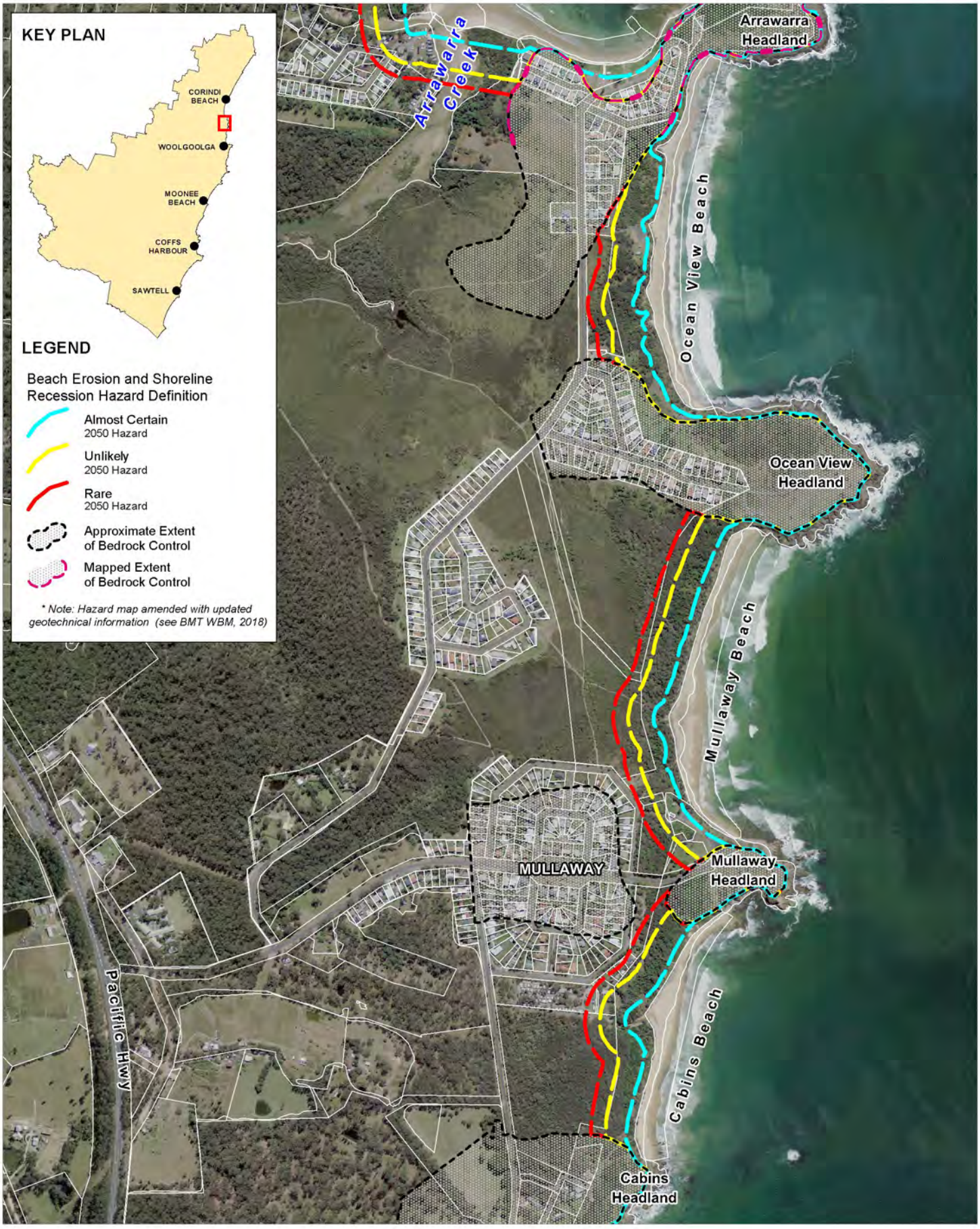


Title:

# Coastal Process Hazard Definition
# 2050 Planning Horizon - Mullaway Beach

Drawing: B-19

Rev: A

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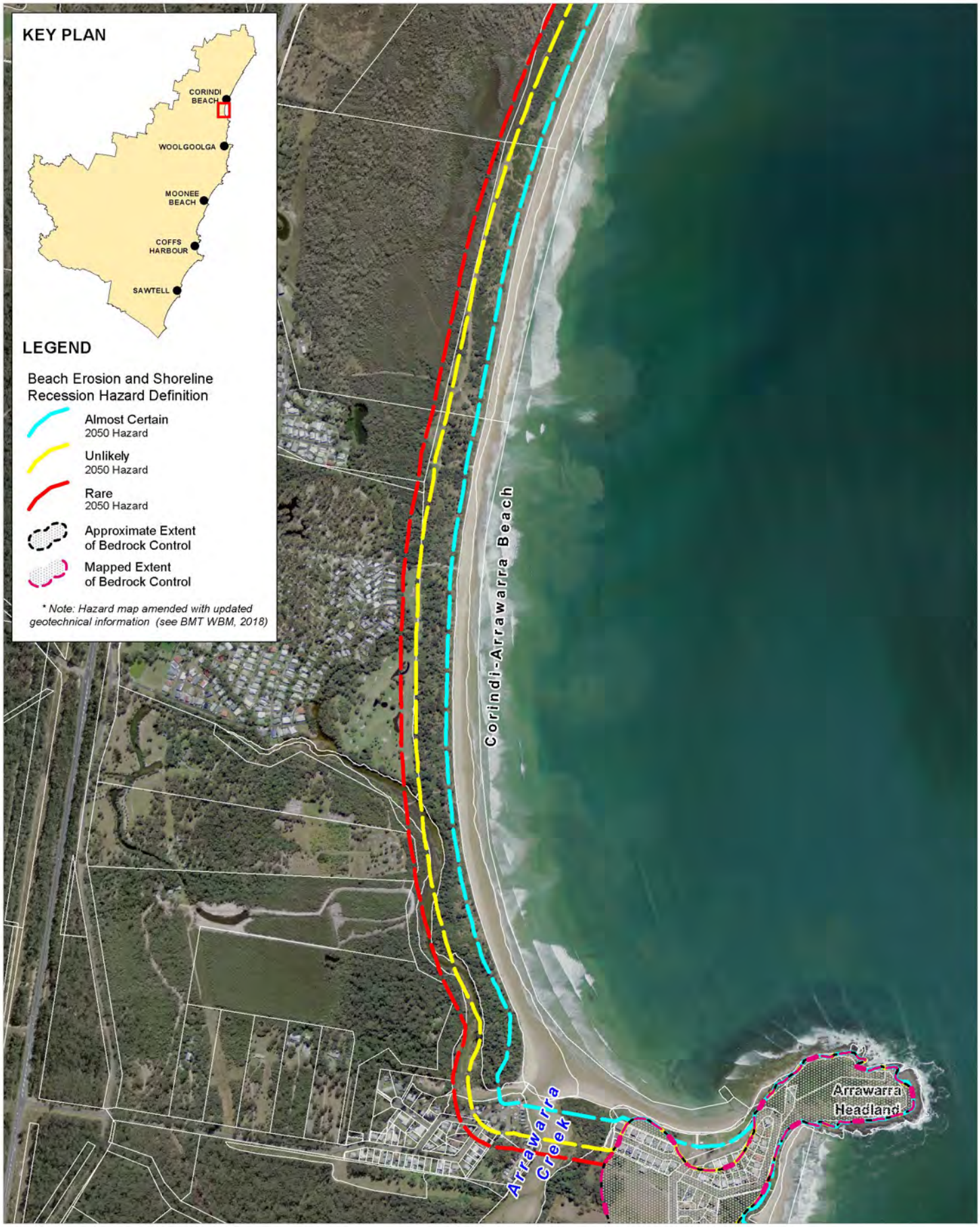


Title:

# Coastal Process Hazard Definitions
# 2050 Planning Horizon - Corindi Beach South

Drawing: B-20

Rev: A

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N

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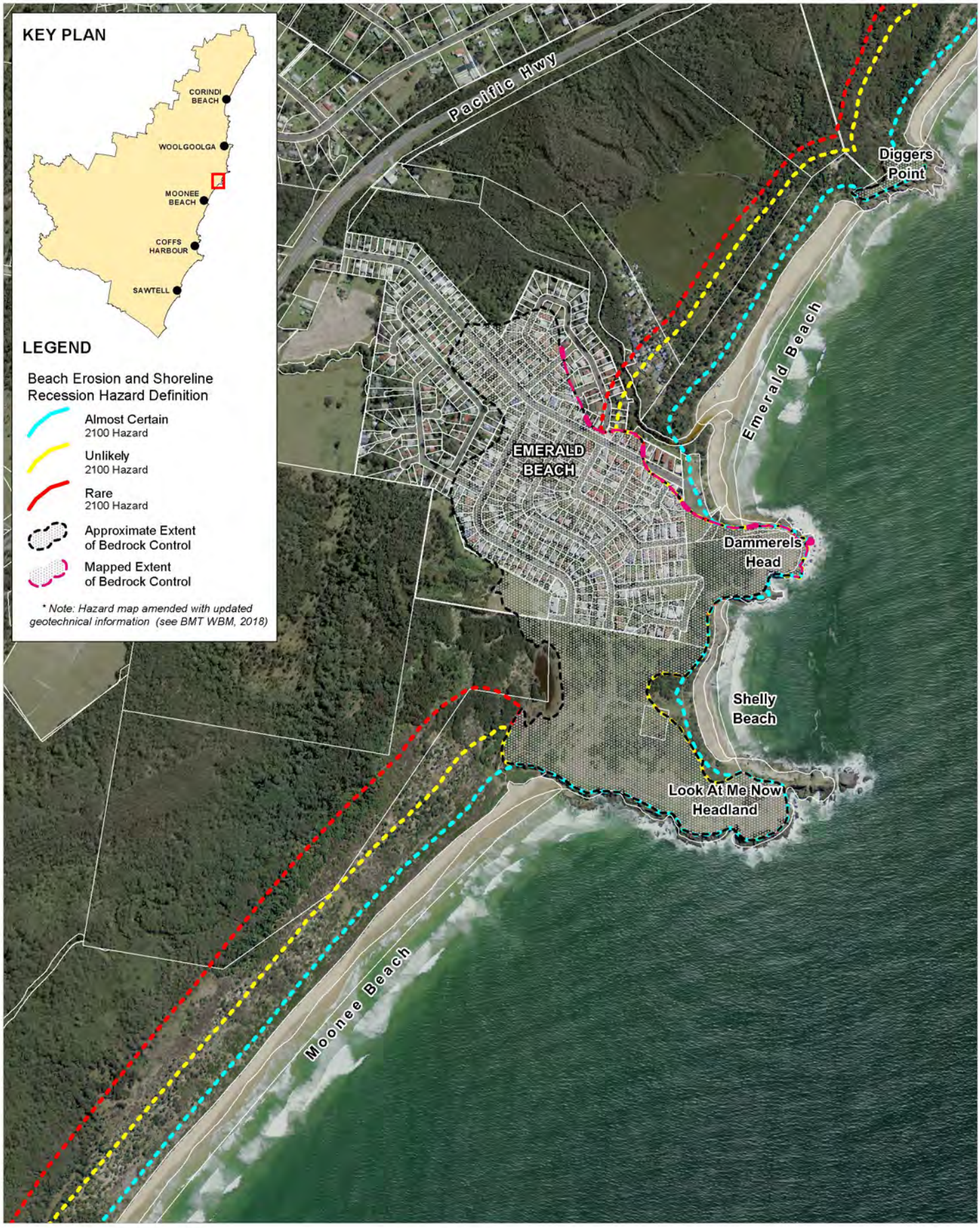


Title:

# Coastal Process Hazard Definition
# 2100 Planning Horizon - Emerald Beach

Drawing: C-14

Rev: A

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N

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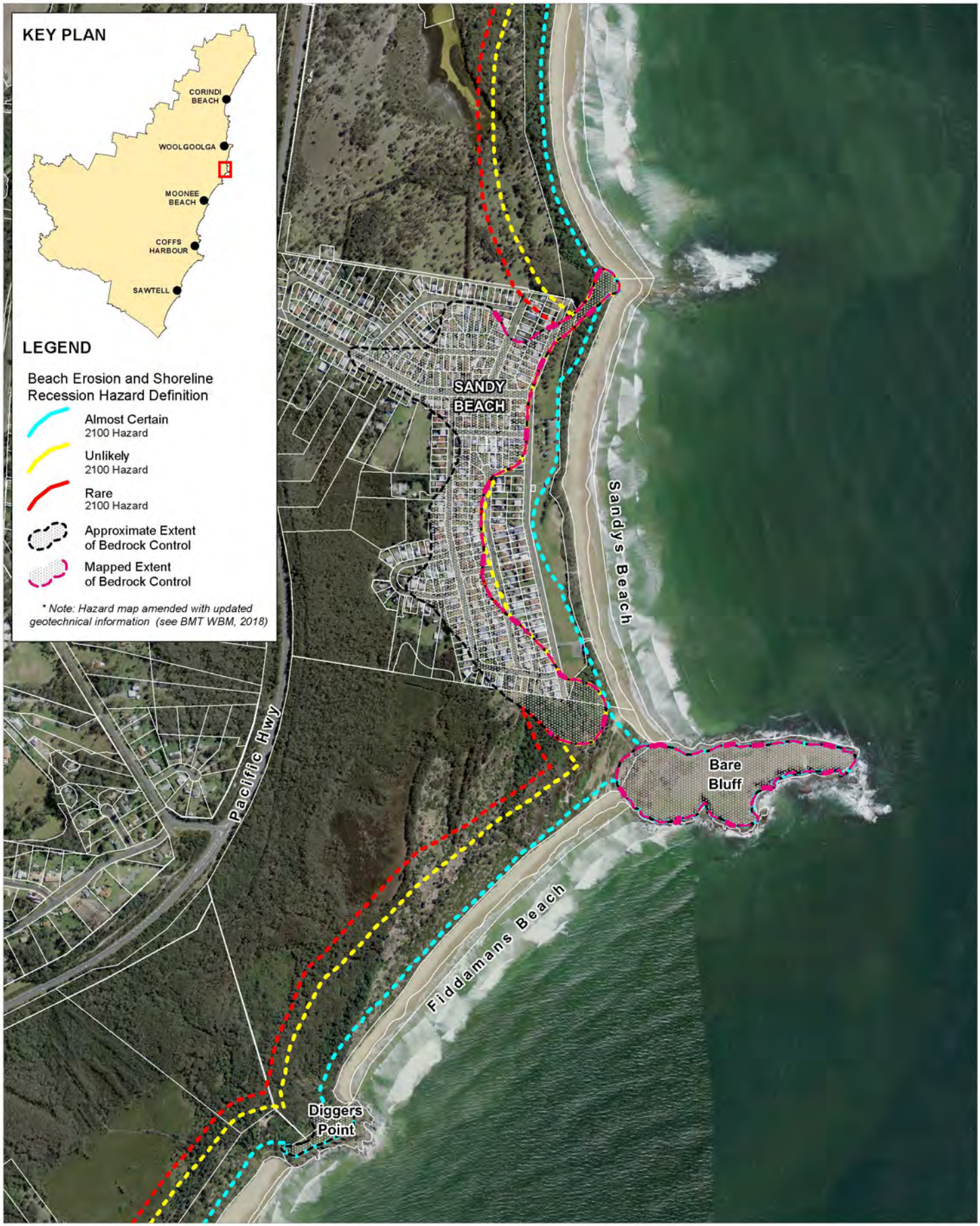


Title:

# Coastal Process Hazard Definition
# 2100 Planning Horizon - Sandy Beach

Drawing: C-15

Rev: A

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N

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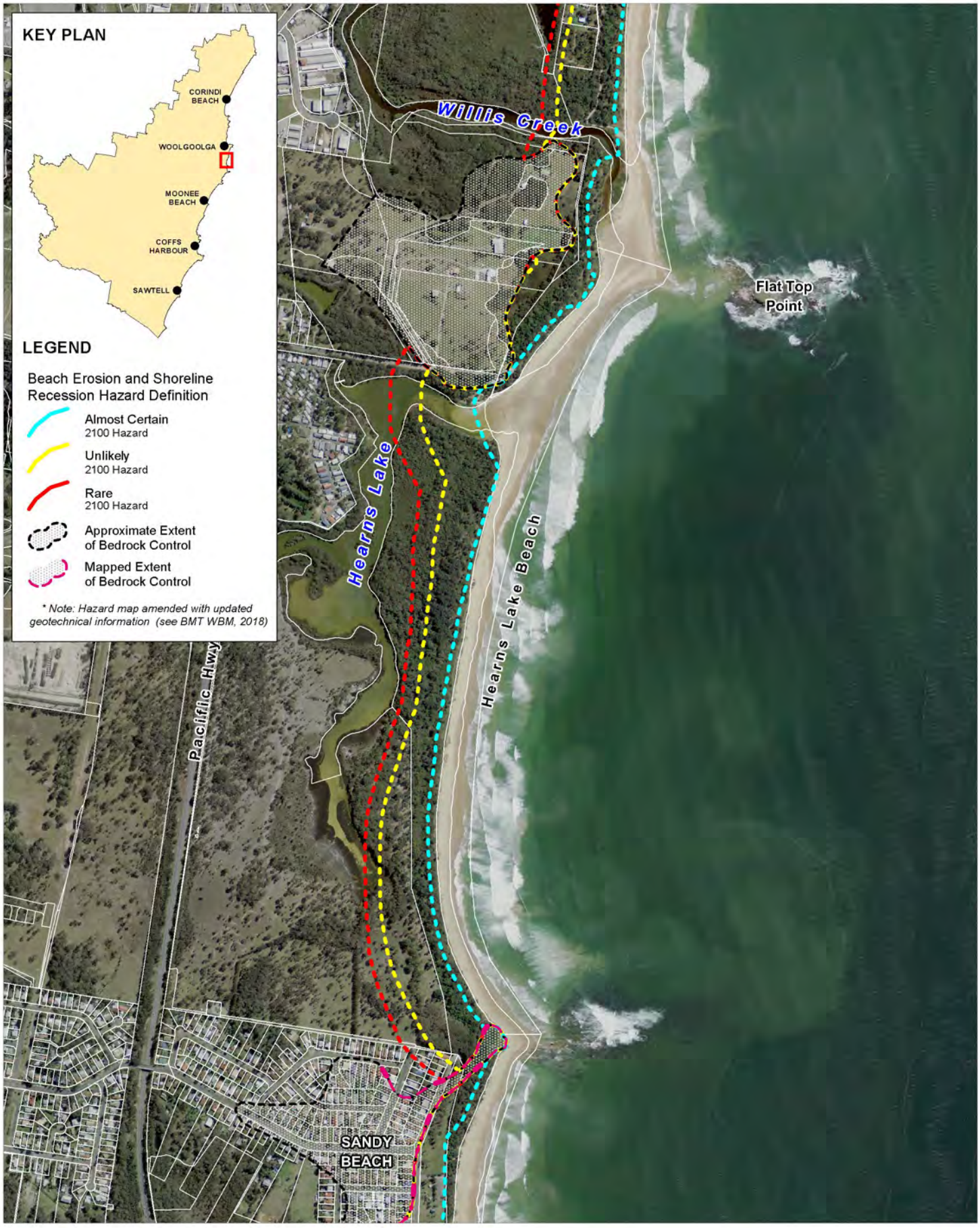


Title:

# Coastal Process Hazard Definition
# 2100 Planning Horizon - Hearns Lake Beach

Drawing: C-16

Rev: A

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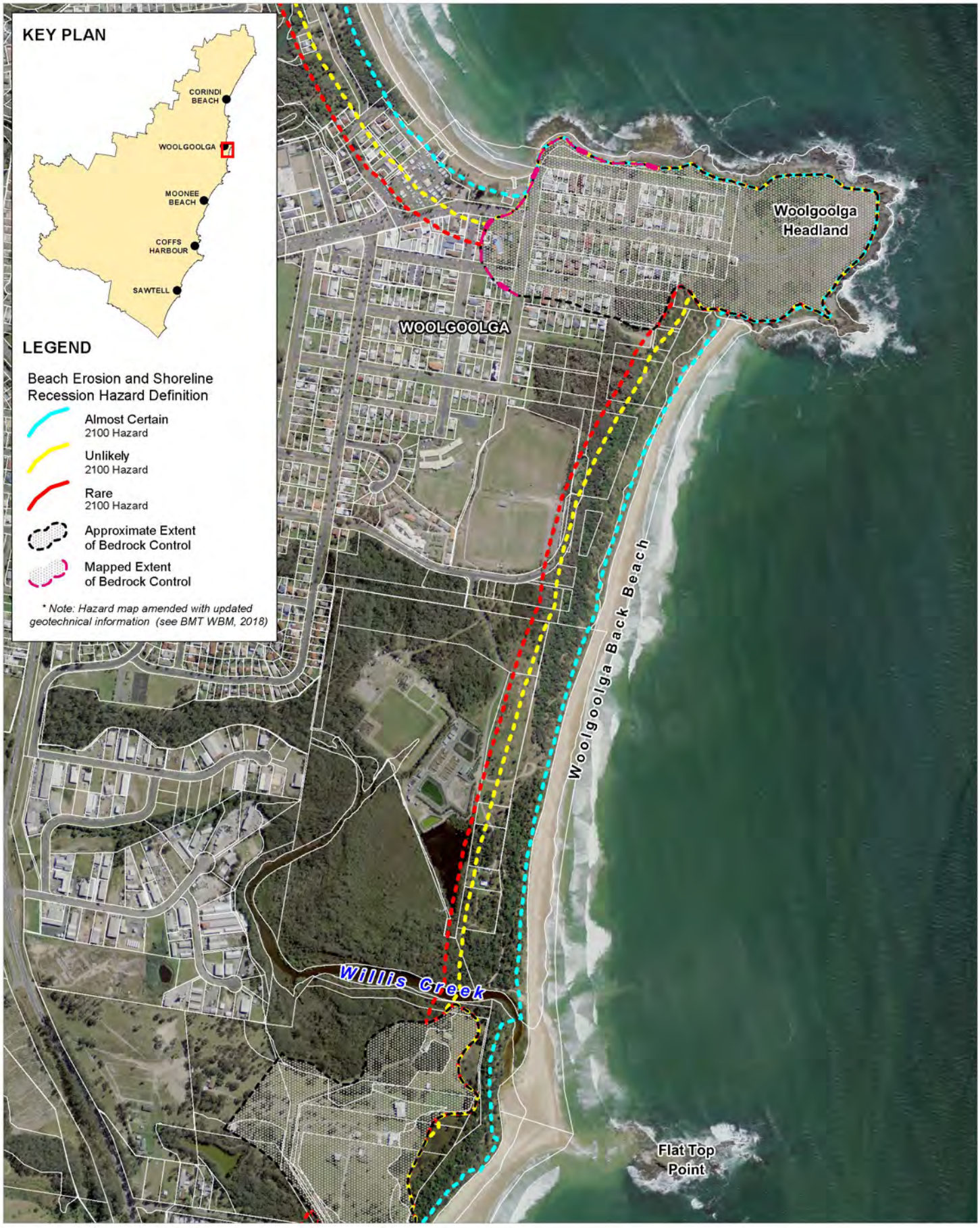


Title:

# Coastal Process Hazard Definition 2100 Planning Horizon - Woolgoolga

Drawing: C-17

Rev: A

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N

0 250 500m

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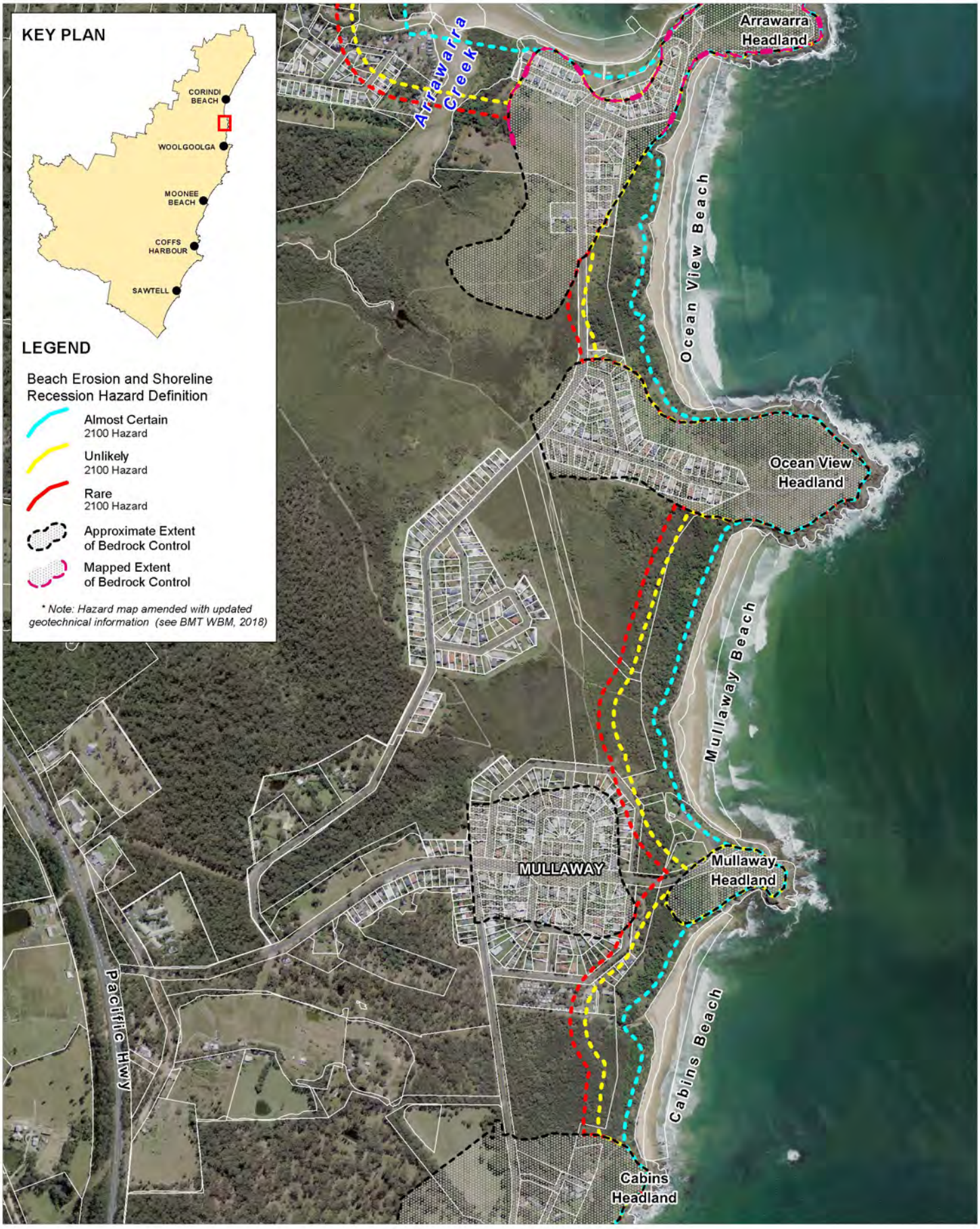


Title:

# Coastal Process Hazard Definition
# 2100 Planning Horizon - Mullaway Beach

Drawing: C-19

Rev: A

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N

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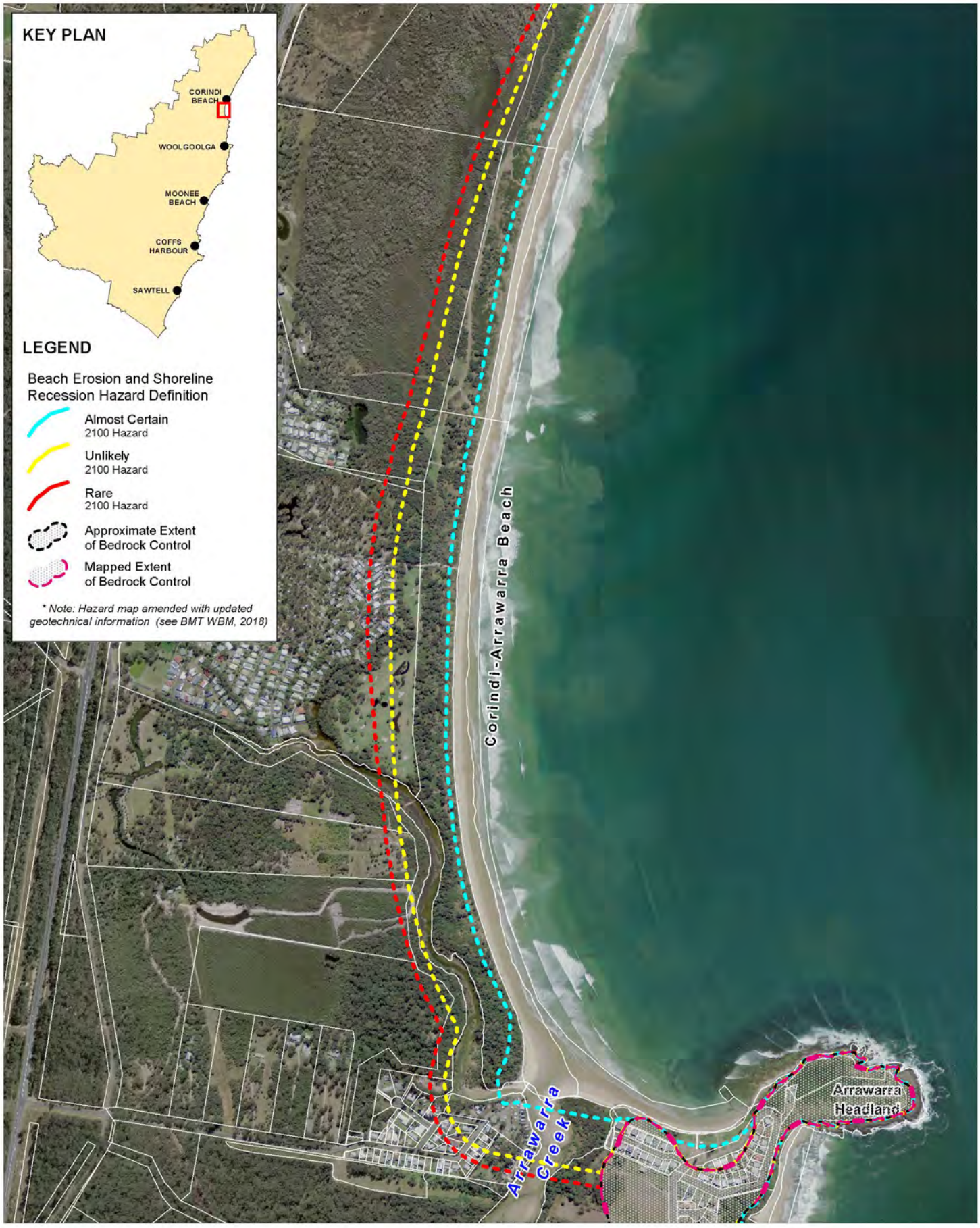


Title:

# Coastal Process Hazard Definitions
# 2100 Planning Horizon - Corindi Beach South

Drawing: C-20

Rev: A

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