

Coastal Zone Emergency Action Subplan – Lower Hawkesbury

Hawkesbury-Nepean River System CMP

Partner Councils

2 October 2025



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GLOSSARY AND ABBREVIATIONS

Term	Definition
AIDR	The Australian Institute for Disaster Resilience
Beach erosion	Landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers: wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.
BoM	Bureau of Meteorology
CCC	Central Coast Council
CM Act	<i>The Coastal Management Act 2016</i>
Coastal cliff and slope instability	Geotechnical instabilities on coastal cliffs and bluffs, including rock falls, slumps, and landslides.
Coastal emergency	An emergency due to actual or imminent coastal inundation, coastal erosion, or coastal cliff and slope instability which (a) threatens endangers, or threatens to endanger, the safety or health of persons; or (b) destroys or damages, or threatens to destroy or damage, any property or the natural environment.
Coastal inundation	Coastal inundation occurs when a combination of marine and atmospheric processes raises the water level at the coast above normal elevations, causing land that is usually 'dry' to become inundated by sea water. Alternatively, the elevated water level may result in wave run-up and overtopping of natural or built shoreline structures (e.g., dunes, seawalls).
Coastal protection works	The CM Act defines coastal protection works as: a) beach nourishment b) activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments, and groynes.
Combat Agency	The agency identified in this subplan as the agency primarily responsible for controlling the response to a particular emergency (SERM Act 1989).
CZEAS	Coastal Zone Emergency Action Subplan (this document)
DCCEEW	The NSW Department of Climate Change, Energy, the Environment and Water. Prior to 1 January 2024, the responsibilities of the department were carried out by the former NSW Department of Planning and Environment (DPE).
DPE	The former NSW Department of Planning and Environment. On 1 January 2024, the DPE was split into two new dedicated entities, the Department of Climate Change, Energy, the Environment and Water (DEECCW), and the Department of Planning, Housing and Infrastructure (DPHI).
ECL	East Coast Low
EMPLAN	Emergency Management Plan
Essential infrastructure	Defined in the CM Act as infrastructure for the following purposes: electricity generation, transmission and distribution, telecommunications, rail, roads, gas, sewerage systems, water supply systems or stormwater management systems, airports, ports shipping and harbours.
Estuary	The CM Act defines an estuary as any part of a river, lake, lagoon, or coastal creek that is affected by coastal tides, up to the highest astronomical tide.



Term	Definition
FRNSW	Fire and Rescue NSW
Hs	Significant Wave Height - the average of the highest one third of waves during a specific period.
HSC	Hornsby Shire Council
LEMC	Local Emergency Management Committee. The LEMC is constituted under the SERM Act for each local government area and is responsible for preparing plans for response and recovery from emergencies.
LEMO	Local Emergency Management Officer
Local Emergency Operations Controller (LEOCON)	A Police Officer appointed by the District Emergency Operations Controller as the Local Emergency Operations Controller for the Local Government Area.
LGA	Local Government Area
MHWS	Mean High Water Springs. The long-term mean of the heights of 2 successive high waters during those periods of 24 hours (approximately once a fortnight) when the range of tide is greatest, during full and new moon.
NBC	Northern Beaches Council
NPWS	National Parks and Wildlife Service
NSW SES	NSW State Emergency Service
Regional Emergency Operations Controller (REOCON)	The NSW Police Southern Region Commander is appointed as the REOCON. This role is typically responsible for coordinating emergency management efforts within a specific region of NSW during crises or disasters. performs the role of REOCON.
RFS	NSW Rural Fire Service
State Emergency Operations Controller (SEOCON)	This SEOCON role is a member of the New South Wales Police Force Senior Executive Service responsible for overseeing emergency response operations at the state level during major emergencies or disasters.
SERM Act	<i>State Emergency and Rescue Management Act 1989</i>
Tsunami	Defined in the State tsunami Plan as “A series of ocean waves with very long wavelengths (typically hundreds of kilometres) caused by large-scale disturbances of the ocean, such as earthquakes, landslide, volcanic eruptions, explosions, or meteorites”.
Wave Run-up	The vertical distance above mean water level reached by the uprush of water from waves across a beach or up a structure.



1 INTRODUCTION

1.1 Background

This Coastal Zone Emergency Action Subplan (CZEAS) forms part of the Hawkesbury-Nepean River System (HNRS) Coastal Management Program (CMP). It addresses emergencies associated with **Coastal Inundation**, as defined in the *Coastal Management Act 2016* (the CM Act), and applies to the foreshore communities within the Lower Hawkesbury River estuary – extending from (but excluding) Little Patonga to Spencer.

This CZEAS **does not cover**:

- Coastal hazard emergencies along the foreshores of **Pittwater** or **Broken Bay**, which are subject to separate CZEAS documents under the CMP framework.
- **Riverine flooding** across the broader Hawkesbury-Nepean Valley, which is managed under the Hawkesbury-Nepean Valley Flood Emergency Plan.

This CZEAS has been prepared based on the requirements of:

- *The Coastal Management Act 2016* (the CM Act).
- The NSW Coastal Management Manual (OEH, 2018a).
- The NSW Guideline for preparing a coastal zone emergency action subplan (DPIE, 2019).

The document has been prepared for the three primary land managers with jurisdiction over the areas covered by this Subplan:

- **Central Coast Council (CCC)** – responsible for the northern foreshores of the Lower Hawkesbury.
- **Hornsby Shire Council (HSC)** – responsible for southern foreshores of the Lower Hawkesbury.
- **Northern Beaches Council (NBC)** – responsible for southern foreshores of the Lower Hawkesbury.
- **NSW National Parks and Wildlife Service (NPWS)** – responsible for key foreshore land tenures throughout the Lower Hawkesbury.

It is acknowledged that a small portion of the Lower Hawkesbury foreshore falls within the Ku-ring-gai Council Local Government Area (LGA). However, there are limited riverside settlements or assets at risk within that portion of the LGA. As such, the primary focus of this CZEAS is on the key management authorities listed above. Notwithstanding, where relevant, the principles and response actions outlined in this Subplan may also be applied or adapted by Ku-ring-gai Council should future risk assessments or local conditions warrant inclusion.

1.2 Purpose and Objectives

As specified in the CM Act, a CZEAS is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to coastal emergency events immediately preceding or during periods of beach erosion, coastal inundation, or coastal cliff and slope instability, where those processes occur through storm activity or an extreme or irregular event.

Subsequently, this CZEAS details arrangements for the four phases of emergency events (prevention, preparation, response, and recovery) relating to coastal hazards for settlements in the Lower Hawkesbury River.



In accordance with the New South Wales (NSW) Guideline for preparing a coastal zone emergency action subplan (DPIE, 2019), the purpose of this CZEAS is to identify and facilitate the implementation of appropriate emergency response actions in order to:

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

The objectives of this CZEAS are to:

- Set a clear definition for what constitutes a coastal emergency (Section 2), and associated triggers for emergency response actions (Section 3).
- Identify the locations that may be affected by beach erosion, coastal inundation, or coastal cliff and slope instability that would constitute a coastal emergency (Section 4).
- Outline the roles and responsibilities of all public authorities, including the relevant Councils and coordinate their response to emergencies immediately preceding or during periods of beach erosion, coastal inundation and coastal cliff and slope instability (Section 5).
- Outline the communications required in the four phases of emergency management (Section 6).
- Summarise key actions to be carried out in the four phases of emergency (Section 7).
- Identify approvals pathways for CZEAS actions as they relate to the NSW Coastal Management Framework (Section 8).

1.3 Consultation

Agencies other than the Partner Councils involved in the implementation of this CZEAS, such as NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), NSW State Emergency Service (NSW SES), have been provided a copy of the draft CZEAS for review and comment. The final CZEAS has addressed all feedback received from key stakeholders.

1.4 Study Area

The study area covered by this CZEAS is provided in Figure 1-1. The CZEAS covers the areas of the HNRS in between Little Patonga and Spencer (exclusive) – including tributaries such as Cowan Creek, Berowra Creek, and Mooney Mooney Creek. An overview of local riverside settlements covered in this CZEAS is provided in more detail in Section 4.

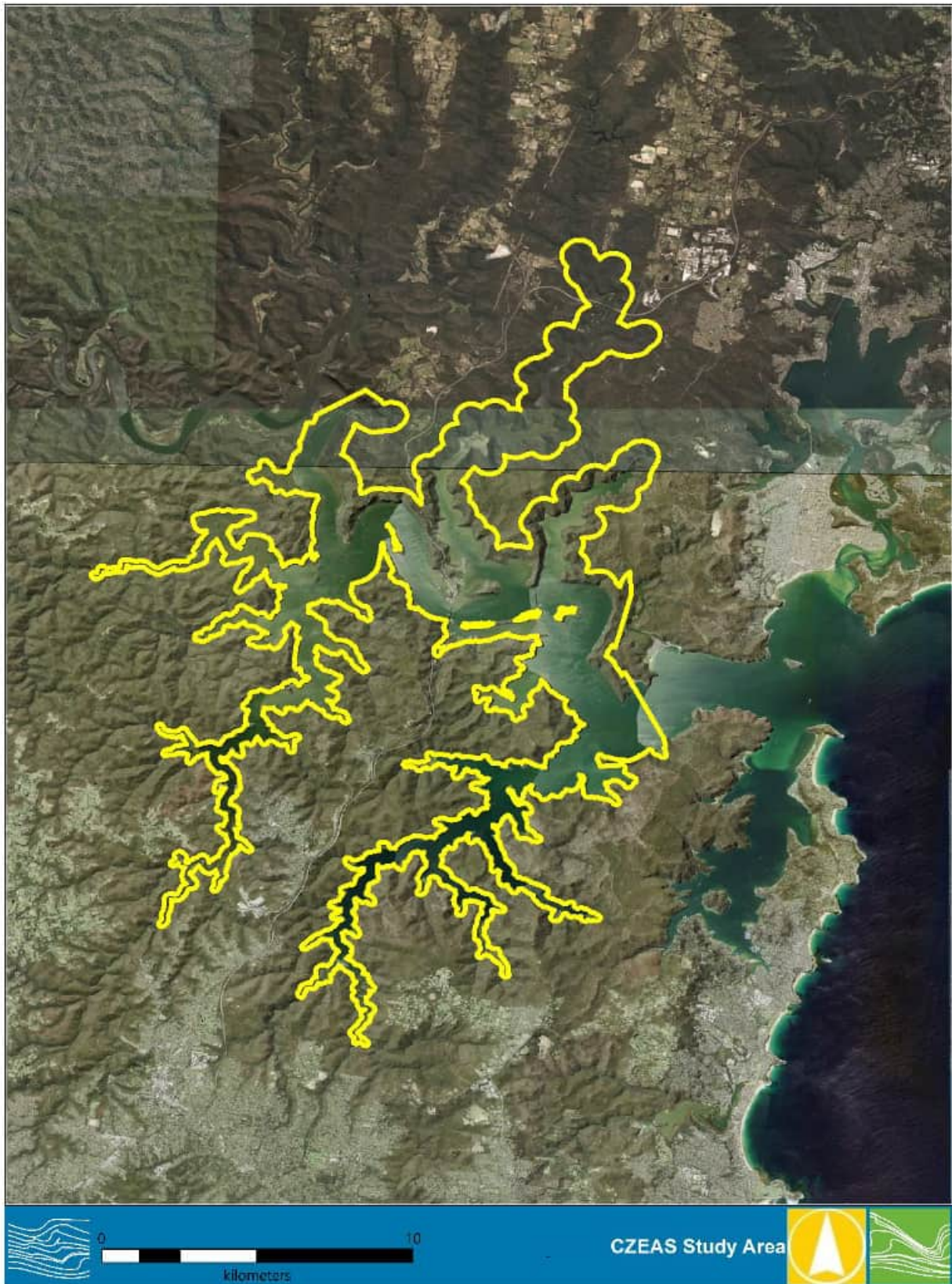


Figure 1-1 Study Area covered by this CZEAS



2 SCOPE OF THE CZEAS

2.1 Coastal Hazards

2.1.1 Definitions of Coastal Hazards

The NSW 2017 State Level Risk Assessment (NSW Office of Emergency Management, 2017) classifies storm and coastal erosion as priority hazards that pose a significant risk to the state. The CM Act identifies three types of coastal hazards that should be considered when developing a CZEAS. These are defined in the guidelines (DPIE, 2019) as:

1. Beach erosion: Not all beach erosion occurring during a storm event provokes a coastal emergency response. Therefore, a “beach erosion emergency” in the context of this CZEAS can be defined as an actual or imminent occurrence of a beach erosion event that occurs when wind, waves, and currents are removing the sediment that comprises the foreshore and/or frontal dune system, landward of the fully accreted condition. The consequence of such erosion can create risks to public safety, and public and private assets - which requires a coordinated emergency response. It should also be noted that this hazard does not apply to the areas covered by this CZEAS – and consequently this hazard is *not included in the scope of this CZEAS*.

2. Coastal inundation: Coastal inundation occurs when marine and atmospheric forces combine and raise water levels at the coast (or inside estuaries) above normal elevations causing dry land to be inundated by seawater. Coastal inundation is often associated with storms and results in elevated still water levels (storm surge), wave set-up, wave runup and over-wash flows. Storm surges and powerful waves can also penetrate estuaries giving rise to strong currents or seiching. This may result in the inundation of roads and low-lying land adjacent to estuaries.

3. Coastal cliff and slope instability: This refers to a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps, and landslides. These may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows generated by extreme rainfall. Instability may occur during or following a coastal storm event but may also occur at other times. There may be very little warning that a coastal cliff or slope instability incident is imminent. These hazards may endanger life and property at the site of the process (e.g., through collapse of a lookout platform or walking track, or undermining of dwellings), and at the toe of the cliff or bluff (rock platform or beach). It should also be noted that there is no formal study area hazard mapping available related to coastal cliff and/or slope instability – and consequently this hazard is *not included in the scope of this CZEAS*.

As stipulated in the *NSW Guideline for preparing a coastal zone emergency action subplan* (DPIE, 2019), the other coastal hazards identified in the CM Act are outside the scope of this CZEAS – including long term shoreline recession, coastal lake or watercourse entrance instability, tidal inundation, and erosion and inundation of estuary foreshores caused by tidal waters and the action of waves. These hazards either pertain to estuary environments outside the scope of this CMP or are not related to storm activity or an extreme or irregular event.

As outlined in Section 2.4, this CZEAS does not relate to other forms of inundation including flooding from land or tsunamis.

2.1.2 Storm Clustering

From a coastal hazard perspective, it is important to note the impacts of storm clustering. An erosion storm cluster occurs when a beach is unable to adequately recover from a previous storm event before a subsequent one commences. The response of a beach to a storm and a storm cluster will depend largely on the physical



characteristics of that particular beach, including sediment type, shoreline orientation and wave climate (Geoscience Australia, 2021).

In this way, a cluster of less severe storm events can generate a greater erosion response than an individual, high severity event (Gravois, Baldock, Callaghan, Daivies, & Nichol, 2018).

2.1.3 Cascading and Compounding Emergencies

The study area coastline is impacted by East Coast Lows (ECLs), and this phenomenon is one of the most significant contributing factors to the occurrence and intensity of coastal hazard emergencies along the NSW coast. ECLs are intense low-pressure systems that occur off the east coast of Australia. They bring damaging winds and surf, as well as heavy rainfall, which leads to erosion and flooding (AdaptNSW, 2023).

Consequently, coastal hazards emergencies do not always occur at a localised scale, nor with a single discrete hazard type. When facing events like an ECL, the consequences can be multifaceted. Coastal erosion and inundation may be occurring at numerous beaches concurrently, while the same event may also generate rainfall that leads to riverine or estuarine flooding, and potential coastal cliff and slope instability.

In this way, cascading and compounding natural hazard emergencies can place significant strain on the resources and capabilities of combat agencies during response efforts. These concurrent crises require a coordinated response from multiple agencies and authorities.

2.2 What is an Emergency?

2.2.1 Definition

An “emergency” is defined in the *State Emergency and Rescue Management Act 1989* (SERM Act) and the State Disaster Plan as:

“An emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) which -

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

For the purposes of the definition of emergency, property in the State includes any part of the environment of the State. Accordingly, a reference in the Act to -

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

2.2.2 The Four Phases of an Emergency

Both the SERM Act and the NSW Coastal Management Manual (OEH, 2018a) identify four distinct stages of an emergency – prevention, preparation, response, and recovery (Figure 2-).

Council’s ability to undertake the actions identified in this subplan will be dependent on the availability of resources during emergency events. The actions prescribed must not conflict with or impede the actions of the NSW SES or the other agencies with roles and responsibilities listed in Section 5 of this document. All actions must not put personnel, staff or volunteers in danger. Emergency management works must not be undertaken during extreme weather unless environmental conditions permit works to be undertaken safely.



Figure 2-15 Stages of Emergency Planning

2.3 Coastal Emergencies Covered by the CZEAS

2.3.1 Legislative Requirements

The scope of this CZEAS is dictated by the requirements of the CM Act and the SERM Act.

SERM Act 1989

The SERM Act established the overarching framework for emergency management in NSW. The SERM Act outlines roles and responsibilities for all emergency management in the state, and specifies:

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

The NSW State EMPLAN 2023 (NSW Office of Emergency Management, 2023) describes the NSW approach to emergency management, the governance and coordination arrangements, and roles and responsibilities of agencies. The plan is supported by hazard specific subplans and functional area supporting plans.

The NSW SES is the designated combat agency for management of floods, tsunamis, and storms, including severe storms which cause coastal erosion. The NSW SES prepares the State Storm Plan, State Flood Plan and State Tsunami Plan, which are subplans to the NSW State EMPLAN 2023.

CM Act 2016

The CM Act identifies specific emergency management considerations associated with beach erosion, coastal inundation, and cliff instability. Section 15 (3) of the CM Act states 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”*



Mandatory requirements for a CMP, including the preparation of a CZEAS where required, are identified in Part A of the NSW Coastal Management Manual (OEH, 2018a).

When preparing a CZEAS, it is crucial to consider the relationship between the coastal management framework established by the CM Act, and the broader NSW emergency management framework. This relationship is depicted in Figure 2-. To this end, Section 15 (4) of the CM Act states that:

*“A coastal management program **must not** include the following—*

(a) matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 in relation to the response to emergencies”

The purpose of this clause is to ensure that there is no duplication or ambiguity of emergency response planning, and to ensure that the CZEAS is consistent with the emergency management provisions addressed in the state, regional and local EMPLANs, and state and local flood plans (Figure 2-).

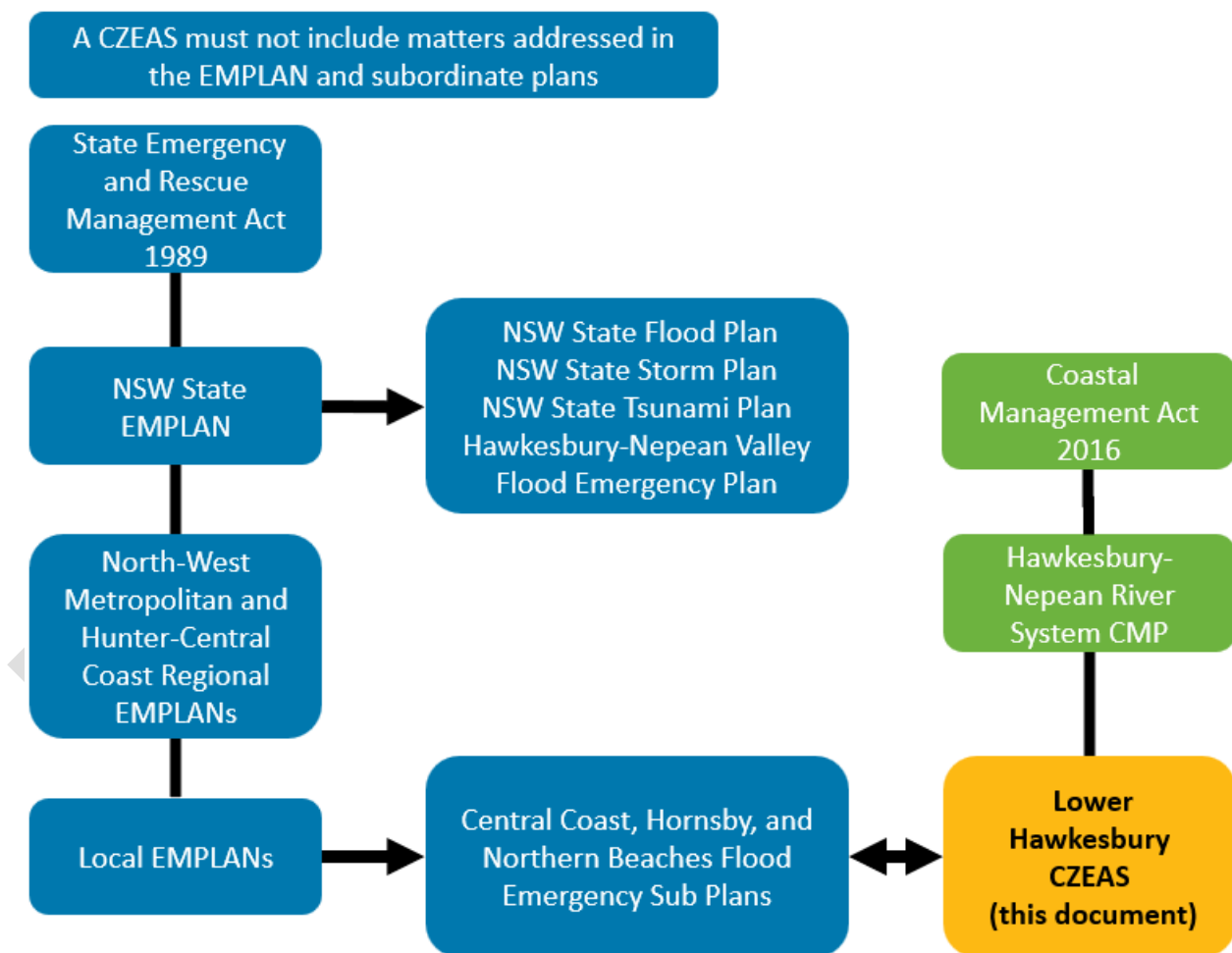


Figure 2-16 Simplified legislative framework for emergency management in NSW and its relationship with coastal management legislation and coastal management programs

2.3.2 Relationship of the CZEAS to other Emergency Plans

As noted in Figure 2-, the requirements of the CM Act stipulate that this CZEAS must not cover emergencies that are already dealt with by another plan made under the SERM Act.



NSW State Storm Plan

The NSW State Storm Plan (NSW SES, 2023) is a sub plan to the NSW State EMPLAN (see Figure 2-), and is a comprehensive strategy to effectively prepare for and respond to severe storms across NSW. Section 1.4.3 of the plan states that:

“Coastal erosion caused by storm activity is within the scope of this plan. Emergency management of coastal erosion that is not caused by storm activity will be controlled and coordinated by the Local Emergency Operations Controller (LEOCON)”.

Coastal erosion is therefore within the scope of the NSW State Storm Plan. However, in doing so, the Plan identifies the triggers and instances for when local councils need to activate their CZEAS at a local level. It is in this way that these two emergency planning documents dovetail, without overlapping.

Section 1.4.4 of the State Storm Plan (NSW SES, 2023) states that the arrangements for the emergency management of flooding are dealt with in the New South Wales State Flood Emergency Sub Plan (NSW SES, 2021) – described below.

NSW State Flood Plan

The NSW Flood Plan (NSW SES, 2021) is a sub plan to the NSW State EMPLAN (see Figure 2-), and sets out the state level multi-agency arrangements for the emergency management of flooding in NSW. Section 1.4.2 of the NSW Flood Plan defines “flooding” as:

*“a relatively high-water level which overtops the natural or artificial banks in any part of a stream, river, **estuary**, lake, or dam, and/or local overland flooding associated with drainage before entering a watercourse, **and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences**”.*

Subsequently, at a strategic level, the emergency management arrangements for prevention, preparation, response, and initial recovery for still water level coastal inundation is covered by the NSW Flood Plan. At a more regional, level this issue is addressed by the respective local Flood Emergency Sub Plans described below.

NSW State Tsunami Plan

The NSW Tsunami Emergency Sub Plan (NSW State Tsunami Plan) is a sub-plan to the NSW State EMPLAN. The purpose of the plan is to set out the state-wide multi-agency arrangements for the emergency management of tsunamis in NSW – including the prevention, preparation, response, and initial recovery (including immediate relief) for tsunami activity at the strategic level. The plan accounts for all tsunami magnitudes and generation mechanisms.

The NSW SES is identified in the NSW State EMPLAN and the SES Act as the lead (combat) agency for preparation for and response to tsunami, and for leading the coordinated response to the impact of tsunami including the evacuation of affected communities and immediate relief if required.

Local Flood Emergency Sub Plans

Hawkesbury-Nepean Valley Flood Emergency Plan (NSW SES, 2020) is the primary emergency plan that sets out the multi-agency arrangements for the emergency management of riverine flooding affecting the Hawkesbury-Nepean Valley in New South Wales. That plan covers the reaches of the river from Wallacia to Spencer (inclusive) – see Figure 2-1. Subsequently, the area that is covered by that plan is excluded from the scope of this CZEAS.



Furthermore, each of the respective councils (Northern Beaches, Hornsby, and Central Coast) has a local Flood Emergency Sub Plan, which is a sub plan of their Local EMPLAN – see Figure 2-. Those plans specifically cover the local preparedness measures, the conduct of response operations, and the coordination of immediate recovery measures from flooding within the entirety of each LGA. Those local Flood Emergency Sub Plan therefore covers land-based and riverine flooding across open coast and in estuarine settings of the LGA. The additional arrangements required for coastal inundation and wave run-up hazards are therefore covered as part of this CZEAS.

Summary

Table 2-1 and Table 2-2 below provide an overview of the planning hierarchy for coastal hazards across the study area.

Table 2-1 Planning hierarchy for coastal hazards listed in the CM Act across the study area

Coastal Hazard	Strategic Arrangements	Local Operations
Coastal inundation - including wave run-up	The NSW State Storm Plan (NSW SES, 2023)	This CZEAS
Riverine inundation – catchment based flooding and overland flow	The NSW State Flood Plan (NSW SES, 2021)	Flood Emergency Sub Plan

Table 2-2 Planning hierarchy for coastal hazards not listed in the CM Act across the study area

Coastal Hazard	Strategic Arrangements	Local Operations
Tsunami	The NSW State Tsunami Plan	Flood Emergency Sub Plan

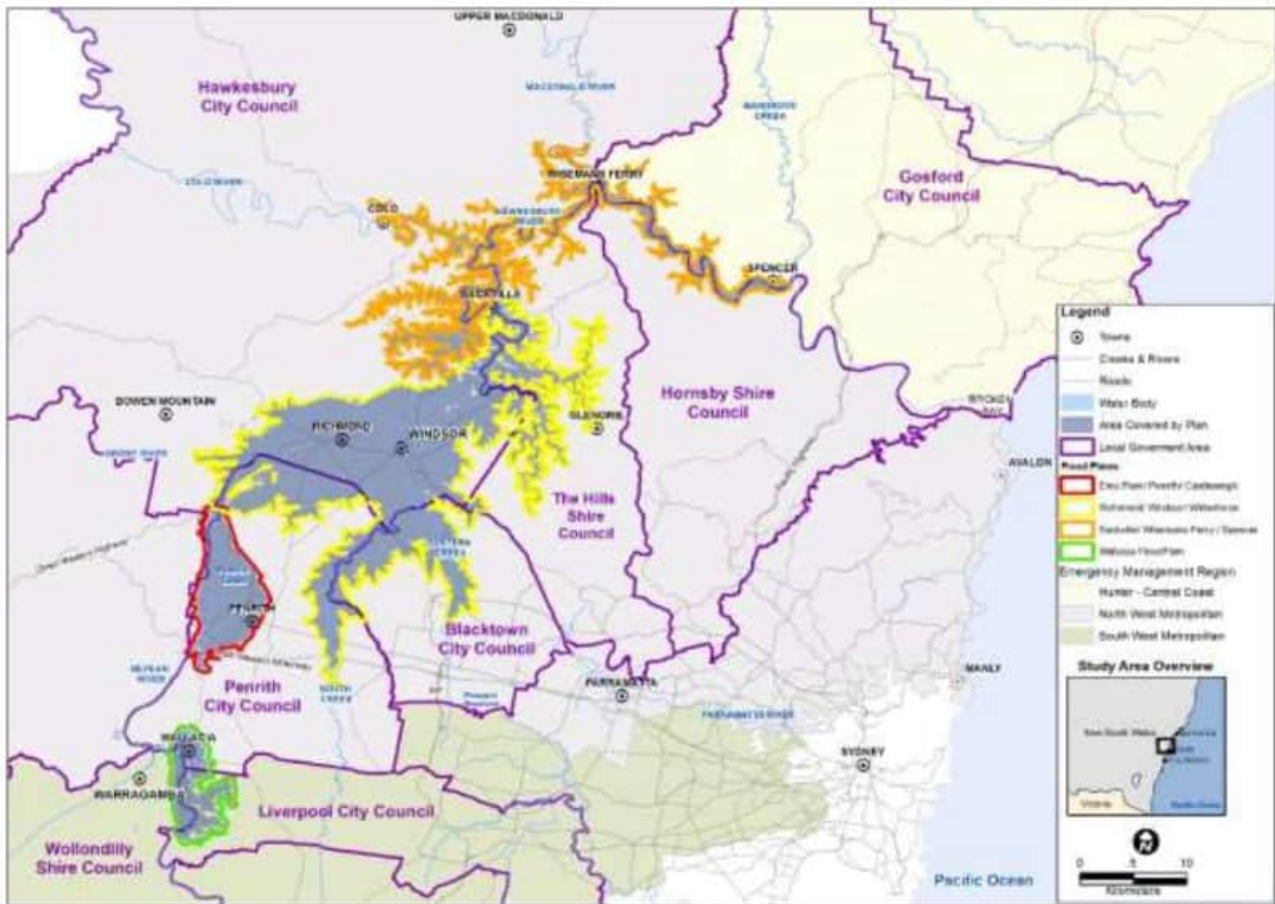


Figure 2-1 Area Covered by the Hawkesbury-Nepean Flood Emergency Sub Plan (Wallacia to Spencer) (NSW SES, 2021)



3 TRIGGERS FOR EMERGENCY ACTION

3.1 Overview

For the purposes of this CZEAS, a coastal emergency event within the study area is occurring when one or more of the below triggers occurs:

- The following hazard forecasts are issued:
 - When the Bureau of Meteorology (BoM) has issued the release of a Coastal Hazard Warning that impacts the Hawkesbury River.
- The following Impact forecasts and assessment are made:
 - In addition to the BoM Coastal Hazard Warning, there are location-specific triggers for when coastal inundation will activate the Response Phase. These triggers are discussed in Section 3.3.

3.2 Hazard Forecasts

3.2.1 BoM Coastal Hazard Warnings

The actions contained in this CZEAS are triggered by the release of a **Coastal Hazard Warning** from the BoM. The BoM issues Coastal Hazard Warnings for abnormally high tides or storm tides that:

- May be higher than the highest astronomical tide, and
- Could flood low lying coastal areas.

A Coastal Hazard Warning includes:

- A list of all potential phenomena, coastal forecast districts and locations that may be affected.
- A description of the threat and the area likely to be affected (the threat area).
- The time the warning was issued and what time the next warning will be issued.
- A description of the weather pattern, including forecast developments of significant weather systems.
- A technical summary of all potential phenomena, their timing and likelihood.
- Confirmed observations and reports.
- Recommended actions.

The lead time depends on the weather situation. It can extend from an hour to 36 hours. While the threat remains, a Coastal Hazard Warning is updated routinely every 6 hours. More frequent warnings may be issued if required.

NSW weather warnings are issued by the BoM and can be found at the following link: <http://www.bom.gov.au/nsw/warnings/>. Alternatively, the BoM weather App can show only the weather warnings that apply to the area set by the user.

3.3 Local Impact Triggers and Forecasts

3.3.1 Location Based Triggers

In addition to the Coastal Hazard Warning, there are location-specific triggers that will activate the Response Phase of this CZEAS – and these include when coastal inundation is occurring or expected to occur at the key locations at risk identified in Section 4 - affecting/with potential to affect safe access/egress or impacting/with potential to impact on public or private assets.



In practice, expert engineering judgement would need to be applied at times of storms to assess when to initiate particular actions as required. This approach relies on regular monitoring of environmental conditions and cliff, slope, and beach behaviour – and seeking appropriate advice when required.

3.3.2 Impact Forecast of Coastal Hazard Risk

Whilst the actions contained in this CZEAS are triggered by BoM Coastal Hazard Warnings and location-based triggers, it is also important to monitor coastal environmental conditions at a local level - in order to supplement and inform decision making.

Forecasting coastal inundation is a complex and challenging task due to the fact that it is not solely governed by a single factor, rather an intricate interplay of several variables, including:

- The astronomical tide cycle, and potential magnitude and timing of storm surge.
- Offshore wave height and direction, and the complex nearshore wave transformation processes that will impacts on wave conditions in the nearshore.

Subsequently, as part of an early warning process, Council should actively monitor forecasts and real-time information related to ocean waves and tides, using the available data sources provided in Table 3-1.

Table 3-1 Available sources of data for coastal hazard parameters

Parameter	Forecast Source	Forecast Window	Real-time Information
Wave Height	BoM Interactive Weather and Wave Forecast ¹ .	7 days	MHL NSW Ocean Wave Data Collection Program ² .
	The NSW Nearshore Wave Forecast ³	5 days	
Estuary Tide	MHL NSW Tide Charts ⁴	1 year	MHL NSW Ocean Tide Data Collection Program ⁵
	BoM New South Wales Tide Tables ⁶	1 year	

These data sources can provide a first-pass indication of when beaches may be at risk of coastal inundation.

¹ <http://www.bom.gov.au/australia/charts/viewer/index.shtml>

² <https://mhl.nsw.gov.au/Data-Wave>

³ <https://forecast.waves.nsw.gov.au/>

⁴ <https://mhl.nsw.gov.au/TideCharts>

⁵ <https://mhl.nsw.gov.au/Data-OceanTide>

⁶ http://www.bom.gov.au/oceanography/projects/ntc/tide_tables.shtml



4 AREAS AT RISK

4.1 Overview

This CZEAS only applies to the known locations affected by coastal inundation as noted in this section. Beach erosion and cliff & slope instability have not been assessed but would constitute a low risk in comparison to other locations across the HNRS such as in Broken Bay and Pittwater.

It is possible that coastal inundation will affect additional locations not currently assessed or known to be risk locations anywhere in the study area. In this event, the respective council should assess these locations and revise this CZEAS to include new locations at risk, as the need arises.

4.2 Local Hazard Exposure

4.2.1 Potential at-risk sites

The study area for this CZEAS covers the area downstream from Spencer (Figure 2-1) and upstream of Broken Bay (see Figure 1-1). Table 4-1 summaries the main riverside settlements in the study area are identified as being potentially at risk of coastal inundation.

Table 4-1 Riverside Settlements known to be at risk of coastal inundation

Settlement	Land Management Responsibility LGA
Cowan Creek	
Cottage Point	Northern Beaches / NPWS
Illawong Bay	Northern Beaches / NPWS
Akuna Bay	Northern Beaches / NPWS
Bobbin Head	Hornsby, Ku-ring-gai / NPWS
Apple Tree Bay	Hornsby / NPWS
Berowra Creek	
Marramarra Creek	Hornsby / NPWS
Coba Point	Hornsby / NPWS
Neverfail Bay	Hornsby / NPWS
Collingridge Point	Hornsby / NPWS
Calabash Point	Hornsby / NPWS
Silverwater Reach	Hornsby / NPWS
Woolwash	Hornsby / NPWS
Lower Hawkesbury (Main Branch)	
Little Wobby	Central Coast
Mooney Mooney (Central Coast LGA)	Central Coast
Cheero Point (Central Coast LGA)	Central Coast
Bar Point (Central Coast LGA)	Central Coast / NPWS
Marlow (Central Coast LGA)	Central Coast



Settlement	Land Management Responsibility LGA
Dangar Island (Hornsby LGA)	Hornsby
Brooklyn (Hornsby LGA)	Hornsby
Milsons Passage (Hornsby LGA)	Hornsby / NPWS

4.2.2 Exposure Summary

An extensive coastal inundation study (Rhelm and Baird, 2023) was conducted as part of Stage 2 of the Hawkesbury-Nepean River System CMP. Appendix A depicts maps of the 1% Annual Exceedance Probability (AEP) coastal inundation extent in present day conditions (i.e. no future sea level rise).

Based on these maps, the following observations are made for emergency management at the locations:

- **Cottage Point.** Cottage Point is an isolated community located in the Northern Beaches LGA. As shown in Figure 2-2, it is primarily a rocky, steep shore with most properties not impacted by coastal inundation in a 1% AEP event. However, there are several properties close to the water that could be impacted including the Cottage Point Inn (restaurant), The Deckhouse (accommodation), Marine Rescue and Cottage Point Kiosk & Boat Hire and Cowan Waters Luxury Home Rental. There are also some private homes set close to the water that could be impacted. It is unknown if any of these properties would receive above flood inundation in the 1% AEP event. There are numerous jetties and wharves that could be overtopped in this event.
- **Illawong Bay.** Illawong Bay is located in the Northern Beaches LGA. It comprises a picnic area managed by NPWS as part of Ku-ring-gai Chase National Park. It is in the confined Coal and Candle Creek and as shown in Figure 2-3 has little impact from a 1% AEP coastal storm event. There would only be minor inundation in the foreshore of the picnic area, some water across General San Martin Drive and at the Illawong Point car park.
- **Akuna Bay.** Akuna Bay is located in the Northern Beaches LGA. It comprises a picnic area managed by NPWS as part of Ku-ring-gai Chase National Park and some private infrastructure including the San Martin Akuna Bay (wedding venue) and the d'Albora Marina Akuna Bay. Although Akuna Bay is in the confined Coal and Candle Creek, as shown in Figure 2-4, the San Martin Akuna Bay and the d'Albora Marina Akuna Bay properties including the café and general store would be inundated in a 1% AEP coastal event. It is unknown if any of these properties would receive above flood inundation in the 1% AEP event. Also, there could be some minor inundation in the foreshore of the picnic area and water across General San Martin Drive.
- **Bobbin Head.** Bobbin Head is located at the confluence of Cowan Creek and Cockle Creek. It straddles two LGAs – western side of Cockle Creek is in Hornsby LGA whilst the eastern side is in Ku-ring-gai LGA. The popular Bobbin Head picnic area is located on the western side of Cockle Creek. The Empire Marina Bobbin Head and the Bobbin Head Waterside Bistro and Café are the main private properties on the eastern side of Cockle Creek. As shown in Figure 2-5, a large part of the picnic area is inundated in a 1% AEP coastal event. The Empire Marina Bobbin Head and the Bobbin Head Waterside Bistro and Café properties are also inundated; however, it is unknown if any of these properties would receive above flood inundation. Also, there could be some water across Ku-ring-gai Chase Road and Bobbin Head Road and the bridge across Cockle Creek.
- **Apple Tree Bay.** Apple Tree Bay is in Hornsby LGA at the confluence of Apple Tree Creek and Cowan Creek. It comprises a picnic area managed by NPWS, jetty and boat ramp. As shown in Figure 2-6, much of the picnic area, carpark and all the jetty and boat ramp would be inundated in a 1% AEP coastal event.



- **Little Wobby.** Little Wobby is located in the Central Coast LGA. It consists of about 40 properties on a steep, rocky shore. Most of the properties are holiday houses and there is only a permanent resident population of about 60 persons. As shown in Figure 2-7, most of these properties have some inundation in a 1% AEP coastal event, although due to the steep foreshore, it is doubtful that there would be above flood inundation in the buildings. However, all the jetties and the Little Wobby Wharf would be inundated in this event.
- **Mooney Mooney.** Mooney Mooney is located in the Central Coast LGA and has about 350 people living in 150 residences. All the residences are built away from the Mooney Mooney Creek and, as shown in Figure 2-8, there is no risk of above flood inundation in a 1% AEP coastal event. However, the private jetties in the area would be inundated, as would the oyster industry properties (e.g. Broken Bay Pearl Farm, Mooney Oysters) to the south of the township and part of the Deerubun Reserve (managed by Central Coast Council) adjoining the M1 motorway (e.g. picnic area, boat ramp, wharf).
- **Cheero Point.** Cheero Point is located in the Central Coast LGA and fronts Mooney Mooney Creek. As shown in Figure 2-9, all buildings will not be inundated in a 1% AEP coastal event. However, there will be some water in the foreshore of these properties and all jetties will be inundated in this event.
- **Bar Point.** Bar Point is located in the Central Coast LGA and is bounded by the Hawkesbury River to the west and south. It mainly comprises holiday houses and has a permanent resident population of about 60 people. Almost all buildings are located away from the water on a slope; however, as shown in Figure 2-10, Figure 2-11 and Figure 2-12, in the 1% AEP coastal event there are about 6 buildings on flatter ground in the western and the eastern part of the township that may be at risk of above floor flooding in this event. All jetties will be inundated in this event.
- **Marlow.** Marlow is located on a reach of the Hawkesbury River about 1 km downstream from Spencer. It is in the Central Coast LGA and comprises the Greenmans on the Hawkesbury caravan park - <https://www.greenmans.com.au/>. The caravan park consists of holiday vans, powered and unpowered sites. As shown in Figure 2-13, in the 1% AEP coastal event, about half of the caravan park is inundated. It is unknown if any of the vans would receive above flood inundation in the 1% AEP event.
- **Dangar Island.** Dangar Island is in Hornsby LGA and is a rocky island in the middle of the Hawkesbury River. The island has a resident population of about 300 people with numerous holiday houses. As shown in Figure 2-14, in the 1% AEP coastal event, there are 6 buildings in the north of the island (near the Dangar Island Wharf) that could be at risk of above flood inundation. There are also a few properties in the south-east (Bradley's Beach) that may experience inundation in this event. The Dangar Island Wharf and the many jetties surrounding the island would all be inundated in the 1% AEP coastal event.
- **Brooklyn.** Brooklyn is in Hornsby LGA and stretches along the southern shore of the Hawkesbury River for about 3 kms. Brooklyn has a population of about 2,000 people and has several marinas and jetties. As shown in Figure 2-15, Figure 2-16 and Figure 2-17, in the 1% AEP coastal event, there are about 30 buildings along the foreshore that could be at risk of above flood inundation. The Brooklyn Wharf and the many jetties along the shore would all be inundated in the 1% AEP coastal event. Brooklyn Road could have water across it in a few places in this event.
- **Milsons Passage.** Milsons Passage is a small, isolated settlement of about 30 properties in Hornsby LGA on the Hawkesbury River. As shown in Figure 2-18, only 4 properties at the northern end of the settlement could be at risk of above flood inundation in the 1% AEP coastal event. All jetties and the Milsons Passage Wharf would be inundated in this event.

4.3 Risk Summary

Table 4-1 summarises the risks of coastal inundation at the localities listed in Section 2.2.1.



Table 4-2 Risk Summary

Location	Overall Risk	Emergency actions
Cottage Point (Northern Beaches)	Medium – jetties and wharves inundated. Some private properties inundated although probably not above floor for buildings.	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and people can evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties and wharves should be not used if inundated.
Illawong Bay (Northern Beaches)	Low – parts of the picnic area and road could be inundated.	Council advise NPWS of possible issues. NPWS close picnic area. Council close General San Martin Drive and the Illawong Point car park if inundated.
Akuna Bay (Northern Beaches)	Medium - Some private properties inundated possibly above floor for buildings. Parts of the picnic area and road could be inundated.	Council advise NSW SES and NPWS of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk (public education) and people can evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. NPWS close picnic area. Council close General San Martin Drive if inundated.
Bobbin Head (Hornsby, Ku-ring-gai)	Medium – marina and a large part of the picnic area is inundated. Also possible inundation of Bobbin Head Waterside Bistro and Café, plus roads in the area.	Council advise NSW SES and NPWS of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. NPWS close picnic area. Hornsby Shire Council close Ku-ring-gai Chase Road and Ku-ring-gai Council close Bobbin Head Road if inundated.
Apple Tree Bay (Hornsby)	Low – water across picnic area, jetties and boat ramp	Council advise NPWS of possible issues. NPWS close picnic area. Jetties, wharves and boat ramps should be not used if inundated.



Location	Overall Risk	Emergency actions
Little Wobby (Central Coast)	Medium – multiple properties inundated although probably no above floor inundation of buildings. Jetties and wharf inundated.	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties, wharves and boat ramps should be not used if inundated.
Mooney Mooney (Central Coast)	Low – no residences at risk of inundation. Probable inundation of oyster businesses and Deerubbun Reserve	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Oyster businesses should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties, wharves and boat ramps should be not used if inundated. Council to close Deerubbun Reserve.
Cheero Point (Central Coast)	Low – no above floor flooding of buildings	Council to provide general advice to this community including jetties, wharves and boat ramps should be not used if inundated.
Bar Point (Central Coast)	Medium – about 6 properties could be at risk of above floor inundation, all jetties will be inundated	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties, wharves and boat ramps should be not used if inundated.
Marlow (Central Coast)	Medium – possible campers and people in vans	Caravan park should have an Emergency Management Plan (EMP) including an evacuation plan for all types of floods including coastal inundation. Council advises caravan park of possible issues. Caravan park enacts EMP and closes park until water subsides.



Location	Overall Risk	Emergency actions
Dangar Island (Hornsby)	Medium – Several properties at risk of above floor inundation, Wharf and jetties will be inundated	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties, wharves and boat ramps should be not used if inundated.
Brooklyn (Hornsby)	Medium – over 30 buildings at risk of above floor flooding, Wharf and jetties inundated	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties, wharves and boat ramps should be not used if inundated. Council to close Brooklyn Road if inundated.
Milsons Passage (Hornsby)	Medium – 4 buildings at risk of above floor flooding, Wharf and jetties inundated	Council advise NSW SES of possible issues. NSW SES to advise residents of possible issue. Properties should be advised of the risk and can people evacuate upslope if required. They can take actions to protect their properties e.g. sandbagging, raising valuable stock. Jetties, wharves and boat ramps should be not used if inundated.



5 ROLES AND RESPONSIBILITIES

5.1 Agencies and Personnel

The general responsibilities of emergency services organisations and support agencies are listed in the Local and State EMPLANS, such as the NSW State Storm Plan (NSW SES, 2023), NSW State Flood Plan (NSW SES, 2021), and the relevant local Flood Emergency Sub Plans. Table 5-1 summarises the roles and responsibilities of these stakeholders that are specifically relevant to this CZEAS.

It should be noted that private landholders are responsible for private land. Private property owners have responsibilities to monitor, manage, prepare and repair their properties for risks associated with coastal erosion, inundation and cliff and slope instability. Any physical works on private property are subject to development controls and environmental planning instruments, including the relevant local Development Control Plans (DCPs). Private property owners should notify the relevant Council immediately of any concerns outside of their property; however, property owners should seek advice directly from suitably qualified geotechnical and/or coastal engineers with regards to instability concerns within their property boundaries. Council does not have a positive obligation to take particular action to protect private property. There is, however, a statutory obligation upon Council to consider any valid development application for coastal protection works which may be lodged by property owners.

Table 5-1 Roles and Responsibilities

Organisation / Personnel	Responsibilities
Northern Beaches, Central Coast, and Hornsby Shire Councils	▪ Prepare, maintain, and update this CZEAS (NSW SES, 2023). ▪ Provide the NSW SES with a copy of this CZEAS (NSW SES, 2023). ▪ Assist the NSW SES with community awareness programs to ensure people in locations potentially threatened by coastal erosion, inundation, and cliff/slope instability understand the threat and its management (NSW SES, 2023). ▪ <u>Prevention & Preparation</u>: Implement the Prevention and Preparation Phase emergency actions prior to a coastal emergency event occurring. ▪ <u>Response</u>: In the event of a coastal emergency at a location at risk, activate this CZEAS and implement the Response Phase emergency actions for the duration of the coastal emergency event. ▪ <u>Recovery</u>: Implement the Recovery Phase emergency actions following a coastal emergency event. ▪ Under the CM Act, Council is the designated coastal authority with responsibility for care of public land within its care, control, and management. The carrying out (or authorising and coordinating) of coastal emergency protective works to protect public assets from coastal erosion, inundation, and cliff/slope instability is Council's role, if it chooses to undertake such measures. ▪ Assist, at their request, NSW Police, NSW SES, and Local Emergency Operations Controller (LEOCON) in dealing with a coastal emergency. ▪ Liaise with the NSW SES Incident Controller to provide advice regarding the need for response actions by the NSW SES such as evacuations.
NSW National Parks and Wildlife Service	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ Assist the NSW SES with identification of road infrastructure in National Parks at risk from storms. ▪ Close and reopen NPWS managed roads when affected by storms and advise the NSW SES of its status.



Organisation / Personnel	Responsibilities
	- Facilitate the safe reliable access by emergency resources on NPWS managed roads. - Assist the NSW SES with the communication of warnings and information provision to the public through variable message signs and other appropriate means.
Local Emergency Management Committee (LEMC)	- The LEMC is constituted under the SERM Act for each local government area and is responsible for preparing plans for response and recovery from emergencies. - The LEMC is chaired by the Chief Executive Officer or their nominated representative from Council. Represented on the LEMC are combat agencies including: - Police. - Rural Fire Service. - Fire and Rescue NSW. - State Emergency Services. - Surf Life Saving NSW. - Marine Rescue. - The LEMC will review the Local EMPLAN every three (3) years, or following any: - activation of the Plan in response to an emergency; - legislative changes affecting the Plan; - exercises conducted to test all or part of the Plan; - In the event of that deficiencies are identified; or - Change of roles and responsibilities.
Local Emergency Operations Controller (LEOCON)	- Monitor coastal emergency event operations. - Act as the combat/responsible agency in the event of: - Coastal erosion that is not caused by direct storm activity, as per Section 1.4.3 of the NSW State Storm Plan (NSW SES, 2023); or - Coastal cliff and slope instability - Even though coastal erosion and/or slope instability are not covered as part of this CZEAS, the above point are worth noting due to the possibility of cascading and compounding emergencies (see Section 2.1). - Coordinate support to the NSW SES Local Incident Controller, if requested to do so.
Council Local Emergency Management Officer (LEMO)	- If requested by the NSW SES Incident Controller, advise appropriate agencies and officers of the start of response operations. - Provide executive support to the LEMC and LEOCON in accordance with the Local EMPLAN.
Regional Emergency Operations Controller (REOCON)	- The REOCON is responsible for the overall control and coordination of emergency response operations at Region level for which the REOCON is the designated controller. - The REOCON is also the designated controller where there is no designated Combat Agency, or where it is necessary to coordinate two or more local level operations which are controlled by Emergency Operations Controllers, or when directed by the SEOCON. - The REOCON is responsible, when requested by a combat agency, to co-ordinate the provision of resources support.



Organisation / Personnel	Responsibilities
State Emergency Operations Controller (SEOCON)	▪ Responsible for the control and coordination of emergency response operations at State level, for which the SEOCON is the designated Controller or where there is no designated Combat Agency. ▪ Provide advice to the Minister regarding emergencies, including whether or not a declaration of a 'State of Emergency' may be necessary. ▪ Consider requests for State or Commonwealth assistance. ▪ Coordinate the establishment of a Major Evacuation Centre in accordance with Major Evacuation Centre Guidelines if required.
NSW State Emergency Service (NSW SES) Local Unit Members	▪ Act as the combat/responsible agency for damage control and the coordination of community evacuation during the following coastal zone hazards as per the Local EMPLAN: – Flooding. – Storms. – Tsunami. ▪ Act as the combat/responsible agency in the event of coastal erosion that is caused by storm activity (NSW SES, 2023). ▪ NSW SES roles and responsibilities in relation to storms and coastal erosion are detailed within the NSW State Storm Plan (NSW SES, 2023), and where relevant the NSW State Flood Plan (NSW SES, 2021). Responsibilities may include: – Assist in the collection of flood and coastal erosion/inundation information for the development of intelligence. – Evacuation. – Delivery of warnings. – Assisting with road closures and traffic control operations. ▪ The NSW SES is not authorised to undertake emergency coastal protection works such as placement of rock armour or geotextile sand containers. ▪ Undertake preparedness education related to its legislated responsibilities of flood, storm, tsunami, and earthquake.
NSW SES Incident Controller	▪ Deal with floods as per the Flood Emergency Sub Plan ▪ Identify and monitor people and/or communities at risk of flooding and coastal erosion. ▪ Provide an information service in relation to: – Coastal erosion. – Coastal inundation. – Road conditions and closures (general information only). – Warning products in line with the AWS. ▪ Direct the evacuation of people and/or communities. ▪ Ensure caravan parks are advised of flood/coastal inundation warnings. ▪ Coordinate the collection of flood and coastal erosion/inundation information for development of intelligence.
NSW Rural Fire Service (RFS)	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ Identify and notify the NSW SES of any locations at risk of fire or hazardous materials that pose a significant threat to surrounding populations due to the impact of a flood for incorporation into NSW SES flood intelligence and planning.



Organisation / Personnel	Responsibilities
	- Conduct HAZMAT operations including asbestos risks, arising from flood and storm emergencies in coordination with the SES Incident Controller. - Assist the NSW SES with the: - Delivery of warning products in line with the AWS, and the conduct of evacuations. - Warning and/or evacuation of at-risk communities. - Monitoring/reconnaissance of flood prone areas. - Provide equipment for pumping flood water out of buildings and from low-lying areas. - Assist with clean-up operations, including the hosing of flood affected properties.
Ambulance Service of NSW	- The roles and responsibilities for NSW Ambulance are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan (NSW SES, 2021). Roles and responsibilities in addition those include: - Participate in NSW SES briefings, training & exercises as required. - Provide a Liaison Officer to the NSW SES State Command or Incident Control Centre/s as required. - Provide Incident Management Personnel and Liaison Officers to the NSW SES where required.
Australian Government Bureau of Meteorology (BoM)	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: - The BoM issue public weather and storm warning products before and during a storm (NSW SES, 2023). These may include: - Coastal Hazard Warnings - Severe Thunderstorm Warnings. - Severe Weather Warnings. - Tropical Cyclone Watches. - Tropical Cyclone Warnings. - Coastal Strong Wind, Gale Storm and Hurricane Force Warnings. - Flood Watches and Flood Warnings. - Provide weather and flood information directly to the NSW SES, LEMC and relevant agencies (NSW SES, 2021).
Marine Rescue NSW	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: - When requested by NSW SES, assist in flood operations when training and equipment are available and suitable including assistance with: - Warning and/or evacuation of at-risk communities. - Providing communications personnel. - Property protection tasks including sandbagging. - Flood rescue operations
NSW Department of Climate Change, Energy, the Environment and Water	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: - Advise the NSW SES about conditions which may lead to coastal erosion; - Provide storm damage response teams to assist the NSW SES and NPWS. - Provide related advice on coastal hazards to the NSW SES on request.



Organisation / Personnel	Responsibilities
NSW Police Force	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ Provide Incident Management personnel and Liaison Officers to the NSW SES Operation Centre if required. ▪ When requested by LEOCON, act as the response agency for coastal cliff and slope instability ▪ When requested by NSW SES in storm operations: – Restrict access to areas affected by storms. – Assist with warning and/or evacuation of at-risk communities. – Provide specialist storm damage response teams to assist the NSW SES if available. – Assist with monitoring and reconnaissance of areas potentially damaged by storms. ▪ Coordinate search and rescue operations. ▪ Conduct road and traffic control operations in conjunction with NSW SES, Council and/or TfNSW. ▪ Coordinate security of supply lines for evacuated and damaged areas. ▪ Manage Disaster Victim Registration. ▪ Operate the Public Information and Inquiry Centre, if requested or otherwise needed during flood events.
Transport for NSW	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ TfNSW (Maritime), following the direction of the NSW Police Force will assist in the identification and recovery of vessels.

5.2 Combat Agencies

It is important to note that the NSW State Storm Plan (NSW SES, 2023) and the North West Metropolitan Regional EMPLAN identify different combat agencies are responsible for different types of coastal hazard - and that this also varies depending on whether or not the emergency event is occurring within or outside of a storm event. This information is summarised in Table 5-2.

Table 5-2 Combat agencies for coastal hazard events

Coastal hazard	Storm Event	Non-Storm Event	Reference
Coastal erosion and inundation	NSW SES	LEOCON	NSW State Storm Plan
Coastal cliff and slope instability	LEOCON	LEOCON	North West Metropolitan, and Hunter-Central Coast Regional EMPLANS

5.3 Emergency Operation Centres

An Emergency Operations Centre (EOC) is a centre established at State, Region, or Local level as a centre of communication and as a centre for the coordination of operations and support during an emergency. In



NSW, the activation of an EOC is triggered by various factors depending on the nature and severity of the emergency or incident. Emergencies that exceed the capabilities of individual agencies or require a coordinated multi-agency response may prompt the activation of the EOC to manage resources and coordination effectively.

As per the NSW State EMPLAN (NSW Office of Emergency Management, 2023):

- The SEOCON is responsible for establishing and controlling a State Emergency Operations Centre (SEOC)
- The REOCON is responsible for establishing and controlling a Regional Emergency Operations Centre (REOC)
- The LEOCON is responsible for establishing and controlling a Local Emergency Operations Centre (LEOC)



6 COMMUNICATION PROTOCOLS

6.1 Overview

Hornsby Shire, Central Coast, and Northern Beaches Councils will provide information about anticipated coastal emergency events to impacted communities through the following mechanisms provided in Table 6-1.

Table 6-1 Communication Protocols

Communication	
	Provide routine emergency management briefings to communicate the strategy outlined in this plan including coastal emergency triggers, areas at risk, roles and responsibilities and response action plan.
	- Provide emergency management information (in the form of signage and brochures) at local community centres and community information hubs. - Inform the community of Council's intended erosion emergency responses under this CZEAS. - Inform community members and businesses about the need to develop a household / business Emergency Management Plan (EMP) for coastal hazards.
	- In consultation with the NSW SES and BoM, provide public information about approaching coastal emergencies where possible through digital means including social media. - Provide emergency management briefings to the public as needed, in particular affected landholders, to communicate the strategy outlined in this CZEAS, including coastal emergency event triggers, locations at risk, roles and responsibilities and the emergency response actions, including what actions a landholder may need to take and any assistance that may be available to them. - Coordinate with the NSW SES to ensure residents are aware of urgent hazards during emergency events and provide assistance with door-to-door communication as necessary. - See Section 6.2 for more information about message construction.
	- Place barriers and signage at Council-managed roads that are closed due to the impacts of coastal inundation. - Provide up to date information on Council's website regarding Council-managed road closures and re-openings.

6.2 Message Construction

6.2.1 The AWS Framework

As per Section 6.1, Council is to consult with the NSW SES and BoM, in order to help provide public information about approaching coastal emergencies.

The design of Council's external messaging during an emergency event should be aligned with the Australian Warning System framework (AIDR, 2021) – which is a new national approach to information and warnings during emergencies like bushfire, flood, storm, extreme heat, and severe weather. Up until now there have been different warning systems for different hazard types across Australia. The new Australian Warning



System aims to provide consistent warnings to Australian communities so that people know what to do when they see a warning level. There are three warning levels, provided in Table 6-2, as per AIDR (2021).

Table 6-2 Warning Levels from the Australian Warning System framework (AIDR, 2021)

Alert Level	Description
Advice (Yellow)	An incident has started. There is no immediate danger. Stay up to date in case the situation changes.
Watch and Act (Orange)	There is a heightened level of threat. Conditions are changing and you need to start taking action now to protect you and your family.
Emergency Warning (Red)	An Emergency Warning is the highest level of warning. You may be in danger and need to take action immediately. Any delay now puts your life at risk.

The Australian Warning System utilises a system of triangular hazard icons with escalating tiers and associated colour palettes. Specific icons have been developed for bushfire, flood, storm, extreme heat, and severe weather, as per Figure 6-1 below. It is recommended that the following icons are used:

- “Storm” icon – for coastal erosion, coastal inundation, and coastal cliff and slope instability that are jointly occurring with storm events.
- “Other” icon – for coastal erosion and coastal cliff and slope instability that does not directly coincide with storm events (as these two hazards may also occur in the aftermath of a specific storm event).

The Australian Warning System utilises a nested model for communications that includes the warning level + hazard / location + action statements – as per Figure 6-1. Each warning level has a set of action statements to give the community clearer advice about what to do. Calls to action can be used flexibly across all three warning levels and contextualised for each hazard for a given location. Table 6-3 provides some examples of the Australian Warning System’s “calls to action” input (AIDR, 2021) that may be useful in a coastal emergency.



CYCLONE			
FIRE			
FLOOD			
HEAT			
STORM			
OTHER			

Figure 6-1 Australian Warning System messaging model (top) and hazard icons (AIDR, 2021)



Table 6-3 Examples of Australian Warning System calls to action (AIDR, 2021) that may be used in a coastal emergency

Advice	Watch and Act	Emergency Warning
- Prepare now - Stay informed - Monitor conditions - Threat is reduced - Avoid the area - Return with caution	- Prepare to leave/evacuate - Leave/evacuate now (if you are not prepared) - Prepare to take shelter - Move/stay indoors - Stay near shelter - Walk two or more streets back - Monitor conditions as they are changing - Move to higher ground (away from creeks/rivers/coast) - Limit time outside - Avoid the area - Stay away from damaged buildings and other hazards - Prepare for isolation - Do not enter flood water - Not safe to return - Prepare your property	- Leave/evacuate (immediately, by am/pm/hazard timing) - Seek/take shelter now - Shelter indoors now - Too late/dangerous to leave

6.2.2 Message Communication

According to the Australian Disaster Resilience Handbook (AIDR, 2009):

‘the best predictions, the best interpretive material and the best warning messages are of little value if they have no impact on damages or safety. Failure is guaranteed if warning messages based on ... predictions and interpretations ... are not conveyed effectively to those expected to respond. In essence, a warning which is not communicated effectively is no warning at all if it is not heard or heeded’.

The handbook identifies two different types of message communication based on target audience:

1. General warnings are disseminated (‘broadcast’) to whole communities or regions.
2. Specific warnings are intended for individuals or parts of communities and reflect the need for ‘narrowcasting’ to specific audiences who may have specific characteristics or be at different kinds of risk.

A combination of the following warning methods may be utilised:

- Internet – including authorised social media and the official Council website.
- Mobile and fixed public address systems
- Two-way radio
- Emergency Alert
- Telephone/fax
- Doorknocking



- Variable message signs
- Community notices in identified hubs
- Distribution through established community liaison networks/partnerships

Emergency Alert is a national telephony-based alert system used by emergency service agencies to send voice messages and short message service (SMS) to landline/mobile telephones in times of emergency. Where appropriate and usually in conjunction with other warning messages, Emergency Alert is used to send SMS/voice alerts to landline and mobile telephones in a specified geographic area. The emergency alert system should be used in conjunction with the three levels of emergency warning depicted in Figure 6-1.



7 EMERGENCY RESPONSE ACTION PLAN

7.1 Overview

This section outlines what actions are to be undertaken in the four phases of emergency management at each of the locations at risk that this CZEAS applies to.

- Section 7.2 summarises the coastal emergency actions through the four phases of emergency management (see Figure 2-), which apply to the locations at risk along the entire study area.
- Appendix A provides details regarding the location-specific actions to address coastal inundation for high-risk coastal settlements, along with associated mapping.

Hornsby Shire (HSC), Central Coast (CCC), and Northern Beaches (NBC) Council's ability to undertake the actions identified in this CZEAS will be dependent on the availability of resources during emergency events.

Implementation of the actions outlined in this document are to be undertaken in accordance with the provisions of Council's Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document. The implementation of an applicable safety hazard risk assessment is required prior to the undertaking of any intervention or non-intervention management measures.

Emergency protection works must not be undertaken during extreme weather unless tidal variations permit works to be undertaken safely. In addition, actions must not conflict with or impede NSW SES or DCCEEW works.

Actions in this CZEAS aim to reduce risk:

- In areas where Council has chosen not to implement other coastal protection works to reduce coastal hazard risks, which have been evaluated as tolerable or acceptable.
- Where coastal hazard risks persist because an agreed action in this CMP has not yet been implemented.
- In situations where coastal hazard risks persist even after the implementation of other actions, leading to what is termed as residual risk.
- When rare and large or unexpected events occur, outside the design criteria or capacity of agreed management actions in this CMP.

7.2 Study Area Wide Actions

Table 7-1 Coastal Emergency Actions: Phase 1 – Prevention

Action	Description	Responsibility	Timing
1.1	Inform: Make this CZEAS available to all relevant stakeholders identified in Section 5.	NBC, CCC, HSC, NPWS	Ongoing
1.2	Inform: Provide advice to the community, landholders, and the NSW SES about the potential for a coastal emergency from beach erosion, coastal inundation or cliff or slope instability – and the types of responses that are and are not permitted.	NBC, CCC, HSC	Ongoing
1.4	Review: Through the Local Emergency Management Committee (LEMC), consult with SES, DCCEEW, Local Police, LEOCON, FRNSW to ensure this CZEAS remains consistent the relevant local, regional, and state-based emergency management plans (see Figure 2-).	NBC, CCC, HSC, NPWS	Within 6 months of EMPLAN updates



Action	Description	Responsibility	Timing
1.5	Review: Review and update this CZEAS in line with any future updates to the CVA Mapping or CMP implementation.	NBC, CCC, HSC, NPWS	Ongoing
1.6	Review: Assess threats to life and property arising from a coastal emergency through the CMP process.	NBC, CCC, HSC, NPWS	During CMP preparation and review.
1.7	Plan: Apply development controls to developments in the coastal hazard areas in accordance with the council LEP and DCP.	NBC, CCC, HSC	Ongoing
1.8	Plan: Develop an early warning system for this CZEAS by formalising the processes set out in Section 3.4 and dovetailing them with Council's internal and external communications protocols and policies.	NBC, CCC, HSC, NPWS	Ongoing
1.9	Plan: Develop protocols between Council, NPWS and NSW SES and LEOCON in relation to operational activities for situations where an Emergency Operations Centre (EOC) is not established.	NBC, CCC, HSC, NPWS	Ongoing
1.10	Plan: Establish internal operational protocol and procedures for all coastal hazard scenarios for LEMO, Council's coastal officers and works crews, and communications staff.	NBC, CCC, HSC	Ongoing

Table 7-2 Coastal Emergency Actions: Phase 2 – Preparedness

Action	Description	Responsibility	Timing
“Sunny Day” Preparedness			
2.1	Inform: Inform community members and businesses about the need to develop a household / business Emergency Management Plan (EMP) for coastal hazards.	NBC, CCC, HSC	Ongoing
2.2	Inform: Inform Council/NPWS staff about the emergency responses within this plan and ensure relevant personnel have the copies of the plan.	NBC, CCC, HSC, NPWS	Ongoing
2.3	Plan: The LEMC will review the Local EMPLAN every three (3) years as per Table 5-1 to ensure interoperability preparedness.	LEMC	Ongoing
2.4	Plan: Prepare an up-to-date list of contact details for key Council staff involved in coordinating actions under the CZEAS (include responsibilities of staff who prepare for, manage and coordinate recovery from an inundation emergency event) and individuals from whom Council may need advice, such as DCCEE staff, or with whom to integrate from other emergency sectors).	NBC, CCC, HSC, NPWS	Ongoing
2.5	Plan: Prioritise planning and response to maximise (to the greatest extent practical) continued functionality for essential infrastructure during an emergency event.	NBC, CCC, HSC, NPWS	Ongoing



Action	Description	Responsibility	Timing
2.6	Plan: Develop an operations procedure to guide Council and NPWS response to coastal emergency events (including resourcing, internal training, testing and periodic review).	NBC, CCC, HSC, NPWS	Ongoing
2.7	Monitor: Undertake regular monitoring of coastal conditions, tide, wave height, rainfall, and weather condition forecasts for indication of approaching coastal hazards, as per Table 3-1.	NBC, CCC, HSC, NPWS	Ongoing
Precaution Preparedness - where of triggers for Response Phase are anticipated			
2.8	Plan: Ensure signage to close Council-managed roads (and NPWS managed roads) and other public areas, and signage warning pedestrians of coastal hazards risks are available for use during coastal emergencies.	NBC, CCC, HSC, NPWS	Ongoing
2.9	Plan: Ensure appropriate plant, equipment and experienced personnel are available for protection of assets at risk. Both internal and external personnel will be required based on specific scope of works.	NBC, CCC, HSC, NPWS	Ongoing
2.10	Monitor: Undertake regular monitoring of hazard forecasts (see Section 3.2) and local forecasts and triggers (see Section 3.3) that may activate the Response Phase..	NBC, CCC, HSC, NPWS, NSW SES	Ongoing

Table 7-3 Coastal Emergency Actions: Phase 3 – Response

Action	Description	Responsibility	Timing / Trigger
3.1	Monitor: Undertake regular monitoring of hazard forecasts (see Section 3.2) and local forecasts and triggers (see Section 3.3) that may activate the Response Phase	NBC, CCC, HSC, NPWS, NSW SES	Ongoing
3.2	Plan: The LEMC (inc. Council LEMO) should consider Council advice regarding consider Warnings and Triggers, and advice provided by the NSW BoM. From here SEOCON, REOCON, LEOCON and NSW SES to are decide on the emergency management process (supported by Council). This may include the establishment of an Emergency Operations Centre (EOC).	SEOCON REOCON LEOCON NSW SES	Response phase activated.
3.3	Plan: No actions undertaken should impede, conflict, or overlap with those of response agencies under the SERM Act unless there is prior agreement between the relevant parties.	NBC, CCC, HSC, NPWS	Response phase activated.
3.4	Communicate: Implement the communication protocol in conjunction with the combat agency (NSW SES) to advise landholders, residents, public authorities and other organisations that a coastal emergency is likely or is occurring and that actions in this CZEAS are to be implemented. When EOC	NBC, CCC, HSC, NPWS, NSW SES	Response phase activated.



Action	Description	Responsibility	Timing / Trigger
	not in place, communications are to be directed through the communications business partner for the Coastal Management Unit. LEMO to be copied into all communications for oversight. Release media information as necessary to keep the community informed. Community information hubs and social media to be utilised, refer to Section 6.		
3.5	Prepare: Place appropriate equipment on standby (back up radios, signs, and barricades etc.).	NBC, CCC, HSC, NPWS	Response phase activated.
3.6	Monitor: At locations that are impacted – or <u>expected to be impacted - by coastal hazards, undertake</u> monitoring of foreshore conditions as appropriate. This includes monitoring: ▪ The need for barriers and safety signage to be erected at damaged and potentially dangerous roads, to minimise risk to public safety. ▪ The need to enact other response measures.	NBC, CCC, HSC, NPWS	Response phase activated. Only if/when safe to do so.
3.7	Close Foreshore Access: Close access to public foreshore reserves, public lookouts, and other public areas. Erect barricades and signs, as necessary. Refer to Appendix A for locations of foreshore areas.	NBC, CCC, HSC, NPWS	Act if public foreshore reserves areas are unsafe due to coastal inundation, wave run-up and overtopping likely to cause or likely to cause inundation of areas with public access.
3.8	Close Roads: Close affected Council and NPWS managed roads or liaise with road owners to enable closure. Erect barricades and signs as necessary.	NBC, CCC, HSC, NPWS	Act if roads or vehicle access tracks are unsafe due to: ▪ Coastal erosion resulting in instability or undermining. ▪ Coastal inundation, wave run-up and overtopping likely to cause or likely to cause inundation of areas.
3.9	Manage Essential Infrastructure: Through consultation with utilities providers assess the requirement and options for utilities management where such infrastructure becomes or is likely to become affected by coastal hazards. Erect barricades and signs, as necessary.	NBC, CCC, HSC, NPWS	As required.
3.10	Respond: Seek specialist coastal engineering advice where required.	NBC, CCC, HSC, NPWS, DCCEEW	As required.



Action	Description	Responsibility	Timing / Trigger
3.11	Respond: Seek advice from DCCEE staff as required.	NBC, CCC, HSC, NPWS, DCCEE	As required.

Table 7-4 Coastal Emergency Actions: Phase 4 – Recovery

Action	Description	Responsibility	Timing / Trigger
4.1	Monitor: Conduct/organise detailed inspections of sites potentially affected by coastal hazards and assess damage to assets and the natural environment. Assess the structural integrity of any damaged infrastructure. Seek professional advice as required.	NBC, CCC, HSC, NPWS	Following an emergency event. Once it is safe to do so.
4.2	Restore: Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.	NBC, CCC, HSC, NPWS	Following an emergency event. Once it is safe to do so.
4.3	Restore: Removal of foreshore debris that poses high risk to public safety, and associated contemporary risk assessment on a site-by-site basis.	NBC, CCC, HSC, NPWS	Following an emergency event. Once it is safe to do so.
4.4	Inform: Liaise with property owners to ensure any private and/or public structures do not pose a risk to the public.	NBC, CCC, HSC	Following an emergency event.
4.5	Inform: If necessary, issue orders under the Local Government Act 1993 and/or the Environmental Planning and Assessment Act 1979 when properties are deemed structurally unsafe or pose a risk to the public.	NBC, CCC, HSC	As required.
4.6	Record: Record coastal emergency impacts and response actions. Take remedial action where necessary. Maintaining photographic and written records of events and decision-making processes. See Section 7.3.	NBC, CCC, HSC, NPWS	Following an emergency event. Once it is safe to do so.
4.7	Inform: Erect permanent warning signs if necessary.	NBC, CCC, HSC, NPWS	Following an emergency event.
4.8	Review: Undertake an After Action Review (see section 7.5) review of this CZEAS and update as necessary to improve the future effectiveness of coastal emergency response actions.	NBC, CCC, HSC, NPWS, NSW SES, DCCEE	Within 2 weeks of plan activation, or as necessary.



7.3 Recording Coastal Emergency Impacts and Emergency Response Actions

After a coastal emergency event, Council is to issue a formal After Action Review in coordination with LEMC partners, in order to record the following details in a database, and to maintain effective emergency actions and understand any changes in coastal conditions over time (DPIE, 2019):

- Details of the emergency event – including any coastal inundation (and wave run-up). Details are to include the weather conditions and tide under which they were caused including photographs where possible.
- The location of any assets and infrastructure that were damaged and details of the extent of the damage.
- Details of any planned future coastal protection works in the CMP that are not yet undertaken, including the cost and the expected implementation timeframe.
- Details of any survey of the foreshore levels and other features that may be considered required to provide a greater understanding of the hazard or the event.
- Where possible, community feedback regarding the emergency communication and response efforts.
- Review and update (if required) this CZEAS, in particular the Emergency Action Plan, in consultation with the NSW SES and any other relevant agencies (see Section 5 above).



8 REFERENCES

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APPENDIX A LOCAL AREA PLANS

DRAFT





Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore and
marinas**

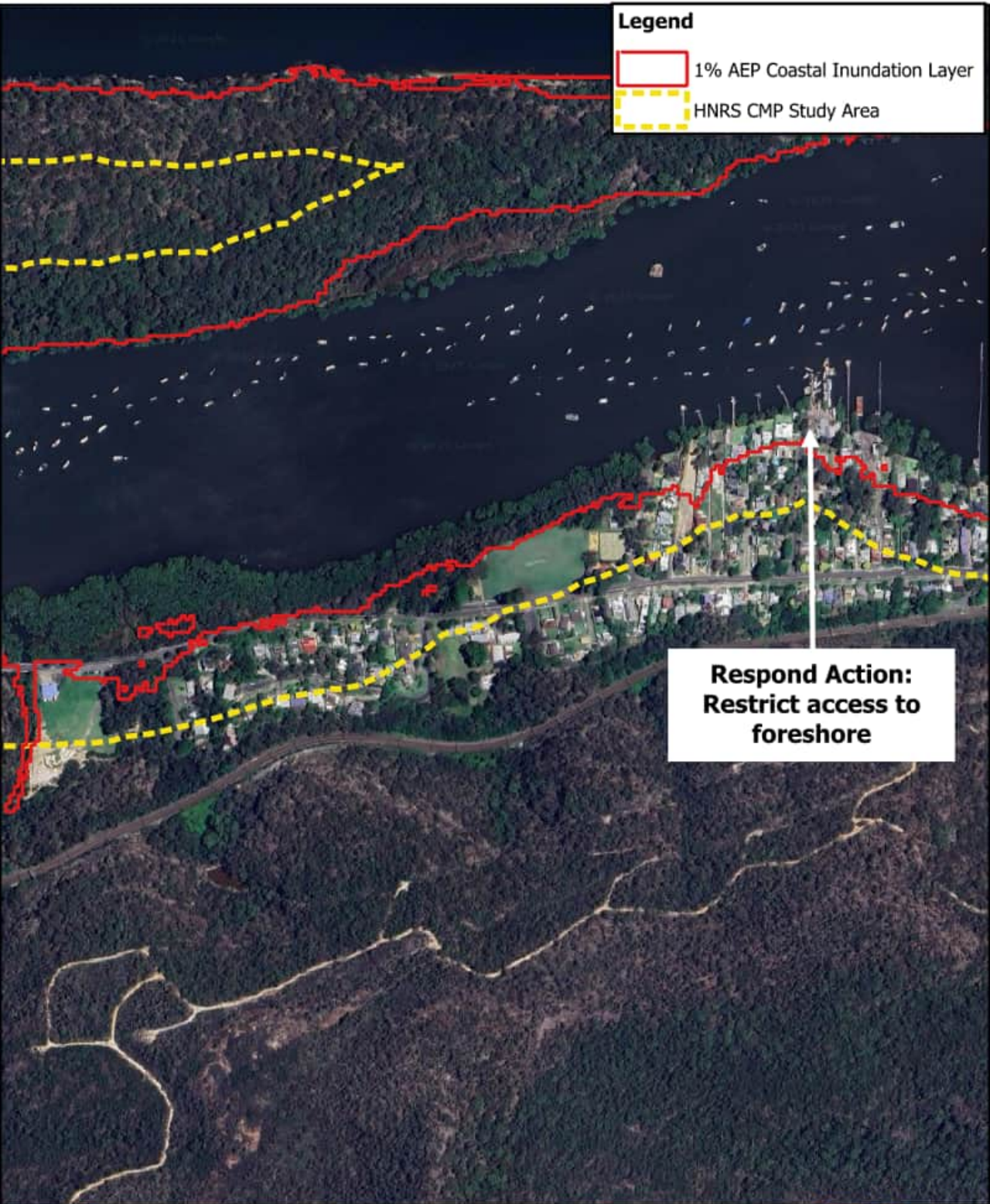
Legend



1% AEP Coastal Inundation Layer



HNRS CMP Study Area



**Respond Action:
Restrict access to
foreshore**



0 0.1 0.2 km

Lower Hawkesbury CZEAS

Brooklyn Emergency Action Reference Guide Map- 2





Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

Respond Action:
Restrict access to
foreshore, marina,
carpark

Respond Action:
Restrict access to
foreshore and
carpark

Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

Respond Action:
Restrict access to
foreshore



0 0.1 0.2 km

Lower Hawkesbury CZEAS
Dangar Island Emergency Action Reference Guide Map



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

Respond Action:
Restrict access to
foreshore, wharves
and car park



0 0.025 0.05 km

Marlow Emergency Action Reference Guide Map

LowerHawkesbury CZEAS



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
Cheero Point Road**



0 0.05 0.1 km

Cheero Point Emergency Action Reference Guide Map

LowerHawkesbury CZEAS



Legend

1% AEP Coastal Inundation Layer



HNRS CMP Study Area



**Respond Action:
Restrict access to
Peat Island**

**Respond Action:
Restrict access to
foreshore**



0 0.1 0.2 km

Lower Hawkesbury CZEAS
Mooney Mooney Emergency Action Reference Guide
Map



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore, Little
Wobby Wharf**



0 0.05 0.1 km

Lower Hawkesbury CZEAS

Little Wobby Emergency Action Reference Guide Map



Legend

- 1% AEP Coastal Inundation Layer
- HNRS CMP Study Area

Respond Action:
Restrict access to car
park



0 0.025 0.05 km

Lower Hawkesbury CZEAS
Apple Tree Bay Emergency Action Reference Guide
Map



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

Respond Action:
Restrict access to
foreshore

Respond Action:
Restrict access to
carpark, marina and
foreshore



0 0.05 0.1 km

Lower Hawkesbury CZEAS

Bobbin Head Emergency Action Reference Guide Map



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

Respond Action:
Close road

Respond Action:
Close road

Respond Action:
Restrict access to car
park



0 0.05 0.1 km

Lower Hawkesbury CZEAS

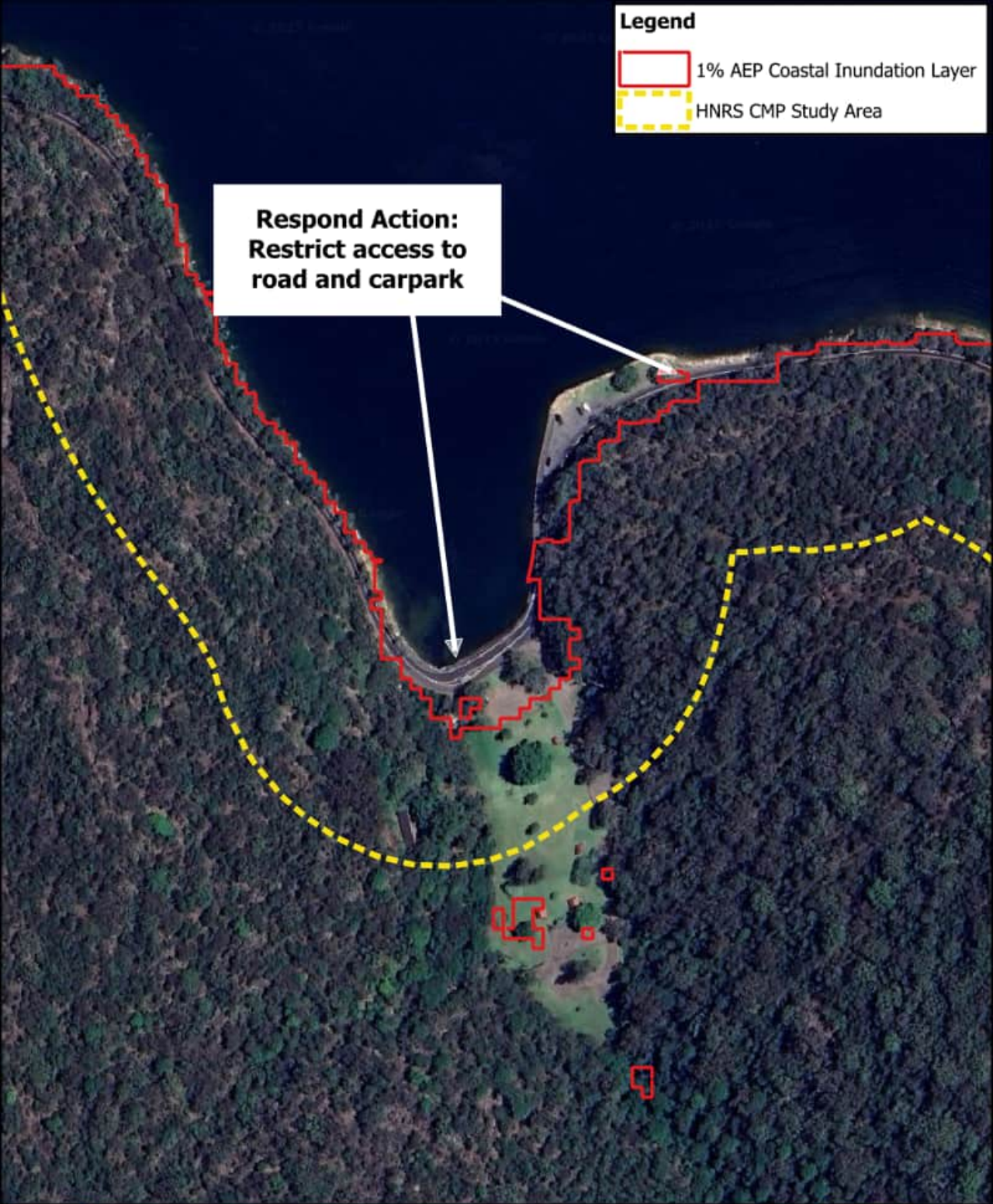
Akuna Bay Emergency Action Reference Guide Map



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

Respond Action:
Restrict access to
road and carpark



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore**



0 0.1 0.2 km

Lower Hawkesbury CZEAS
Cottage Point Emergency Action Reference Guide
Map



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore, and
Kalinda Road**



0 0.1 0.2 km

Lower Hawkesbury CZEAS

Bar Point Emergency Action Reference Guide Map- 1





Legend

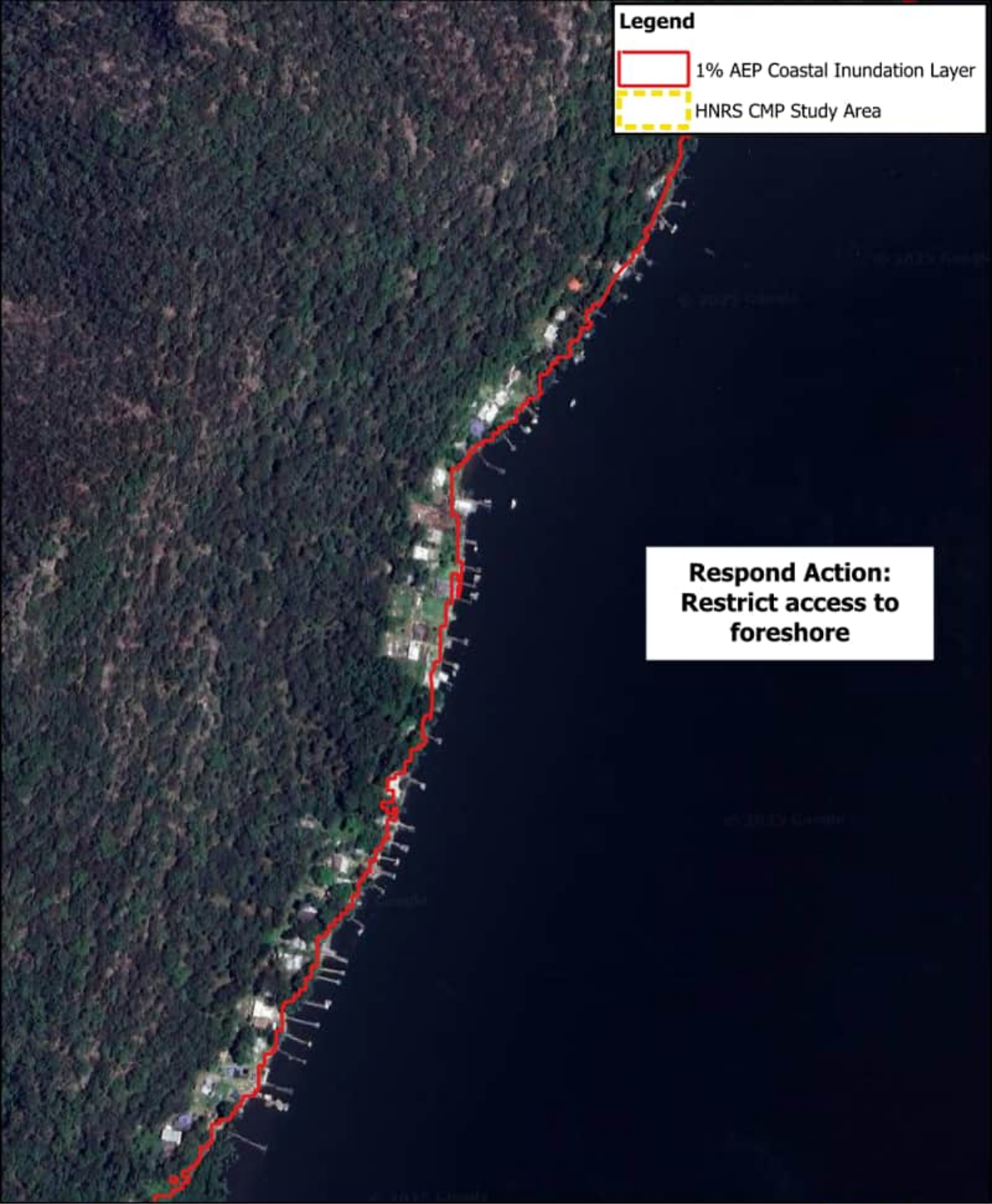
-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore**



Lower Hawkesbury CZEAS

Bar Point Emergency Action Reference Guide Map- 2



Legend

-  1% AEP Coastal Inundation Layer
-  HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore**



Lower Hawkesbury CZEAS

Bar Point Emergency Action Reference Guide Map- 3

Legend

- 1% AEP Coastal Inundation Layer
- HNRS CMP Study Area

**Respond Action:
Restrict access to
foreshore**

0 0.05 0.1 km

Lower Hawkesbury CZEAS
Milsons Passage Emergency Action Reference Guide
Map



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