

# REPORT

## Coastal Management Plan

Request for Planning Proposal: Kurnell Planning  
Proposal - 251, 260R, 278, and 280-282 Captain Cook  
Drive, Kurnell

Client: Besmaw Pty Ltd

Reference: PA3577-RHD-XX-XX-RP-X-0001

Status: Final/2.0

Date: 5 December 2023

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Status: Final/2.0

Date: 5 December 2023

Project name: Kurnell Planning Proposal

Project number: PA3577

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Date: 4 December 2023

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Date: 5 December 2023

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Classification

Project related

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## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Background	1
1.2	Site Description	2
1.3	Scope of Work	5
1.4	NSW Legislative Framework	5
1.4.1	General	5
1.4.2	Resilience and Hazards SEPP	5
1.4.2.1	Coastal Wetland and Littoral Rainforests Area	5
1.4.2.2	Coastal Environment Area	6
1.4.2.3	Coastal Use Area	6
1.4.2.4	Coastal Vulnerability Area	6
1.4.2.5	Site Mapping	7
1.4.3	Coastal Management Manual	8
1.5	NSW Coastal Design Guidelines 2023	9
1.6	Local Planning Direction 4.2 Coastal Management	9
1.7	Acceptable Risk Approach	10
1.8	Acceptable Risk Framework	10
1.9	Recognition of Uncertainty	10
1.10	Risk to Life	11
1.11	Report Structure	11
<b>2</b>	<b>Probabilistic Coastal Erosion and Shoreline Recession Hazard Assessment</b>	<b>12</b>
2.1	General	12
2.2	Determination of Likelihoods	12
2.2.1	Terminology	12
2.2.2	Planning Period	13
2.2.3	Coastal Hazard Line Components	14
2.3	Determination of Consequences	14
2.4	Acceptable Risk	15
2.5	Adopted Coastal Hazard Line	17
2.6	Practical Application of Acceptable Risk Line for Development	17
<b>3</b>	<b>Coastal Inundation Hazard Assessment</b>	<b>18</b>
3.1	General	18
3.2	Ocean Still Water Level and Wave Runup Levels	18
3.2.1	Elevated Water Levels	18

3.2.2	Wave Runup Level	21
3.3	Estuary Still Water Level and Wave Runup Levels	22
3.3.1	Elevated Water Levels	22
3.3.2	Wave Runup Level	23
3.4	Practical Application of Still Water and Wave Runup Levels for Development	24
3.4.1	Lot 2 South	24
3.4.2	Lot 2 North	24
<b>4</b>	<b>Master Plan Assessment</b>	<b>26</b>
4.1	General	26
4.2	Lot 2 South	26
4.3	Lot 2 North	28
4.4	Lot 8 and Lot 9	29
4.5	NSW Coastal Design Guidelines 2023	29
<b>5</b>	<b>Recommendations and Conclusion</b>	<b>30</b>
<b>6</b>	<b>References</b>	<b>32</b>

## Table of Tables

Table 1-1: Site Description	2
Table 2-1: Likelihood descriptors and associated probabilities used by AGS (2007a, b)	13
Table 2-2: Consequence descriptors from AGS (2007a, b)	15
Table 3-1: Sutherland Shire Council Adopted Sea Level Rise Projections (SSC, 2016)	19
Table 3-2: Adopted Sea Level Rise Projections	20

## Table of Figures

Figure 1-1: Site Aerial and Map (Source: GroupGSA)	3
Figure 1-2: Looking north to Quibray Bay over Lot 2 North and Captain Cook Drive in the foreground	3
Figure 1-3: Looking north across Lot 2 South, towards Quibray Bay with Boat Harbour in the foreground	4
Figure 1-4: Bate Bay looking south west, illustrating the revegetated dune in Lot 2 South	4
Figure 1-5: Looking towards Bate Bay over Lot 2 South and Lot 8 (left)	5
Figure 1-6: Coastal Wetland Area in Resilience and Hazards SEPP Mapping	7
Figure 1-7: Coastal Environment Area in Resilience and Hazards SEPP Mapping	8
Figure 1-8: Coastal Use Area in Resilience and Hazards SEPP Mapping	8

Figure 2-1: Schematic representation of coastline hazard zones (after Nielsen et al, 1992)	14
Figure 2-2: Risk matrix from AGS (2007a, b)	16
Figure 3-1: Bi-linear beach profile (Mayer and Kriebel, 1994)	22
Figure 3-2: Shoreline adjacent to Lot 2 North, looking west (top photo) and looking east (bottom photo)	23
Figure 3-3: Shoreline adjacent to Lot 2 North, looking back towards the vegetation buffer	24

## **Appendices**

Appendix A: Coastal Erosion and Shoreline Recession Hazard Map

Appendix B: NSW Coastal Design Guidelines 2023 Assessment Checklists

## 1 Introduction

### 1.1 Background

This Coastal Management Plan report has been prepared by Royal HaskoningDHV (RHDHV) to accompany a proponent initiated Planning Proposal (Planning Proposal) in support of the proposed amendment to *State Environmental Planning Policy (Precincts – Central River City) 2021* (SEPP Precincts) and *Sutherland Shire Local Environment Plan 2015* (SSLEP 2015).

The Planning Proposal aims to translate and amend current land uses zones under the applicable controls to be consistent with the standard instrument local environmental plan zones and enable additional uses to accommodate a diverse range of land uses at 251, 260R, 278, and 280-282 Captain Cook Drive, Kurnell (the site). The Planning Proposal will establish a new mixed-use community encompassing residential, employment, tourism, education, cultural facilities, ecological regenerative zones and public open space areas.

This Coastal Management Plan report has been prepared to address coastal engineering and planning matters in relation to the proposed Master Plan for the site and feedback provided by State government agencies.

In March 2023 the proponent submitted a Scoping Proposal to Sutherland Shire Council to commence the formal Planning Proposal process, in accordance with the LEP Making Guidelines. The Scoping Proposal provided a comprehensive ‘status update,’ outlining the concept master plan, the intended development outcome, the proposed planning controls and the environmental considerations which were to be further resolved.

As part of the Scoping Proposal process, Council referred the Scoping Proposal package to the DPE, State agencies, and several internal Council teams for review and comment. The advice received from these stakeholders has provided clear directives on the necessary updates and key focus areas within the technical documentation.

Separate to the Scoping Proposal package, extensive and ongoing engagement with relevant State Agencies has occurred since November 2022, with the objective of clarifying and resolving any of the outstanding considerations.

RHDHV were previously involved in the preparation of a coastal engineering study report (RHDHV, 2019) to support the proposed amendment to *State Environmental Planning Policy (Kurnell Peninsula) 1989* (SEPP Kurnell Peninsula)<sup>1</sup>. This was lodged and recognised as having ‘strategic merit’ by the Department of Planning and Environment (DPE) in 2022.

Besmaw has engaged RHDHV to prepare a Coastal Management Plan report to address the feedback received from the DPE and state agencies and reflects the engagement undertaken to date.

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<sup>1</sup> Now Chapter 5 Kurnell Peninsula of *State Environmental Planning Policy (Precincts – Central River City) 2021*.

## 1.2 Site Description

The land to which this planning proposal relates is 251, 260R, 278, and 280-282 Captain Cook Drive, Kurnell (refer **Figure 1-1**) and is located within the Sutherland Shire Local Government Area (LGA).

The key features of the site are summarised in **Table 1-1** and are described below.

Table 1-1: Site Description

Feature	Lot 2 North	Lot 2 South	Lot 8	Lot 9
Street Address	251 Captain Cook Drive	280-282 Captain Cook Drive	278 Captain Cook Drive	260R Captain Cook Drive Kurnell
Legal Description	Lot 2 in DP1030269	Lot 2 in DP559922	Lot 8 in DP586986	Lot 9 DP 586986
Site Area	16ha	160ha	34.5ha	82m <sup>2</sup>
	Total Area: Approximately 210.5 hectares			
Local Government Area	Sutherland Shire			

Lot 2 North (refer **Figure 1-2**) is bound by Quibray Bay to the north and north-east, Towra Point Nature Reserve to the west and Captain Cook Drive to the south and has an area of 16 hectares. It has been occupied in part by Kurnell Boarding Stables and Riding School since 1976.

Besmaw is undertaking ongoing land management, including weed eradication on Lot 2 North. The Lot contains a small area of Coastal Wetlands identified in *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP). The remainder of the Lot does not contain any areas of significant vegetation or endangered ecological communities.

Lot 2 South (refer **Figure 1-3**, **Figure 1-4**, and **Figure 1-5**) is bound by Captain Cook Drive to the north, industrial zoned land to the northeast (including the Sydney Water Desalination Plant), Kurnell Village and the Caltex Oil Refinery, and Kamay Botany Bay National Park to the east, Bate Bay to the south, and Wanda Reserve to the west.

Lot 2 South has an area of approximately 160 hectares and comprises the following uses:

- Extractive operations that provide a significant portion of fine building sand to the Sydney Construction market. In addition to the extraction, rehabilitation activities are undertaken including filling of the extraction area with virgin excavated natural material (VENM), management of the frontal dune system to Bate Bay, removal of noxious weeds, and planting of endemic species to protect the dunes.
- Safety and security fencing erected within the site.
- A collection of dwellings to the north of Boat Harbour (refer **Figure 1-3**), known as the Boat Harbour cabins used for permanent and vacation accommodation.

Lot 8 DP586986 (Lot 8, refer **Figure 1-5**) has an area of approximately 34.5 hectares and is bound by industrial land to the north and the sand extraction area to the south (Lot 2 South). Lot 8 is generally vegetated apart from several unsealed access tracks. The site contains two areas of Coastal Wetlands identified in the Resilience and Hazards SEPP.

Lot 9 DP586986 (Lot 9) is a small parcel of cleared land with an area of only 82m<sup>2</sup> and is bound by industrial land to the west and is surrounded by the vegetated area of Lot 8.

The entire site is privately owned, including the foreshore areas along Bate Bay and Boat Harbour. These foreshore areas are proposed to be dedicated to the relevant State and local government authorities to be integrated into the adjoining National Park and local open space networks.



Figure 1-1: Site Aerial and Map (Source: GroupGSA)



Figure 1-2: Looking north to Quibray Bay over Lot 2 North and Captain Cook Drive in the foreground





*Figure 1-3: Looking north across Lot 2 South, towards Quibray Bay with Boat Harbour in the foreground*



*Figure 1-4: Bate Bay looking south west, illustrating the revegetated dune in Lot 2 South*



Figure 1-5: Looking towards Bate Bay over Lot 2 South and Lot 8 (left)

### 1.3 Scope of Work

This report addresses the management of coastal hazards, comprising beach erosion, shoreline recession, and coastal inundation, that are associated with the proposed Master Plan for the site. The future coastal hazards that may act on the area of the proposed development are defined and assessed in relation to the proposed Master Plan in order for a coastal management plan to be developed. This includes consideration of relevant actions within the Bate Bay Coastal Management Program.

### 1.4 NSW Legislative Framework

#### 1.4.1 General

The NSW Government has delivered recent reforms to the coastal management legislation and regulatory framework in NSW. The key elements of the reform are:

- the *Coastal Management Act 2016*;
- Coastal Management Manual; and,
- *State Environmental Planning Policy (Resilience and Hazards) 2021* (referred to as the Resilience and Hazards SEPP herein) with related maps.

#### 1.4.2 Resilience and Hazards SEPP

The Resilience and Hazards SEPP outlines a range of development controls that apply to different mapped coastal management areas, which include:

- Coastal Wetland and Littoral Rainforests Area;
- Coastal Environment Area;
- Coastal Use Area; and,
- Coastal Vulnerability Area.

##### 1.4.2.1 Coastal Wetland and Littoral Rainforests Area

Development proposals within Coastal Wetland and Littoral Rainforest Areas are subject to controls within the Resilience and Hazards SEPP. Development within this area is designated development and requires

an environmental impact assessment to support any development application. A 100m proximity area has been defined as a buffer around Coastal Wetland and Littoral Rainforest Areas within which development will not be granted unless it will not significantly impact on:

- the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest; or,
- the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

#### **1.4.2.2 Coastal Environment Area**

Proposed development within the Coastal Environmental Area is permitted provided that the proposed development avoids, minimises or manages impacts on:

- the integrity and resilience of the biophysical, hydrological and ecological environment;
- coastal environmental values and natural coastal processes;
- the water quality of the marine estate, and has particular regard to cumulative impacts on sensitive coastal lakes;
- marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms;
- existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including people with a disability;
- Aboriginal cultural heritage, practices and places; and,
- the use of the surf zone.

#### **1.4.2.3 Coastal Use Area**

Development proposals within the Coastal Use Area must address public interest and built form criteria to avoid, minimise or mitigate impacts on:

- existing safe access to and along a foreshore, beach, headland or rock platform, including access for people with a disability;
- overshadowing, wind funnelling and loss of views from public places to foreshores;
- the visual amenity and scenic nature of the coast, including headlands;
- Aboriginal cultural heritage, practices and places; and,
- cultural and built environment heritage.

#### **1.4.2.4 Coastal Vulnerability Area**

Coastal hazards considered within Coastal Vulnerability Areas include:

- beach erosion;
- shoreline recession;
- coastal lake or watercourse entrance instability;
- coastal inundation;
- tidal inundation;
- coastal cliff or slope instability; and,
- erosion and inundation of foreshores caused by tidal water and waves including the interaction of those waters with catchment floodwaters.

Development proposals within the Coastal Vulnerability Area must address the following criteria:

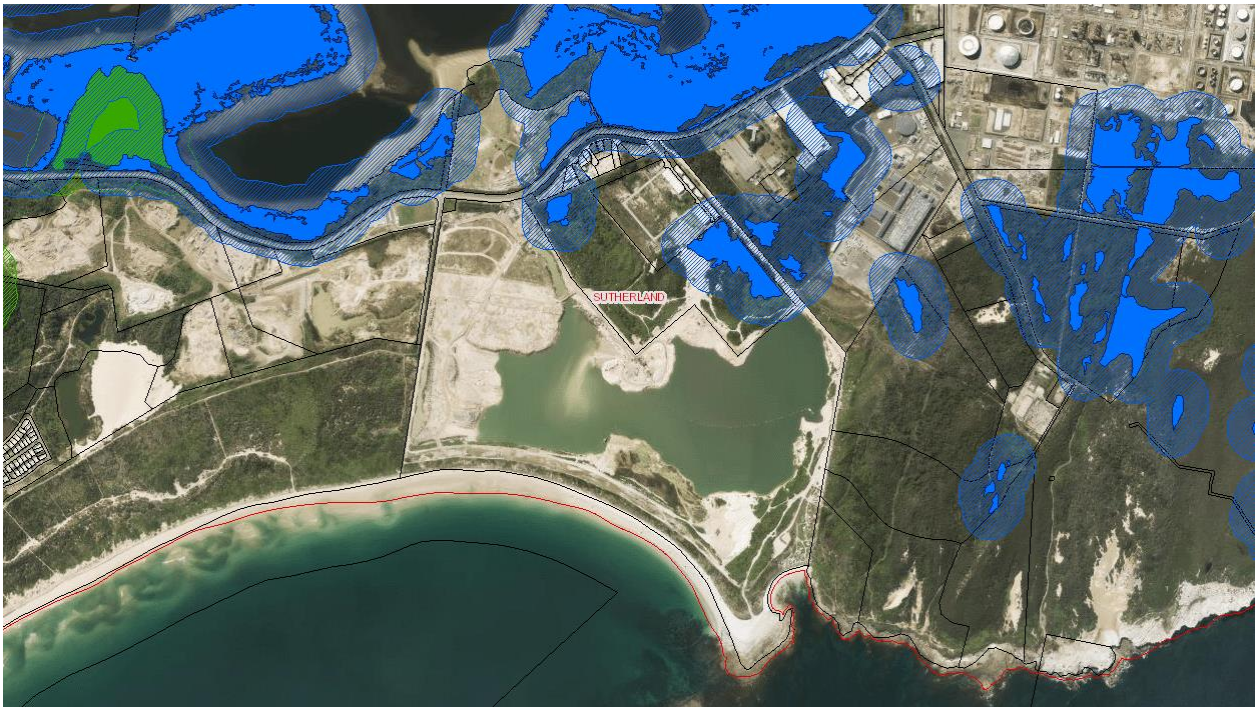
- any coastal development is engineered to withstand current and future coastal hazards for the design life of any building or structure. This will avoid creating new or more severe risks for future generations to manage;
- development is not likely to alter coastal processes to the detriment of the natural environment;
- development is not likely to reduce public amenity, access to and use of any adjacent beach, foreshore, rock platform or headland; and,
- appropriate measures to manage risk to life and public safety from coastal hazards are incorporated into the development.

#### 1.4.2.5 Site Mapping

Review of the mapping of the above areas (refer **Figure 1-6**, **Figure 1-7** and **Figure 1-8**) indicates that part of Lot 2 North and Lot 8 contains Coastal Wetland Area and associated proximity areas. A Coastal Environmental Area and Coastal Use Area have been applied along the shoreline of Quibray Bay. The Coastal Use Area between Northern Beaches and Sutherland Shire Councils has been applied 100m landward of estuaries, bays and other waterways.

Lot 2 South includes a Coastal Environment Area which has been applied along the beach and dune area and a Coastal Use Area buffer has been applied further landward. The Coastal Use Area between Northern Beaches and Sutherland Shire Councils has been applied 200m landward of the open coast.

A Coastal Vulnerability Area has not yet been mapped for the shoreline of either Quibray Bay or Bate Bay. It is understood that the NSW Government is currently working with local government to include relevant coastal hazard mapping from adopted studies into the definition of Coastal Vulnerability Areas.



Note: Coastal Wetland Area shown in blue shading, proximity area in blue hatching. Littoral Rainforest Area shown in green shading, proximity area in green hatching.

Figure 1-6: Coastal Wetland Area in Resilience and Hazards SEPP Mapping



Note: Coastal Environment Area shown in light blue shading.

Figure 1-7: Coastal Environment Area in Resilience and Hazards SEPP Mapping



Note: Coastal Use Area shown in pink shading.

Figure 1-8: Coastal Use Area in Resilience and Hazards SEPP Mapping

### 1.4.3 Coastal Management Manual

The Coastal Management Manual contains a number of parts to guide and support local councils and communities to develop their Coastal Management Programs (CMPs). Part B of the Manual defines the process for preparing a CMP which involves five stages. Stage 2 of the process comprises Detailed

Studies of Vulnerabilities and Opportunities. This section of the Manual outlines the scope of studies required, including studies of beach erosion and shoreline recession. The Manual recommends the use of appropriate methods to determine the uncertainty about the likelihood (probability) and consequences of a coastal hazard occurring at time-frames relevant to the management of existing and future development. The *Guidelines for coastal hazard and risk assessment* within the Coastal Management Toolkit are referred to as providing additional information on the methods to be applied. However, this guideline document has not been released. Notwithstanding, the Coastal Management Manual clearly refers to a risk-based approach to assessment of coastal hazards.

## 1.5 NSW Coastal Design Guidelines 2023

The NSW Coastal Design Guidelines 2023 were released by DPE in October 2023. Chapter 3 of the guidelines addresses planning proposals in the coastal zone and outlines a number of desired coastal outcomes with associated requirements.

Planning proposals in the coastal zone must demonstrate how the requirements are addressed, to ensure the desired coastal outcomes are achieved. Each planning proposal must identify which requirements are relevant to the proposal. Where the planning proposal is inconsistent with any of the relevant requirements, those inconsistencies must be explained and justified in the planning proposal. Planning proposals must use the assessment checklists (refer **Appendix B**) to demonstrate consideration of all requirements for the relevant coastal management area(s).

## 1.6 Local Planning Direction 4.2 Coastal Management

Local Planning Directions are issued to relevant planning authorities under section 9.1(2) of the *Environmental Planning and Assessment Act 1979*. These directions apply to planning proposals lodged with DPE on or after the date the particular direction was issued and commenced.

Local Planning Direction 4.2 Coastal Management is relevant to the matters considered herein and was issued to commence 1 March 2022. A summary of relevant provisions within Local Planning Direction 4.2 is provided below:

- a planning proposal must include provisions that give effect to and are consistent with:
  - objects of the *Coastal Management Act 2016* and objectives of coastal management areas;
  - NSW Coastal Management Manual and associated Toolkit;
  - NSW Coastal Design Guidelines 2003 (superseded by NSW Coastal Design Guidelines 2023); and,
  - any relevant Coastal Management Program that has been certified by the Minister.
- a planning proposal must not rezone land which would enable increased development or more intensive land-use on land:
  - within a Coastal Vulnerability Area identified in the Resilience and Hazards SEPP; or,
  - that has been identified as land affected by a current or future coastal hazard in a local environmental plan or development control plan, or a study or assessment undertaken by or on behalf of the relevant planning authority, planning proposal authority or public authority.
- a planning proposal must not rezone land which would enable increased development or more intensive land-use on land within a Coastal Wetlands and Littoral Rainforest Area identified in the Resilience and Hazards SEPP.

## 1.7 Acceptable Risk Approach

Coastal development setbacks in NSW have traditionally been defined through delineation of coastal hazard lines, using a variety of planning periods and hazard zones. However, until recently, there has been no rigorous assessment of the validity of traditional hazard lines (established by a so-called deterministic methodology) in terms of leading to an acceptable risk to property if used as setbacks for new development.

RHDHV developed a methodology for defining ‘acceptable risk’ as part of completion of the *Collaroy-Narrabeen Beach and Fishermans Beach CZMP* for the then Warringah Council in 2014. As part of that investigation, it was agreed between the study team (which included coastal engineer and former Pittwater Council General Manager Mr Angus Gordon, as well as a legal firm), Council staff (including Council’s corporate lawyer), Councillors, Office of Environment and Heritage (OEH) staff and an external peer reviewer (Mr Bruce Walker of JK Geotechnics) that defining appropriate development setbacks using the ‘acceptable risk’ approach developed was valid, reasonable and an improvement on traditional hazard line approaches to defining setbacks. As such, ‘acceptable risk’ lines were delineated at Collaroy-Narrabeen and Fishermans Beach to define setbacks for future beachfront development.

The ‘acceptable risk’ methodology is considered to be consistent (in principle) with *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013) and papers by OEH staff such as Kinsela and Hanslow (2013). In OEH (2013), one of the Coastal Management Principles is to “adopt a risk management approach to managing risks to public safety and assets”. The approach is also considered to be consistent (in principle) with the joint Australian, New Zealand and International Organisation for Standardization Standard AS/NZS ISO 31000:2009, “Risk management - Principles and guidelines” and Australian Standard AS 5334-2013, “Climate change adaptation for settlements and infrastructure - A risk based approach”. As noted above, the approach is also considered to also be consistent with guidance in the Coastal Management Manual.

## 1.8 Acceptable Risk Framework

The framework of the adopted ‘acceptable risk’ approach came from Australian Geomechanics Society (AGS) procedures for landslide risk management (AGS, 2007a, b), which were developed over a period of more than a decade via a Working Group of experts<sup>2</sup>, and have been widely applied in geotechnical engineering practice since 2000<sup>3</sup>. The AGS procedures were also subject to peer review and discussion through the AGS Landslides Taskforce, with 23 members. That is, the AGS procedures can be considered to be an established, recognised and peer reviewed methodology for defining landslide risk for development assessment. With modification to be appropriate for ‘sandy beach’ coastline hazards, it is considered that the same principles of the AGS procedures can be applied to define ‘acceptable risk’ for beachfront development, as has been undertaken herein.

## 1.9 Recognition of Uncertainty

It is important to recognise that future climate cannot be predicted precisely, and is subject to not only storm variability, but longer term cycles such as the El Nino / La Nina Southern Oscillation, Pacific Decadal Oscillation, and Interdecadal Pacific Oscillation (IPO).

For example, Helman (2007) has postulated that during negative Interdecadal Pacific Oscillation (IPO) phases, the NSW coast experiences wet periods, major floods, sea level above the long-term trend and

<sup>2</sup> Mr Bruce Walker, who peer reviewed the ‘acceptable risk’ assessment in the *Collaroy Narrabeen Beach and Fishermans Beach CZMP*, was the AGS Working Group Convenor.

<sup>3</sup> Using preceding AGS documents as discussed in AGS (2007a).

coastal erosion. Using an 11 year Chebychev filter of annual series from 1871 to 2008 (Folland, 2008), a significant past continuous negative IPO period was from 1945 to 1977, and IPO was positive from 1978 to 2000, returning to negative from 2001 to 2008 (although the nature of the filtering was such that the 2004 to 2008 period should be regarded with caution). A return to negative IPO combined with additional future projected sea level rise could lead to a future period of enhanced erosion compared to the 1978 to 2000 period.

Future climate can also not be predicted precisely due to ongoing climate change caused by the enhanced greenhouse effect. Climate change effects such as sea level rise are projected by researchers based on various scenarios as to how greenhouse gases and aerosols will be emitted anthropogenically in the future, that is so called “Shared Socioeconomic Pathways” as described by the Intergovernmental Panel on Climate Change (IPCC), for example in IPCC (2021). These scenarios represent a range of 21<sup>st</sup> century climate policies and cannot be precisely predicted as they largely depend on political decisions and economic growth.

Furthermore, storm events more severe than the adopted design events can occur, or a structure could remain in place for longer than the design life considered herein (thus potentially being exposed to more severe conditions, for example because sea level rise is projected to be ongoing).

Therefore, it must be recognised that any development landward of a particular ‘acceptable risk’ line is not at zero risk (but at acceptably low risk), and damage may be possible both during and particularly beyond the design life. It cannot be guaranteed that development sited landward of a particular ‘acceptable risk’ line would never be damaged by coastal processes.

That stated, the approach developed herein is considered to be reasonable and valid for defining acceptable risk to the future development at the subject site, and an improvement on traditional (deterministic) methods of hazard definition.

## 1.10 Risk to Life

Only risk to property is evaluated in this study. In a coastal beach context, risk to life is considered to be acceptably low for various reasons including good foreknowledge of tides and coastal storms, high visibility of advancing erosion and/or shoreline recession risk, and the well-established role of the NSW Police and the State Emergency Service (SES) to warn and evacuate residents and the general public from vulnerable areas.

## 1.11 Report Structure

The report herein is set out as follows:

- Probabilistic coastal hazard assessment and acceptable risk is defined in **Section 2**;
- Design still water and wave runup levels are defined in **Section 3**;
- An assessment of the proposed Master Plan is provided in **Section 4**; and,
- References are listed in **Section 5**.



## 2 Probabilistic Coastal Erosion and Shoreline Recession Hazard Assessment

### 2.1 General

A probabilistic coastal erosion and shoreline recession hazard assessment was recently completed by RHDHV as part of the Bate Bay Coastal Management Program (Bate Bay CMP). The draft Bate Bay CMP (RHDHV, 2023) was endorsed by Council in March 2023 and has been submitted to the Minister for certification. The results of the Bate Bay CMP coastal erosion and shoreline recession hazard assessment have been adopted for evaluation of the proposed Master Plan for the site.

The following sections outline the basis for selection of a probabilistic coastal hazard line that is appropriate for assessment of the proposed Master Plan development using the acceptable risk approach. Details of the methodology for the probabilistic coastal erosion and shoreline recession hazard assessment can be found within the Bate Bay CMP (RHDHV, 2023).

### 2.2 Determination of Likelihoods

#### 2.2.1 Terminology

AGS (2007a, b) used 6 likelihood descriptors, as set out in Column 1 of **Table 2-1**<sup>4</sup>, along with associated annual exceedance probabilities (AEPs). The AEP is given as both the indicative (single) value reported by AGS (2007a, b) in Column 2, as well as the range (based on notional boundaries between the likelihoods) in Column 3.

For a design life of 100 years, the cumulative probability of an event of a particular AEP occurring at least once over the design life was determined as per Column 4 of **Table 2-1**, using the formula:

$$J = 1 - (1 - P)^L \quad (1)$$

where  $P$  is the AEP,  $L$  is the design life (years) and  $J$  is the probability of the event with an AEP of  $P$  occurring over the design life. The lower probability limit was associated with each descriptor herein, as per Column 5 of **Table 2-1**, which is conservative.

<sup>4</sup> The heading of each column shows the column number.

Table 2-1: Likelihood descriptors and associated probabilities used by AGS (2007a, b)

1 Descriptor	2 Annual Exceedance Probability (indicative value)	3 Annual Exceedance Probability	4 Cumulative probability of event occurring over 100- year design life (range)	5 Designated cumulative probability of event occurring over 100- year design life
Almost Certain	10%	> 5%	> 99.4%	99.4%
Likely	1%	0.5 to 5%	39.4 to 99.4%	39.4%
Possible	0.1%	0.05 to 0.5%	4.9 to 39.4%	4.9%
Unlikely	0.01%	0.005 to 0.05%	0.5 to 4.9%	0.5%
Rare	0.001%	0.0005 to 0.005%	0.05 to 0.5%	0.05%
Barely Credible	0.0001%	< 0.0005%	< 0.05%	not used

## 2.2.2 Planning Period

The design life of the development/structure governs the planning period over which the risks are assessed. That is, the risks to structures will be determined as being acceptable or not acceptable on the basis of the risk of damage to the structure up to the end of the design life.

Having regard to design life adopted for landslide risk assessment (AGS, 2007a and 2007b), design life adopted for structures and structural components in various Australian Standards, and amortization of residential development used in the *Income Tax Assessment Act 1997*, it is considered that a reasonable design life for devising setbacks and controls for beachfront development is between 40 and 60 years. Since future climate is uncertain, an upper end design life of 60 years for built structures has been adopted.

However, the land area to be developed in this case is significant and the process for the necessary future land use zones and development controls to be put in place and for development approvals to be secured may take some time. As such, to allow for planning and approvals processes and for progressive development of the site over a period of time a design life of 100 years has been applied from the approximate present time. Therefore, the year 2120 has been adopted as the end of the planning period for the proposed development along the open coast frontage of the site.

The adopted planning period of 100 years is consistent with previous guidance provided by OEH in *Guidelines for Preparing Coastal Zone Management Plans* (OEH, 2013), which notes that long-term planning horizons to set strategic directions for coastal hazard areas would be 50 to 100 years. Typically 50 years might be adopted for infill development and 100 years for 'greenfield' sites. Discussions with OEH<sup>5</sup> have confirmed that a 100 year planning period to 2120 is considered to be appropriate for the proposed development.

<sup>5</sup> During meeting held on 28<sup>th</sup> February 2018 and subsequent endorsement with written advice.

### 2.2.3 Coastal Hazard Line Components

The probabilistic coastal hazard line assessment completed for the Bate Bay CMP included allowances for the following contributions to the future coastal erosion/recession hazard (it is convenient to consider the erosion and shoreline hazards jointly):

- storm demand;
- long term recession due to net sediment loss; and,
- long term recession due to sea level rise.

The resultant coastal hazard lines were defined based on the method of Nielsen et al (1992), which delineates various coastline hazard zones as discussed below and depicted in **Figure 2-1**.

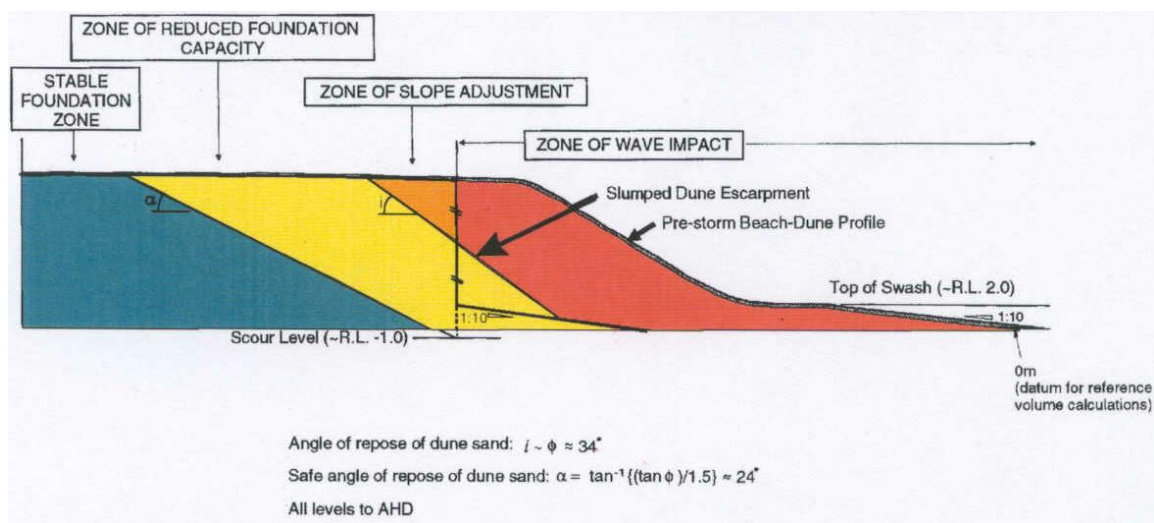


Figure 2-1: Schematic representation of coastline hazard zones (after Nielsen et al, 1992)

The *Zone of Wave Impact* (ZWI) delineates an area where any structure or its foundations would suffer direct wave attack during a severe coastal storm. It is that part of the beach which is seaward of the beach erosion escarpment.

A *Zone of Slope Adjustment* (ZSA) is delineated to encompass that portion of the seaward face of the beach that would slump to the natural angle of repose of the beach sand following removal by wave erosion of the design storm demand. It represents the steepest stable beach profile under the conditions specified.

A *Zone of Reduced Foundation Capacity* (ZRFC) for building foundations is delineated to take account of the reduced bearing capacity of the sand adjacent to the storm erosion escarpment. Nielsen et al (1992) recommended that structural loads should only be transmitted to soil foundations outside of this zone (i.e. landward or below), as the factor of safety within the zone is less than 1.5 during extreme scour conditions at the face of the escarpment. In general (without the protection of a terminal structure such as a seawall), dwellings/structures not piled and located with the ZRFC would be considered to have an inadequate factor of safety.

## 2.3 Determination of Consequences

AGS (2007a, b) used 5 consequence descriptors. These descriptors were related to the percentage of damage caused to a property due to a landslide event, relative to the market value of the property (land plus structures), as listed in **Table 2-2**.

Table 2-2: Consequence descriptors from AGS (2007a, b)

Descriptor	Approximate cost of damage	Description
Catastrophic	> 100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation. Could cause at least one adjacent property major consequence damage.
Major	40% to 100%	Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works. Could cause at least one adjacent property medium consequence damage.
Medium	10% to 40%	Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works. Could cause at least one adjacent property minor consequence damage
Minor	1% to 10%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works
Insignificant	< 1%	Little damage

For this study it is considered that the appropriate consequence descriptor for storm erosion leading to a slumped erosion escarpment and the formation of a Zone of Reduced Foundation Capacity (ZRFC)<sup>6</sup> immediately seaward of a structure on conventional foundations (such as slab-on-ground, strip footings or shallow piers) is “insignificant”.

In adopting the consequence descriptor of “insignificant” for development on conventional foundations, it is assumed that there are no additional coastal hazards landward of the ZRFC. Such hazards could include wave runup and overtopping forces on structures, or inundation of floor areas, that lead to damage. It is recognised that these hazards would need to be managed as part of defining acceptable risk to development, for example through ensuring sufficiently elevated ground floor levels, and it has been assumed that appropriate regard would be made for these effects in design. The coastal inundation hazard at the subject site is addressed in **Section 3**.

## 2.4 Acceptable Risk

A risk matrix is presented in AGS (2007a, b) for combinations of likelihood and consequence, as shown in **Figure 2-2**. For example, if the consequences of a particular “unlikely” event were “minor”, then the risk would be considered “low”.

<sup>6</sup> If the Zone of Slope Adjustment was used to define coastal hazard lines the consequence descriptor would change to “minor” in recognition of the structure being in the Zone of Reduced Foundation Capacity and hence having a lower factor of safety and resulting in the potential for some damage.

Likelihood	Consequence				
	Catastrophic	Major	Medium	Minor	Insignificant
Almost Certain	Very High	Very High	Very High	High	Medium
Likely	Very High	Very High	High	Medium	Low
Possible	Very High	High	Medium	Medium	Very Low
Unlikely	High	Medium	Low	Low	Very Low
Rare	Medium	Low	Low	Very Low	Very Low
Barely Credible	Low	Very Low	Very Low	Very Low	Very Low

Figure 2-2: Risk matrix from AGS (2007a, b)

AGS (2007a, b) defined “acceptable risk” as follows:

“A risk for which, for the purposes of life or work, we are prepared to accept as it is with no regard to its management. Society does not generally consider expenditure in further reducing such risks justifiable”.

A key aspect of the AGS (2007a, b) approach is that they defined the acceptable level of risk for new development as being “low” risk (or lesser, that is “very low”) as per the matrix in **Figure 2-2**. This was based on review of the limited literature available, extensive discussion amongst the AGS Working Group, and consideration of the annualised cost of damage to property. AGS (2007a, b) concluded that:

“most informed home owners are likely to be risk averse as a result of appreciation of the consequences at a family or personal level, almost regardless of the likelihood of the event. This risk aversion suggests that Low Risk to Property is an appropriate recommendation for acceptable risk to the regulator for domestic dwellings which are of Importance Level 2 (as defined in the BCA [Building Code of Australia])”.

Note that AGS (2007a, b) considered that the acceptable risk level was “low” for structures of both:

- Importance Level 2 (such as low-rise residential construction)<sup>7</sup>; and,
- Importance Level 3 (such as buildings and facilities where more than 300 people can congregate in one area, schools of greater than 250 people, health care facilities with a capacity of 50 or more residents, power generating facilities, water treatment and waste water treatment facilities).

For structures of Importance Level 4 (such as buildings and facilities designated as essential facilities or with special post-disaster functions, medical emergency or surgery facilities, emergency service facilities (fire, rescue, police etc.), the designated acceptable risk level was “very low”.

Given that “low” risk can be considered acceptable for proposed development at the site, it follows from **Figure 2-2** that the “likely” coastal hazard line can be used to define the acceptable risk setback for new development that is constructed on conventional foundations (since, as noted in **Section 2.3**, this has “insignificant” consequences if positioned immediately landward of the ZRFC and the combination of the Likely likelihood and Insignificant consequence give Low risk).

<sup>7</sup> For structures of Importance Level 1 (such as minor temporary facilities), the designated acceptable risk level was “medium”.

## 2.5 Adopted Coastal Hazard Line

As outlined in **Section 2.4**, the likelihood descriptor corresponding to an acceptable risk level is considered to be a 'likely' event. In accordance with **Table 2-1**, this corresponds to the cumulative probability of the event occurring over a 100 year design life or an encounter probability of 39.4%. The probabilistic coastal hazard line corresponding to the acceptable risk level for the position of the ZRFC in 2120 has been extracted from the Bate Bay CMP analysis and plotted on a plan of the proposed Master Plan (refer **Appendix A**).

## 2.6 Practical Application of Acceptable Risk Line for Development

The position of the acceptable risk line (refer **Appendix A**) falls within the flat area of land behind the vegetated dune and is located inside the area of 'dedicated land'. This land area has been filled to a typical level of around 7.5-8m AHD and grass cover has been established and maintained by Besmaw. The crest level within the adjacent seaward vegetated natural dune area is typically 1-2m above this level.

The acceptable risk line represents the predicted position of the ZRFC in 2120 and is around 26-30m seaward of the proposed land dedication boundary. Given that the ZSA (landward limit of slumped erosion escarpment) would be around 11m further seaward of the ZRFC, the available buffer zone from the 2120 erosion escarpment to the proposed land dedication boundary would be in the order of 37-41m. This is considered to be an adequate width for maintaining a viable vegetated dunal system up to 2120 as the shoreline progressively recedes under the action of net sediment loss, sea level rise and periodic coastal storms. The width of the vegetated dune currently maintained at the subject site is around 25-40m.

As such, it is considered that the proposed land dedication boundary represents an appropriate development setback for management of future coastal hazards up to the end of the 100 year planning period. Furthermore, additional buffer distance is provided landward of the proposed land dedication boundary as the proposed Master Plan incorporates open space areas in the southern (open-coast facing) portion of Lot 2 South.

## 3 Coastal Inundation Hazard Assessment

### 3.1 General

The following sections address coastal inundation hazards that may be caused by elevated still water levels and wave runup processes. These processes have the potential to impact both the ocean-facing portion of the Master Plan site (Lot 2 South) and the estuary-facing portion of the Master Plan site (Lot 2 North) and are addressed in turn below.

### 3.2 Ocean Still Water Level and Wave Runup Levels

#### 3.2.1 Elevated Water Levels

There are five main components which contribute to elevated water levels in the ocean near shorelines where waves break, namely:

- astronomical tide;
- barometric setup;
- wind setup;
- wave setup (caused by breaking waves); and,
- wave runup.

Astronomical tide refers to the regular rise and fall of sea level in response to the gravitational attraction of the sun, moon and planets. Tides along the NSW coastline are semi-diurnal in nature, i.e. two high tides and two low tides daily, with significant diurnal inequality (difference in range between successive high and low tides).

Barometric pressure setup refers to the increase in mean sea level caused by a drop in atmospheric pressure, such as when a low pressure system is centred over an area. Wind stress setup is the increase in mean sea level caused by the “piling up” of water on a shoreline by wind action acting on the water surface. The combined effect of barometric setup and wind stress setup is referred to as storm surge.

Wave setup is defined as the superelevation of the mean water level caused by wave action alone. The phenomenon is related to the conversion of the kinetic energy of wave motion to quasi-steady potential energy. It is manifested as a decrease in water level prior to breaking, with a maximum set down at the break point; from the break point the mean water surface slopes upward to the point of intersection with the shore (Coastal Engineering Research Center, 1984). Wave setup is therefore a maximum at the shoreline. The total water level including astronomical tide, storm surge and wave setup, but excluding wave runup, can be termed the “storm nearshore still water level”.

Wave runup is the vertical distance above the nearshore still water level reached by the uprush of water from individual waves. It is a more transient phenomenon than wave setup and is discussed further in **Section 3.2.2**.

Design ocean still water levels have been published in DECCW (2010) and were derived from extreme value analysis of Fort Denison tide gauge data from June 1914 to December 2009 (after Watson and Lord, 2008). A 100 year ARI design still water level of 1.44m AHD was adopted for 2010, which includes astronomical tide and storm surge effects but excludes wave setup and wave runup.

The above design ocean still water level will need to be adjusted to reflect sea level rise that has occurred between 2010 and 2016<sup>8</sup>, and the sea level rise at the end of the adopted planning period to 2120. DECCW (2010) reported that satellite altimetry data indicates that the rate of contemporary sea level rise is approximately 3mm/year. This is consistent with analysis of recent trends within the Fort Denison tide gauge record by Whitehead & Associates (2014), which determined that between 1996 and 2013 mean sea level had increased by 3.3mm/year.

Council has adopted its own Sea Level Rise Policy (SSC, 2016) which is based on the IPCC (2013b) RCP6.0 (high) scenario. Review of the adopted sea level rise values relative to 2015 (refer **Table 3-1**) indicates that the published IPCC (2013b) values have been increased by Council by 10% to account for local variation in sea level rise relative to the global mean. It is noted that IPCC has updated its SLR guidelines in 2021 (IPCC, 2021), however since Council's SLR policy is based on IPCC (2013b), the SLR guidelines outlined in that document have been utilised herein.

Table 3-1: Sutherland Shire Council Adopted Sea Level Rise Projections (SSC, 2016)

Year	Sea Level Rise (m)
2015	0.00
2020	0.03
2030	0.10
2040	0.15
2050	0.23
2060	0.30
2070	0.39
2080	0.50
2090	0.61
2100	0.72

It is considered that the modified RCP6.0 (high) values adopted by Council are appropriate to represent the most likely or modal sea level rise trajectory. **Table 3-2** summarises the adopted minimum, modal and maximum sea level rise projections that are derived from IPCC (2013b) values with a base date of 2016<sup>8</sup>, increase of 10% for local variation relative to the global mean, and extrapolation to 2120.

<sup>8</sup> To correspond with the 2016 date of the adopted base beach profile for coastal hazard assessment.



Table 3-2: Adopted Sea Level Rise Projections

Year	Sea Level Rise (m)
2016	0.00
2020	0.02
2030	0.09
2040	0.14
2050	0.22
2060	0.30
2070	0.39
2080	0.50
2090	0.61
2100	0.72
2110*	0.83
2120*	0.94

\*Extrapolated values based on 2090 to 2100 linear trend.

If the 2010 design ocean still water level of 1.44m AHD is increased by 3mm/year to determine the 2016 still water level and the modal trajectory value of 0.94m from 2016 to 2120 is applied (refer **Table 3-2**), then the 2120 design ocean still water level (excluding wave setup) would be 2.4m AHD.

The typical magnitude of wave setup at a shoreline is about 15% of the breaking significant wave height. Nearshore extreme wave conditions extracted from the NSW Nearshore Wave Transformation Tool<sup>9</sup> indicate that in the vicinity of the study area the 100 year ARI wave condition at 10m water depth has a significant wave height ( $H_s$ ) of 3.8m and peak wave period ( $T_p$ ) of 13.6s for waves approaching from the worst case SSE direction. If this wave is shoaled to its break point<sup>10</sup>, the 100 year ARI significant breaking wave height is estimated to be 4.3m. This would result in a wave setup of 0.65m and a 2120 storm nearshore still water level of approximately 3.1m AHD.

Boat Harbour is located at the eastern end of Lot 2 South and comprises a small embayment formed by the rocky outcrops of Merries Reef and similar rock platforms and coastal bluffs at its eastern side. Nearshore extreme wave conditions extracted from the NSW Nearshore Wave Transformation Tool indicate that Boat Harbour is exposed to a more severe wave climate as it does not benefit from the sheltering offered by Merries Reef from SSE waves. The 100 year wave condition at 10m water depth has a significant wave height ( $H_s$ ) of 6.8m and peak wave period ( $T_p$ ) of 13.6s for waves approaching from the worst case SSE direction. If this wave is shoaled to its break point, the 100 year ARI significant breaking wave height is estimated to be 7m. This would result in a wave setup of 1.05m and a 2120 storm nearshore still water level of approximately 3.5m AHD.

<sup>9</sup> Developed by OEH and Baird Australia.

<sup>10</sup> Approximated by the rule of thumb relationship  $H_b = 0.78 d_b$ .

### 3.2.2 Wave Runup Level

After waves break they runup the foreshore slope to a level which exceeds the still water level, denoted as the wave runup level. The height of wave runup on beaches depends on many factors including (NSW Government, 1990):

- wave height and period;
- the slope, shape and permeability of the beach;
- the roughness of the foreshore area; and,
- wave regularity.

Hanslow and Nielsen (1995) have provided guidance on calculating wave runup. They found that the runup above the still water level (with the still water level excluding wave setup)<sup>11</sup> was given by:

$$R = 0.9H_s(L_s/H_s)^{0.5} \tan\beta \quad (2)$$

where  $R$  is the runup exceeded by 2% of waves,  $H_s$  is the significant wave height,  $L_s$  is the significant wave length, and  $\tan\beta$  is the beach slope. The significant wave length is given by:

$$L_s = \frac{gT_s^2}{2\pi} \quad (3)$$

where  $g$  is the gravitational acceleration ( $9.81\text{ms}^{-2}$ ) and  $T_s$  is the significant wave period.

Runup values predicted using Equation 2 are sensitive to the beach slope adopted. Numerous authors (Saville, 1957; Nielsen and Hanslow, 1991; de Waal and van der Meer, 1992; Mayer and Kriebel, 1994) have indicated that the slope between the break point and runup limit is generally most appropriate to use. Adopting a relatively steep 1V:10H beach slope, the predicted 100 year ARI wave runup is 2.9m above the 2120 design ocean still water level (2.4m AHD excluding wave setup) giving a wave runup level of 5.3m AHD.

Due to the presence of a steeper dune face at the rear of the beach that is within the zone of wave runup, it is considered that the above estimate based on the typical beach swash zone slope is an under-estimate of wave runup. To address this, the approach for estimation of wave runup on composite beach slopes proposed within Mayer and Kriebel (1994) has been applied. The beach profile during a coastal storm can be represented by a simplified bi-linear profile (refer **Figure 3-1**) with a 1V:10H slope over the beach berm and 1V:1.5H over a slumped dune escarpment.

<sup>11</sup> It must be emphasised that the water level, to which  $R$  is added to determine the runup elevation, excludes wave setup. Numerous authors have applied the methodology over-conservatively by including wave setup in the water level component.

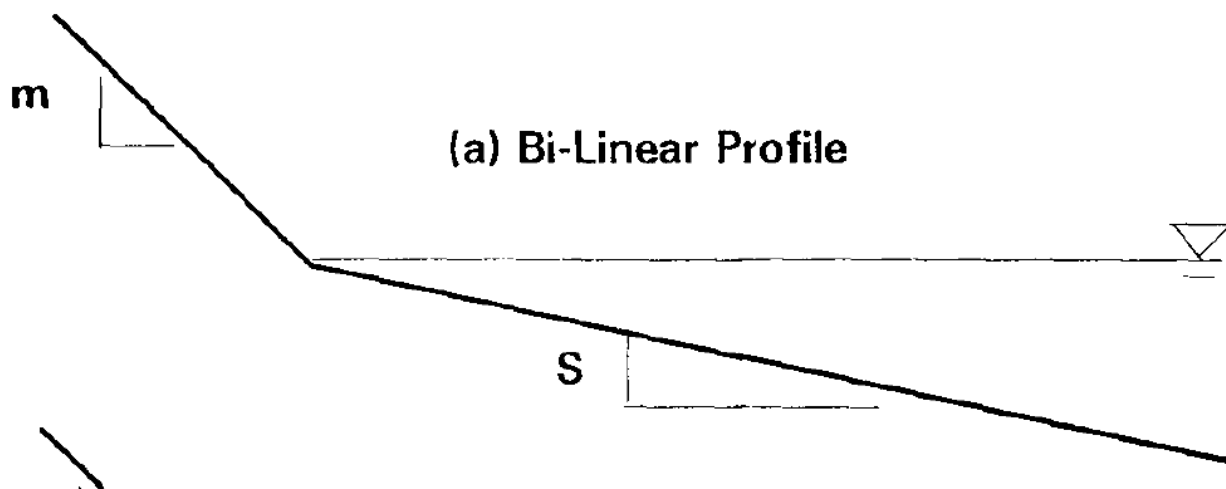


Figure 3-1: Bi-linear beach profile (Mayer and Kriebel, 1994)

Mayer and Kriebel 1994 developed the following relationship for estimation of wave runup on a bi-linear beach profile:

$$R = \frac{2ms}{m+s} \sqrt{H_o L_o} \quad (4)$$

where R is the wave runup, 'm' and 's' are the beach profile slopes as per **Figure 3-1** and  $H_o$  and  $L_o$  are the significant deepwater wave height and wave period respectively.

Application of Equation 4 results in a predicted 100 year ARI wave runup of 5.6m above the 2120 design ocean still water level (2.4m AHD excluding wave setup) giving a wave runup level of 8m AHD. This estimate of wave runup is considered to be appropriate to adopt along the open coast frontage of Lot 2 South.

At Boat Harbour the beach berm is slightly flatter at a slope of around 1V:15H according to available LiDAR data. Application of Equation 4 using the 100 year ARI wave conditions estimated within Boat Harbour results in a predicted 100 year ARI wave runup of 5.0m above the 2120 design ocean still water level (2.4m AHD excluding wave setup) giving a wave runup level of 7.4m AHD. This estimate of wave runup is considered to be appropriate to adopt within the Boat Harbour embayment.

### 3.3 Estuary Still Water Level and Wave Runup Levels

#### 3.3.1 Elevated Water Levels

As Botany Bay is open to the ocean, elevated water levels within Quibray Bay (shoreline adjacent to Lot 2 North) are influenced by the same processes as outlined in **Section 3.2.1** with the exception of swell waves which do not penetrate into this area. However, Quibray Bay is exposed to a significant fetch of 8km across Botany Bay, which would generate wind waves from a relatively narrow wind direction sector from the NNW. Wind wave hindcasting calculations performed over this fetch length indicate that 100 year ARI NNW wind waves are estimated to have a significant wave height ( $H_s$ ) of 1.3m and peak wave period ( $T_p$ ) of 3.3s. The estimated wave setup associated with this wave condition would be 0.2m. When added to the 2120 design ocean still water level (2.4m AHD) this gives a 2120 storm nearshore still water level of approximately 2.6m AHD.

### 3.3.2 Wave Runup Level

Wind waves within Quibray Bay would propagate as unbroken waves under extreme water level conditions over the very flat intertidal shoreline adjacent to Lot 2 North (refer **Figure 3-2**) and travel towards the back beach area. A buffer of dune and wetland vegetation (refer **Figure 3-3**) exists adjacent to the boundary of Lot 2 North which ranges in width from 60m to 300m. This vegetation buffer would be effective in inducing wave breaking and dissipating wave energy well before wave runup is able to reach the boundary of Lot 2 North. As such, it is considered that wave runup associated with wind waves would have an insignificant effect on development of the subject site. Therefore, the relevant constraint for development would be the 2120 storm nearshore still water level of 2.6m AHD, as described in **Section 3.3.1** above.



Figure 3-2: Shoreline adjacent to Lot 2 North, looking west (top photo) and looking east (bottom photo)



Figure 3-3: Shoreline adjacent to Lot 2 North, looking back towards the vegetation buffer

### 3.4 Practical Application of Still Water and Wave Runup Levels for Development

#### 3.4.1 Lot 2 South

The existing dune crest levels along the open beach section of Lot 2 South are generally elevated above the predicted design still water and wave runup levels in 2120. Therefore, provided that the vegetated dunal system is maintained at current levels (i.e. crest above 8m AHD) into the future, the proposed landward development would not be expected to be impacted by coastal inundation hazards.

Within Boat Harbour the existing dune crest level is generally higher than the predicted design wave runup level in 2120 hence proposed landward development would not be expected to be impacted by coastal inundation hazards. However, dune crest levels in the eastern end of Boat Harbour reduce to around 5.5m AHD, which is below the predicted wave runup level of 7.4m AHD. In this case, waves overtopping the foreshore would fold over the dune crest and travel as a sheet flow at shallow depth (say 0.3-0.5m), spreading out and infiltrating over the landward areas. As such, the predicted design wave runup level of 7.4m AHD would not be realised in this area. There would be expected to be a significant reduction in the velocity and depth of the runup within the order of 15-20m from the dune crest. That is, even if a structure (in particular habitable floor level) is below a predicted wave runup level, this does not necessarily imply there would be damage to the structure, as this would primarily depend on the depth of flow (or flow momentum in immediate foreshore areas), and nature of the construction.

Notwithstanding the above, the proposed land dedication boundary within Boat Harbour is positioned landward of the area that may be affected by localised coastal inundation. Accordingly, the proposed land dedication boundary represents a suitable setback for future development.

#### 3.4.2 Lot 2 North

The existing ground levels over Lot 2 North are typically at 1.5-2.0m AHD according to available LiDAR data. Levels across the site rise gradually towards Captain Cook Drive, which is generally elevated above 3m AHD. The subject Lot is surrounded by low-lying wetland areas along its western, northern and eastern boundaries and within the eastern area of the Lot, which have an elevation of 0.0-1.5m AHD. These include the Coastal Wetlands mapped within the Resilience and Hazards SEPP (refer **Figure 1-6**).

Due to the absence of a barrier dune system, most of Lot 2 North would be subject to inundation under the predicted future elevated water level (2.6m AHD) unless ground level changes are made. Inundation depths would range from approximately 0.6m to 1.1m above existing ground levels. The flood risk on Lot 2 North would be reduced by regrading the land as part of the proposed development landform.

## 4 Master Plan Assessment

### 4.1 General

The proposed Master Plan for future development of Lot 2 South, Lot 2 North and Lot 8 is documented in the Kurnell Master Plan – Master Plan Updates document prepared by GroupGSA (dated 28 November 2023). The following provides an assessment of the Master Plan with respect to coastal processes and hazards defined in **Section 2** and **Section 3** herein.

### 4.2 Lot 2 South

As discussed in **Section 2.6**, the available buffer zone from the predicted 2120 slumped erosion escarpment to the proposed land dedication boundary would be in the order of 37-41m. This is considered to be an adequate width for maintaining a viable vegetated dunal system up to 2120 as the shoreline progressively recedes under the action of net sediment loss, sea level rise and periodic coastal storms. The width of the vegetated dune currently maintained at the subject site is around 25-40m.

The proposed Master Plan shows that the closest development to the shoreline comprises tourism buildings, underground carpark and Surf Life Saving Club (SLSC) buildings to the west, and tourism buildings and an underground carpark to the east. These structures are all positioned landward of the land dedication boundary (and the adopted acceptable risk line for coastal erosion hazard in 2120) and are surrounded by large areas of open space. This open space area would be used for public access, including footpaths for access behind the dunes and to the beach, and could also be used (as required) as a future buffer area for maintenance of a vegetated dunal system. The position of the proposed development within the Master Plan is consistent with Action CH26 within the Bate Bay CMP, which is reproduced below:

Action CH26

*New subdivisions or greenfield development to be located landward of 2120 ZRFC coastal hazard line.*

As discussed in **Section 3.4.1**, the existing dune crest levels along the open beach section of Lot 2 South are generally elevated above the predicted design still water and wave runup levels in 2120. Therefore, provided that the vegetated dunal system is maintained at current levels (i.e. crest above 8m AHD) into the future, the proposed landward development would not be expected to be impacted by coastal inundation hazards.

The Master Plan provides an indicative location of an underground carpark and SLSC buildings that are located on the western side of the Lot 2 South beach frontage and positioned landward of the proposed land dedication boundary. As noted above, the SLSC buildings are also positioned landward of the adopted acceptable risk line for the coastal erosion/recession hazard in 2120 and can be built on conventional foundations (such as slab-on-ground, strip footings or shallow piers). In addition to supporting beach use from the new residential development, the provision of surf life saving facilities at this location is also consistent with Action CS5 within the Bate Bay CMP, which is reproduced below:

Action CS5

*Consider installation of temporary lifeguard observation tower and Emergency Response Beacon at Greenhills Beach.*

The above action was developed to address public safety concerns for remote response to be improved in the area for lifeguard services. This issue would be increasingly relevant with additional residential

development in the area, as is proposed by the Master Plan. It is recommended that Council are consulted to establish the arrangements for the proposed SLSC buildings, which are typically public facilities that are managed by local Councils. Additional land may need to be dedicated to facilitate public ownership and management of surf life saving facilities and services by Council.

Although wave runup under predicted design conditions in 2120 could overtop the lower dune crest levels within Boat Harbour, the proposed land dedication boundary within Boat Harbour is positioned landward of the area that may be affected by localised coastal inundation due to wave overtopping. In addition, the proposed Master Plan shows that the closest development to the Boat Harbour foreshore comprises a single storey retail building located a further 45m landward of the proposed land dedication boundary and behind an area of regional open space.

4WD vehicle access has historically been available through a permitting system managed by a private business operating at Boat Harbour Park, with unsealed road access being provided through the dunes at Boat Harbour onto the beaches at Boat Harbour and Greenhills. It is understood from recent feedback received on the Scoping Proposal that vehicle access to beaches in the area is generally not supported by DPE. This matter was also raised as Action CE15 and Action FA1 to be resolved in the Bate Bay CMP, which are reproduced below:

Action CE15

*Council to collaborate with the community, local landowners, DPE – EHG and DPI - Fisheries to assess and (if required) address potential environmental risk of 4WD vehicle access through dunes and onto the beaches at Greenhills and Boat Harbour, with respect to Council's Open Space Strategy and Implementation Plan.*

Action FA1

*Subject to the outcomes of CE15, if required, Council to collaborate with local landowners, DPE – EHG and DPI - Fisheries to develop and implement a strategic approach to capacity and spatial extent of vehicle access to the beaches at Greenhills and Boat Harbour, within Council's Open Space Strategy and Implementation Plan.*

It is understood that the above actions are still outstanding matters for Council to address in their future delivery of the Bate Bay CMP. In any case, the proposed Master Plan does not include any provisions for continuation of vehicle access to the beach via Boat Harbour. Roads proposed in the Master Plan for the Boat Harbour precinct terminate at tourism, retail and carpark facilities that are located landward of the land dedication boundary.

In summary, it is considered that the development in the proposed Master Plan is setback appropriately from the coastal zone to mitigate any adverse impacts from coastal processes and hazards under the action of net sediment loss, sea level rise and climate change over the 100 year planning period to 2120. In addition, proposed setbacks to building development landward of the land dedication boundary provide opportunity for enhancing the amenity of the development with wide buffer zones of open space proposed behind the land dedication boundary and frontal dune. The dedication of land within the Master Plan is consistent with Action FA10 within the Bate Bay CMP, which is reproduced below:

Action FA10

*Subject to resolution of the Besmaw Pty Ltd land planning proposal, extension of the public reserve for the full length of the beach frontage to increase public access. Recommend that width of the reserve is to be based on providing adequate spatial extent for the foredune and public*



*access during the 100 year future planning period, in keeping with Council's Open Space Strategy and Implementation Plan.*

It is noted that the Master Plan includes indicative alignments for the Regional East-West coastal walk and linking beach access walkways from Lot 2 South. These walkways are located seaward of the proposed land dedication boundary, hence may be located within the future coastal hazard zone. As such, the siting and design of these public access structures (e.g. on-grade paths, elevated boardwalks and viewing platforms) by Council should include consideration of potential future exposure to coastal hazards. The provision of beach access walkways is consistent with Action CE19 and Action FA4 within the Bate Bay CMP, which are reproduced below:

Action CE19

*Council to collaborate with the community, local landowners and DPE – EHG to assess potential requirement to amend the number and location of accessways through the dunes and onto the beach, within Council's Open Space Strategy and Implementation Plan.*

Action FA4

*Council to continue to maintain appropriate accessways through Wanda dunes and if required, subject to the outcomes of CE19, Council to collaborate with the community, local landowners and DPE – EHG to consider amendment of the number and location of accessways through the dunes and onto the beach, within Council's Open Space Strategy and Implementation Plan.*

It is noted that ongoing maintenance of a viable vegetated frontal zone within the proposed land dedication zone is an important management measure to mitigate against coastal hazards over the planning period. This was initiated by the Holt family in the 1950s and has been effective in preventing landward loss of sand under wind action that had occurred historically. The maintenance of vegetative cover and the current dune crest levels provides protection against wave runup and a sand buffer for episodic storm erosion. As such, the land dedication zone should be incorporated into the current dune maintenance programs and plans of management delivered by Council, Bushcare and the Soil Conservation Service in areas to the south (North Cronulla Beach to Wanda Beach and North Cronulla Heritage Dune). The maintenance of the dune system is consistent with Action CE8 within the Bate Bay CMP, which is reproduced below:

Action CE8

*Subject to resolution of the Besmaw Pty Ltd land planning proposal, consideration of establishing (and maintaining) a wildlife corridor along the foreshore linking Wanda Reserve to Boat Harbour within Council's Open Space Strategy and Implementation Plan.*

## 4.3 Lot 2 North

As discussed in **Section 3.4.2**, the existing low-lying ground levels over a portion of Lot 2 North would be subject to inundation under the predicted 2120 storm nearshore still water level (2.6m AHD). However, the proposed landform within the Master Plan shows that the developed area within Lot 2 North is proposed to be filled to a level of 3-5m AHD. This proposed ground level is above the estimated future nearshore still water level that is based on a combination of the 100 year ARI still water level, sea level rise to 2120 and 100 year ARI local wind wave setup. As such, the proposed landform would not be classed as flood prone land. It follows that the proposed use of Lot 2 North for seniors living, residential, and retail development is permitted in accordance with Sutherland Shire Development Control Plan 2015 (DCP 2015) Chapter 40 – Environmental Risk.

It is noted that the development proposed on Lot 2 North retains the existing Coastal Wetland in the eastern area of the lot, which is protected by the Resilience and Hazards SEPP. There is no significant built development proposed by the Master Plan, other than low impact elevated boardwalks, within the mapped Coastal Wetland area which will be retained and protected. Proposed Master Plan features within the Coastal Wetland proximity area comprise public open space landscaping and a local park.

#### **4.4 Lot 8 and Lot 9**

Lot 8 and Lot 9 are located in the central portion of the Kurnell Peninsula and do not have any direct exposure to open coast or estuarine coastal hazards. However, Lot 8 contains two areas of Coastal Wetland mapped within the Resilience and Hazards SEPP. There is no built development proposed by the Master Plan within the mapped Coastal Wetland areas, which will be retained and protected. Proposed Master Plan features within the Coastal Wetland proximity areas comprise public open space landscaping.

#### **4.5 NSW Coastal Design Guidelines 2023**

The assessment checklists provided in **Appendix B** provides responses to the requirements within the NSW Coastal Design Guidelines 2023 that are relevant to the proposed Master Plan.

## 5 Recommendations and Conclusion

Recommendations derived from the above Master Plan assessment are summarised below:

- Council is consulted to establish the arrangements for the proposed SLSC buildings, which are typically public facilities that are managed by local Councils. Additional land may need to be dedicated to facilitate public ownership and management of surf life saving facilities and services by Council.
- Council to resolve Action CE15 and Action FA1 within the Bate Bay CMP, which relate to vehicle access onto the beaches at Boat Harbour and Greenhills (not allowed for in the proposed Master Plan).
- Council is consulted regarding the provision of public access through the dunes and onto the beach via beach access walkways, in relation to Action CE19 and Action FA4 within the Bate Bay CMP.
- The proposed land dedication zone should be incorporated into the current dune maintenance programs and plans of management delivered by Council, Bushcare and the Soil Conservation Service in areas to the south (North Cronulla Beach to Wanda Beach and North Cronulla Heritage Dune).

A summary of the Master Plan assessment against various coastal management considerations is provided below:

- The proposed position of the land dedication boundary within the southern (open-coast facing) portion of Lot 2 South represents an appropriate development setback for management of the predicted future erosion and recession hazards up to the end of the 100 year planning period (nominally 2120). The position of the land dedication boundary also allows for an adequate buffer zone width landward of the predicted erosion and recession hazards in 2120 for maintaining a viable vegetated dunal system up to 2120. In addition, the proposed setbacks to building development landward of the land dedication boundary provide opportunity for enhancing the amenity of the development with wide buffer zones of open space proposed behind the land dedication boundary and frontal dune.
- Provided that the vegetated dunal system in Lot 2 South is maintained at current levels (i.e. crest above 8m AHD) into the future, the proposed landward development would not be expected to be impacted by the coastal inundation hazard.
- Although wave runup under predicted design conditions in 2120 could overtop the lower dune crest levels within Boat Harbour, the proposed land dedication boundary within Boat Harbour is positioned landward of the area that may be affected by localised coastal inundation due to wave overtopping.
- The proposed landform within the Master Plan shows that the developed area within Lot 2 North is proposed to be filled to a level of 3-5m AHD, which would be above the predicted 2120 design storm nearshore still water level.
- Lot 8 and Lot 9 are located in the central portion of the Kurnell Peninsula and do not have any direct exposure to open coast or estuarine coastal hazards.
- Areas of Coastal Wetland mapped within the Resilience and Hazards SEPP would be retained and protected. There is no significant built development proposed by the Master Plan, other than low impact elevated boardwalks, within the mapped Coastal Wetland areas. Proposed Master



Plan features within the Coastal Wetland proximity areas comprise public open space landscaping and a local park.

Based on above the assessment, it is concluded that the Master Plan proposal is suitable for the site with respect to coastal management considerations.

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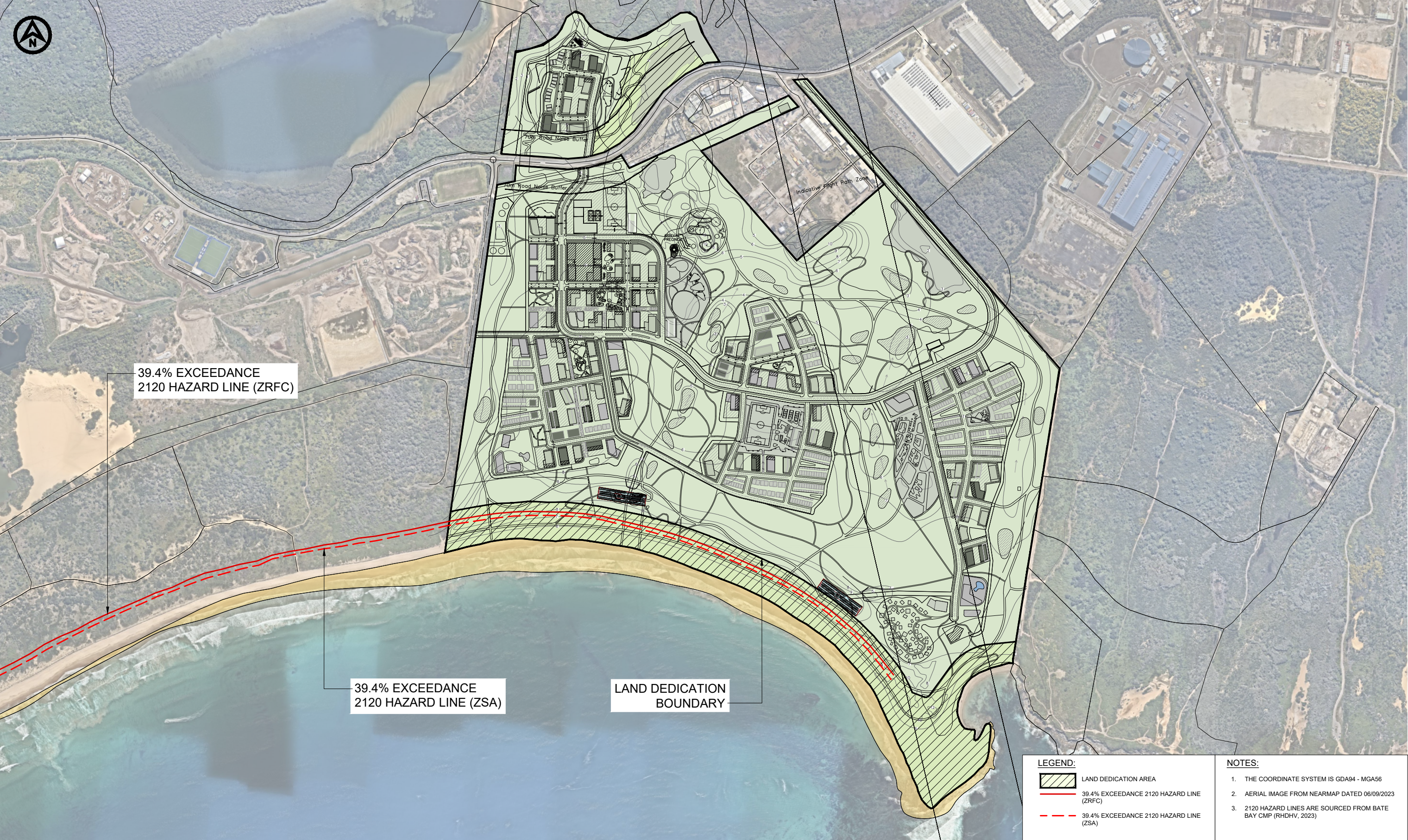
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## Appendix A: Coastal Erosion and Shoreline Recession Hazard Map



39.4% EXCEEDANCE  
2120 HAZARD LINE (ZRFC)

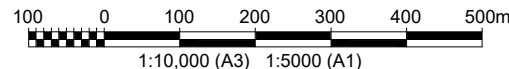
39.4% EXCEEDANCE  
2120 HAZARD LINE (ZSA)

LAND DEDICATION  
BOUNDARY

**LEGEND:**

	LAND DEDICATION AREA
	39.4% EXCEEDANCE 2120 HAZARD LINE (ZRFC)
	39.4% EXCEEDANCE 2120 HAZARD LINE (ZSA)

- NOTES:**
1. THE COORDINATE SYSTEM IS GDA94 - MGA56
  2. AERIAL IMAGE FROM NEARMAP DATED 06/09/2023
  3. 2120 HAZARD LINES ARE SOURCED FROM BATE BAY CMP (RHDHV, 2023)





## **Appendix B: NSW Coastal Design Guidelines 2023 Assessment Checklists**

# NSW Coastal Design Guidelines 2023



## Appendix 1: Assessment checklist for planning proposals

Hierarchy of coastal management areas:

1. CWLRA = coastal wetlands and littoral rainforests area
2. CVA = coastal vulnerability area
3. CEA = coastal environment area
4. CUA = coastal use area

**Note:** Requirements relating to coastal hazards must be considered for all coastal hazard and risk areas, regardless of which relevant coastal management area(s) these fall within. 'Coastal hazard and risk areas' mean any mapped coastal vulnerability areas and/or areas affected by (or projected to be affected by) coastal hazards that have been identified in a state environmental planning policy, local environmental plan, development control plan, coastal management program, coastal hazard policy or study adopted by council.

Outcome A. Protect and enhance coastal environmental values			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>Outcome A.1 Protect coastal ecosystems</b>			
<b>A.1a</b> Avoid development on undeveloped headlands and significant coastal landforms.	CVA, CEA	Yes	YES. There is no development proposed by the Masterplan on undeveloped headlands or significant coastal landforms.
<b>A.1b</b> Do not increase development or intensify land uses where there is existing development on headlands and significant coastal landforms.	CVA, CEA	No	N/A. There is no existing development on headlands or significant coastal landforms.
<b>A.1e</b> Identify, protect and enhance sensitive coastal ecosystems including coastal wetlands, littoral rainforests and other coastal threatened ecological communities that may be affected by development.	CWLRA, CEA	Yes	YES. Coastal Wetland areas mapped within the Resilience and Hazards SEPP have been identified for protection. There is no built development proposed by the Masterplan within the mapped Coastal Wetland and proximity areas.
<b>A.1d</b> Maintain and protect the presence of beaches, rock platforms, coastal dunes, riparian vegetation and the natural features of foreshores, including along estuaries and coastal lakes.	CWLRA, CVA, CEA	Yes	YES. The proposed Masterplan includes a land dedication zone to provide public access and maintain the natural features of the dune system and beach area along the ocean frontage of Lot 2 South.
<b>A.1e</b> Use environmental buffers and limit the number of access points and pathways to protect coastal ecosystems. In some cases, it may not be appropriate to allow public access to areas with highly sensitive ecosystems or animal populations.	CWLRA, CEA, CUA	Yes	YES. The Masterplan includes an extensive network of open space within which substantial environmental buffers are to be incorporated.

## Outcome A. Protect and enhance coastal environmental values

Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>A.1f</b> Consider if the planning proposal is needed or if development zones could be better located to minimise effects on biodiversity.	CWLRA, CEA, CUA	Yes	<i>YES. The Master Plan has provided for protection of existing biodiversity, while providing for large areas of open space, which will be revegetated with local native vegetation types. There will be a nature positive outcome as a result.</i>
<b>A.1g</b> Avoid development that may disturb, expose or drain areas of Class 1 and Class 2 acid sulfate soils.	CWLRA, CEA, CUA	Yes	<i>NO. Lot 2 North has a high probability of Acid Sulfate Soils between 1 – 3 metres below the ground surface. Future development on the site will be accompanied by an Acid Sulfate Soils Management Plan to minimise the risk of exposing, disturbing, or draining ASS.</i>
<b>A.1h</b> Consider direct and indirect effects of development, including any necessary infrastructure, on water quality, water quantity and hydrological flows of waterways and groundwater.	CEA.CUA	Yes	<i>YES. Effects of development on water quantity, flows and quality are outlined within the Stormwater Management Strategy. The strategy includes a combination of OSD and WSUD controls.</i>

## Outcome A.2 Protect coastal wetlands and littoral rainforests

<b>A.2a</b> Identify coastal wetlands and littoral rainforests, including areas that could be rehabilitated or restored in the future, and do not increase development or intensify land uses in these areas.	CWLRA	Yes	<i>YES. All vegetation on the site has been mapped and will be retained under the Masterplan and embedded in revegetated open space areas.</i>
<b>A.2b</b> Allow for the adaptive management of stormwater run-off so that the quality of water leaving the site is better than pre-development quality to lessen effects on coastal wetlands or other sensitive receiving environments.	CWLRA, CEA, CUA	Yes	<i>YES. The Stormwater Management Strategy involves the identification of the baseline (existing) values of the receiving environments and uses a neutral or beneficial approach to lessen effects on the receiving waters.</i>
<b>A.2c</b> Provide environmental buffers and riparian corridors that enable the long-term management and protection of areas of biodiversity and ecosystem integrity.	CWLRA, CVA, CEA.CUA	Yes	<i>YES. A substantial area of environmental buffers and riparian corridors will be provided and will be managed in perpetuity for cultural values and biodiversity.</i>
<b>A.2d</b> Identify and protect areas that allow for landward migration pathways for coastal wetlands to respond to climate change.	CWLRA, CEA	Yes	<i>YES. As above the open space corridors are substantial and will be able to incorporate landward migration for coastal wetlands to respond to climate change.</i>
<b>A.2e</b> Exclude land uses that affect the natural state of coastal wetlands and littoral rainforests or that will make it harder to rehabilitate these ecosystems in the future.	CWLRA	Yes	<i>YES. The coastal wetlands on site will be actively managed in perpetuity to exclude harmful land uses. Littoral rainforests will be established by replanting reclaimed sand mined land, and then will be managed as per the wetlands.</i>

## Outcome A.3 Protect marine parks and aquatic reserves

<b>A.3a</b> Avoid development and land uses that affect the environmental, economic, social and cultural values of marine parks and aquatic reserves.	CEA.CUA	Yes	<i>YES. The environmental, economic, social, and cultural values of adjacent marine parks and aquatic reserves will be protected. Some land from the site will be dedicated and will augment these areas.</i>
<b>A.3b</b> Protect the ecological health of marine parks and aquatic reserves, including providing for riparian vegetation and buffers in their catchments.	CEA, CUA	Yes	<i>YES. The Master Plan provides for protection of existing native vegetation and extensive replanting of remediated quarry land. This will help to protect the ecological health of marine parks and aquatic reserves.</i>

## Outcome B. Ensure the built environment is appropriate for the coast and local context

Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>Outcome B.1 Respond to and protect elements that make the place special</b>			
<b>B.1a</b> Integrate development within the natural topography of the site and ensure land use, building scale and height respond sympathetically to coastal landforms.	CWLRA, CVA, CEA.CUA	Yes	YES. The coastal landforms surrounding the site are generally undulating up to a height of RL 40 in the Kamay Bay National Park. The Masterplan proposes building heights up to 44m which is commensurate with the surrounding natural topography.
<b>B.1b</b> Ensure the intended form and footprint of development does not dominate coastal elements, including foreshores, public spaces and other areas of natural beauty.	CWLRA, CVA, CEA. CUA	Yes	YES. The proposed building height and floor space controls will not dominate coastal elements. The proposed urban development has been setback significantly from the frontal dune to ensure that public spaces and the foreshore is not overshadowed.
<b>B.1c</b> Incorporate adaptive, water-sensitive urban design into the development footprint to reduce run-off and manage water quality within receiving environments.	CWLRA, CEA, CUA	Yes	YES. Managing the storm water quality and quantity independently in the development precincts and the overall area is part of the Stormwater Management Strategy.
<b>B.1d</b> Ensure that lot sizes, building heights and density are appropriate for the coastal settlement, and complement the existing or desired local character, supported by place-based strategies.	CEA.CUA	Yes	YES. The proposed building heights and density controls are generally similar to contemporary development throughout the Sutherland Shire and nearby coastal environments. The proposal allows for increase density within the Town Centre which provides for a compact urban form.
<b>B.1e</b> Avoid development that would harm geological features and geoheritage.	CEA.CUA	No	N/A. Site does not contain, nor is located in close proximity to, any significant geological features or geoheritage.
<b>Outcome B.2 Ensure urban development complements coastal scenic values</b>			
<b>B.2a</b> Limit ribbon development and urban sprawl wherever possible. In certain locations, place-based strategies may support increased development density and building heights as a better response to urban growth.	CEA.CUA	Yes	YES. The Masterplan has responded to all site constraints to limit urban sprawl whilst limit adverse outcomes. Generally, building heights are increased towards the centre of each precinct to maximise proximity to services and infrastructure.
<b>B.2b</b> Use greenbelts to create, maintain and mark out separation between settlements.	CEA.CUA	Yes	YES. The Masterplan incorporates extensive ecological corridors and green belts to delineate between the distinct neighbourhoods.
<b>B.2c</b> Consider effects on scenic values and maintain publicly accessible views to significant landmarks.	CEA.CUA	Yes	YES. The Masterplan will improve the scenic value of the Kurnell Peninsula through establishing ecological habitat and tourism opportunities on the site.
<b>B.2d</b> Ensure that building heights consider the effect on views from different vantage points.	CEA.CUA	Yes	YES. The Visual Impact Assessment demonstrates that there will be a low-moderate visual impact on surrounding views.
<b>B.2e</b> Retain or create views from public spaces. Prioritise this over creating views from private property.	CEA. CUA	Yes	YES. The existing site is an active sand quarry with little visual interest. The Masterplan will generate visual interest in the site and the surrounding public domain.
<b>B.2f</b> Provide for active transport links along foreshores, including along estuaries and coastal lakes, and between settlements to increase public access and amenity.	CWLRA, CVA, CEA.CUA	Yes	YES. The Masterplan includes the provision of separated bidirectional cycleways along the Main Street and residential boulevards. The Masterplan also includes an extensive pedestrian network which transverses throughout the site. Therefore, the Masterplan will increase public access and amenity at the site.

## Outcome C. Protect and enhance the social and cultural values of the coastal zone

Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>Outcome C.1 Protect and promote heritage values</b>			
<b>C.1a</b> Ensure development does not harm heritage values or sites.	CWLRA, CVA, CEA.CUA	Yes	YES. The Masterplan has ensured that all future development will not harm heritage values or sites. The site contains the McCue Midden in the northern portion of Lot 8 which will be celebrated and enhanced through the Masterplan.
<b>C.1b</b> Work collaboratively with local Aboriginal people before and throughout the planning proposal process.	CWLRA, CVA, CEA.CUA	Yes	YES. The Masterplan has been informed by ongoing and extensive consultation with the local Aboriginal community. The consultation has informed the design of the Masterplan, and recommended opportunities for Aboriginal enterprise and the protection of Aboriginal Cultural Heritage
<b>C.1c</b> With permission and guidance from local Traditional Custodians, identify and emphasise significant features of coastal land and sea Country.	CWLRA, CVA, CEA.CUA	Yes	YES. The Connecting with Country framework accompanying the Masterplan has been informed by guidance from the local Aboriginal community. The Masterplan will embed elements of sea Country and the coastal landscape.
<b>C.1d</b> With permission and guidance from local Traditional Custodians, identify and protect sacred and significant areas through the appropriate siting of development.	CWLRA, CVA, CEA.CUA	Yes	YES. Through the ACHAR process, the extent of the McCue Midden was identified. The McCue Midden will be celebrated by the Masterplan through establishing opportunities for interpretation and education about Aboriginal culture.
<b>C.1e</b> Ensure land use, building type, scale and height respond to heritage items and areas.	CEA.CUA	Yes	YES. The site adjoins a number of state and local heritage items which are not anticipated to be impacted by the Masterplan. The impact of future built form on the heritage values of surrounding areas will be assessed during any subsequent DA.
<b>Outcome C.2 Provide public access to significant coastal assets</b>			
<b>C.2a</b> Protect and, where practical, improve, public amenity, access to and use of beaches, foreshores, rock platforms, geoheritage sites and headlands, unless you must restrict access for public safety or for environmental or cultural protection. In doing so, consider both current and projected future coastal hazards.	CVA, CEA	Yes	YES. Public amenity and access will be enhanced by the dedication of land to Council to maintain the dune system and associated beach accessways along the ocean frontage of Lot 2 South. The extent of the land dedication area considers projected future coastal hazards to 2120.
<b>C.2b</b> Identify opportunities to maintain and improve existing public access to beaches, foreshores, coastal waters and coastal lakes that support active and passive recreation activities, where this does not interfere with existing coastal industries.	CWLRA, CVA, CEA.CUA	Yes	YES. Public access will be maintained and enhanced by the dedication of land to Council to maintain the dune system and associated beach accessways along the ocean frontage of Lot 2 South.
<b>C.2c</b> Consolidate access points and consider alternative access to protect sacred and significant Aboriginal cultural areas.	CWLRA, CVA, CEA.CUA	Yes	YES. The Masterplan has been designed to protect and celebrate the McCue Midden. The Masterplan has provided opportunities for the interpretation and education about Aboriginal culture.
<b>C.2d</b> Maintain and improve foreshore access and connections to existing or proposed networks of public open spaces. This includes waterways, riparian areas, bushland and parks for active and passive recreation.	CWLRA, CVA, CEA.CUA	Yes	YES. The Masterplan will improve public access to the foreshore area through the dedication of land in the frontal dune area into Council ownership. The Masterplan will establish the Cultural Trail and the ecological corridors which connect Quibray Bay with Boat Harbour and improve foreshore access.

<p><b>C.2e</b> Consider opportunities to protect and improve habitat connectivity through settlements, such as those described in the <i>Greener Places Design Guide</i>.</p>	<p>CWLRA, CEA, CUA</p>	<p>Yes</p>	<p><i>YES. The Landscape and Open Space Strategy provides for extensive use of native vegetation. This will be established across the open space network, and there will also be plantings beside the built environment which create habitat connectivity through the built landscape.</i></p>
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## Outcome C. Protect and enhance the social and cultural values of the coastal zone

Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>C.2f</b> Avoid development on coastal dunes and foreshore reserves unless it is for essential public purposes, such as surf life-saving club buildings. Any building or structure located on dunes must be of lightweight construction and relocatable.	CVA, CEA	Yes	<i>YES. The dune system along the ocean frontage of Lot 2 South is proposed be dedicated land for Council to manage. No development is proposed within the land dedication zone. SLSC buildings are proposed at a location that is landward of the proposed land dedication zone, and is subject to consultation with Council.</i>
<b>C.2g</b> Define the boundaries of development sites with a public edge-for example, a pedestrian pathway or public laneway.	CEA, CUA	Yes	<i>YES. The Masterplan clearly delineates the boundary between development sites and open space through using perimeter road and pedestrian pathways.</i>
<b>C.2h</b> Prevent the privatisation of coastal open space by ensuring development next to foreshores is set back, maintains public access and accessibility, and provides links and connections to other public accessways.	CEA, CUA	Yes	<i>YES. The proposed Masterplan includes a land dedication zone to provide public access and maintain the natural features of the dune system and beach area along the ocean frontage of Lot 2 South.</i>
<b>Outcome C.3 Protect public amenity</b>			
<b>C.3a</b> Avoid development that will overshadow the beach, foreshore or public domain. Apply the standard that there must be no overshadowing before 4 pm (midwinter) and 7 pm (Eastern Daylight Saving Time).	CEA, CUA	Yes	<i>YES. The shadow study within the Urban Design Report confirms that no built form will overshadow the beach or foreshore area at any point of the day.</i>
<b>C.3b</b> Protect the amenity of public spaces from buildings, structures or land uses that may be visually and/or acoustically intrusive or create wind funnels.	CEA, CUA	Yes	<i>YES. Detailed design at the development application stage would be required to assess visual, acoustic and wind impacts. However, the site is not located in proximity to public spaces that are likely to be adversely impacted.</i>

Outcome D. Support sustainable coastal economies			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>Outcome D.1 Support sustainable industries and recreational activities that depend on the coast</b>			
<b>D.1a</b> Ensure that development will not harm sustainable coastal industries needing waterfront access, or recreational use of the coastal environment.	CEA. CUA	Yes	<i>YES. The proposed Masterplan includes a land dedication zone to provide public access for recreational use of the coastal environment, and to maintain the natural features of the dune system and beach area along the ocean frontage of Lot 2 South.</i>
<b>D.1b</b> Protect and improve essential facilities such as access ramps and jetties for sustainable coastal industries needing waterfront access.	CEA. CUA	No	<i>N/A. There are no essential facilities providing waterfront access to sustainable coastal industries within the site of the proposed Masterplan.</i>
<b>D.1c</b> Ensure access ramps, jetties, pontoons, groynes and other structures do not impede navigation on the water or harm coastal landforms or impair processes such as surf breaks.	CWLRA. CVA. CEA. CUA	No	<i>N/A. There are no access ramps, jetties, pontoons or other coastal structures within the existing site or proposed within the Masterplan.</i>
<b>D.1d</b> Ensure that the proposal considers how development in a waterway may affect the land.	CEA. CUA	No	<i>N/A. There is no development proposed in waterway areas.</i>
<b>Outcome D.2 Promote green infrastructure</b>			
<b>D.2a</b> Do not allow development that is likely to significantly reduce connectivity of existing green infrastructure.	CEA. CUA	Yes	<i>YES. The Masterplan will protect and enhance the biodiversity value and green infrastructure on the site. The masterplan will establish ecological corridors to promote the movement of flora and fauna and improve connectivity between adjoining sites.</i>
<b>D.2b</b> Provide for diverse green infrastructure that can support the changing needs of current and future communities, and provide tourism and recreational opportunities.	CEA, CUA	Yes	<i>YES. The Masterplan includes flexibly designed spaces which will respond to the contemporary needs of the community. Significant recreational space and tourism infrastructure is proposed to celebrate the sites coastal environment.</i>



Outcome E. Respond to coastal hazards			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>Outcome E.1 Respond to coastal processes</b>			
<b>E.1a</b> Planning proposals that affect land within a coastal hazard and risk area must not alter coastal processes in a way that harms the natural environment or other land.	CWLRA, CVA, CEA, CUA	Yes	YES. The proposed Masterplan includes a land dedication zone along the ocean frontage of Lot 2 South. This area is subject to future coastal hazard but is proposed to be managed Council with the objective to maintain the natural features of the dune system and beach area. As such, the existing coastal processes would not be altered.
<b>E.1b</b> Exclude development in areas affected by a current or projected future coastal hazard that is likely to increase the risk of coastal hazards on that land or other land.	CWLRA, CVA, CEA.CUA	Yes	YES. The proposed Masterplan includes a land dedication zone along the ocean frontage of Lot 2 South. This area is subject to future coastal hazard but is proposed to be managed as public land by Council and excluded from development.
<b>E.1c</b> Locate or consolidate development in areas with little or no exposure to current and projected future coastal hazards, to ensure public safety and prevent risks to life.	CWLRA, CVA, CEA.CUA	Yes	YES. The Masterplan assessment concludes that the proposed development is sited in areas that would not be subjected to an unacceptable risk of coastal hazards to 2120.
<b>E.1d</b> Do not increase development potential or intensify land uses in a coastal hazard or risk area.	CWLRA, CVA, CEA.CUA	Yes	YES. Refer response to E.1b above.
<b>Outcome E.2 Account for natural hazard risks</b>			
<b>E.2a</b> Identify areas on and near the proposal that are affected by current or projected future coastal hazards. Ensure that the proposal is compatible with any identified threat or risk.	CWLRA, CVA, CEA.CUA	Yes	YES. The Coastal Management Plan identifies the extent of coastal hazards. The proposed Masterplan development is sited in areas that would not be subjected to an unacceptable risk of coastal hazards to 2120.
<b>E.2b</b> Account for potential interaction between coastal hazards and other current and future natural hazards. This includes flooding, bushfires, landslip, heatwaves, severe storms, east coast lows and cyclones. Refer to the <i>Strategic Guide to Planning for Natural Hazards</i> .	CWLRA, CVA, CEA.CUA	Yes	YES. Evacuation routes (e.g. roads) that may be required for other natural hazards such as flooding or bushfires are not affected by coastal hazards over the life of the development.
<b>E.2c</b> Manage natural hazard risk within the development site. Avoid using public space or adjoining land to lessen risk.	CWLRA, CVA, CEA.CUA	Yes	YES. The stormwater and flooding strategies have been designed to ensure that natural hazards will be managed within the site without utilising adjoining land to reduce the risk factors.  Bushfire protection measures can be provided wholly within the site and are not encumbrance on adjoining land.
<b>Outcome E.3 Account for climate change</b>			
<b>E.3a</b> Demonstrate that the proposal applies a 100-year planning horizon for the full range of climate change projections for coastal hazards. This approach recognises that sea level is projected to continue to rise for centuries because of climate change.	CWLRA, CVA, CEA.CUA	Yes	YES. The Coastal Management Plan identifies the extent of coastal hazards, which include allowance for sea level rise projections associated with climate change. The proposed Masterplan development is sited in areas that would not be subjected to an unacceptable risk of coastal hazards to 2120.
<b>E.3b</b> Consider how climate change could affect the risk profile of existing natural hazards and create new vulnerabilities and exposure for the proposal in the future.	CWLRA, CVA, CEA.CUA	Yes	YES. Refer response to E.3a above.

Outcome E. Respond to coastal hazards			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
<b>Outcome E.4 Provide sustainable defences to coastal hazards</b>			
<b>E.4a</b> Reduce exposure to coastal hazards by protecting, restoring or improving natural defences. This includes coastal dunes, vegetation, coastal floodplains and coastal wetlands, where suitable.	CWLRA, CVA, CEA. CUA	Yes	YES. The proposed Masterplan includes a land dedication zone to facilitate maintenance of the existing natural dune system along the ocean frontage of Lot 2 South.
<b>E.4b</b> If natural defences are not possible, reduce exposure to coastal hazards without significantly degrading:  <ul style="list-style-type: none"> <li><b>biological diversity and ecosystem integrity</b></li> <li><b>ecological, biophysical, geological and geomorphological coastal processes</b></li> <li><b>beach and foreshore amenity, or the social and cultural value of these areas</b></li> <li><b>public safety and access to, or use of, beaches or headlands.</b></li> </ul>	CWLRA, CVA, CEA.CUA	No	N/A. Natural defences are proposed, refer response to E.4a above. The proposed Masterplan development is sited in areas that would not be subjected to an unacceptable risk of coastal hazards to 2120.
<b>Outcome E.5 Protect essential infrastructure</b>			
<b>E.5a</b> Locate and design essential infrastructure to reduce vulnerability to current and projected future coastal hazards. Consider the effects of climate change over at least a 100-year planning horizon.	CWLRA. CVA. CEA.CUA	Yes	YES. The Masterplan assessment concludes that the proposed development is sited in areas that would not be subjected to an unacceptable risk of coastal hazards to 2120.
<b>E.5b</b> Where exposure to coastal hazards cannot be avoided, prepare adaptation plans for essential service infrastructure. These plans should be consistent with any applicable coastal management program.	CWLRA, CVA, CEA. CUA	No	N/A. Refer response to E.5a above.
<b>E.5c</b> Consult local Aboriginal land management experts and emergency management agencies on how to strategically locate access routes and other essential infrastructure.	CWLRA. CVA. CEA. CUA		YES. The Proponent has engaged and consulted with a local Aboriginal land management expert, the RFS and the SES to determine potential strategies for the management of bushfire hazards.  The Coastal Management Plan confirms that the Masterplan would not result in unacceptable risk of coastal hazards to 2120.
<b>Outcome E.6 Change land uses to manage legacy issues and avoid creating new ones</b>			
<b>E.6a</b> Ensure the proposal will not require coastal management interventions to remain viable over its expected lifespan.	CWLRA, CVA, CEA. CUA	Yes	YES. The Masterplan assessment concludes that the proposed development is sited in areas that would not be subjected to an unacceptable risk of coastal hazards to 2120.
<b>E.6b</b> Consider the potential legacy effects of the proposal and if the proposed land uses or development will create a social, environmental, economic or cultural burden for future generations.	CWLRA, CVA, CEA. CUA	Yes	YES. The Masterplan will generate significant positive social, environmental, cultural and economic outcomes and demonstrates intergenerational equity.

<p><b>E.Gc</b> Consider if the proposed change of land use could remove redundant legacy infrastructure or reduce existing legacy effects.</p>	<p>CWLRA, CVA, CEA.CUA</p>	<p>Yes</p>	<p><i>YES. The Masterplan will remove the current sand quarry operations at the site, and provide significant opportunity for social, environmental , cultural and economic benefits.</i></p>
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# NSW Coastal Design Guidelines 2023



## Appendix 2: Assessment checklist for urban design

Hierarchy of coastal management areas:

1. CWLRA = coastal wetlands and littoral rainforests area
2. CVA = coastal vulnerability area
3. CEA = coastal environment area
4. CUA = coastal use area

**Note:** Requirements relating to coastal hazards must be considered for all coastal hazard and risk areas, regardless of which relevant coastal management area(s) these fall within. 'Coastal hazard and risk areas' mean any mapped coastal vulnerability areas and/or areas affected by (or projected to be affected by) coastal hazards that have been identified in a state environmental planning policy, local environmental plan, development control plan, coastal management program, coastal hazard policy or study adopted by council.

4.2 Design guidance for the natural environment			
Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.2.1 Base considerations on a hierarchy of landform, then landscape, then built form</b>			
<b>4.2.1a</b> Site and orientate structures to reinforce natural coastal landform.	CWLRA, CVA, CEA, CUA		
<b>4.2.1b</b> Account for dynamic coastal processes and the changing nature of the landform under projected climate change scenarios and effects.	CWLRA, CVA, CUA, CEA		
<b>4.2.1c</b> Integrate public spaces and infrastructure with coastal landforms and systems.	CEA, CUA		
<b>4.2.1d</b> Create block and lot patterns responsive to topography, water flow, natural coastal assets and cultural landscapes.	CEA, CUA		
<b>4.2.1e</b> Maintain the ecological integrity of the foreshore and headlands, and retain public views of these coastal landscapes. Prioritise this over creating views and outlooks from private properties.	CVA, CEA, CUA		
<b>4.2.2 Protect and enhance water quality, hydrological systems and coastal processes</b>			
<b>4.2.2a</b> Support and incorporate water-sensitive urban design approaches.	CWLRA, CVA, CEA, CUA		
<b>4.2.2b</b> Identify and protect sensitive downstream environments such as marine parks, aquatic reserves, coastal wetlands, coastal lakes and national parks from adverse effects on water quality and quantity, and hydrological flows.	CWLRA, CVA, CEA, CUA		

## 4.2 Design guidance for the natural environment

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.2.2c</b> Consider opportunities to re-naturalise and engineer hydrology, hydraulics and flow regimes to support natural coastal and floodplain processes (for example, floodplain inundation, saltmarsh inundation, longshore drift).	CWLRA, CVA, CEA, CUA		
<b>4.2.2d</b> Remediate or remove legacy infrastructure that may be harming coastal environments and waterways.	CWLRA, CVA, CEA, CUA		
<b>4.2.3 Identify, protect and enhance sensitive coastal ecosystems and threatened ecological communities</b>			
<b>4.2.3a</b> Minimise disturbance to sensitive coastal ecosystems by grouping structures and providing common access points (such as walkways). Avoid vehicular access within sensitive coastal ecosystems.	CWLRA, CVA, CEA, CUA		
<b>4.2.3b</b> Avoid and minimise effects on areas of high biodiversity value.	CWLRA, CVA, CEA, CUA		
<b>4.2.3c</b> Restore, protect and improve sensitive coastal ecosystems –such as intertidal foreshores, coastal wetlands, littoral rainforests and riparian habitats –and increase connectivity between remnant areas where possible.	CWLRA, CVA, CEA, CUA		
<b>4.2.3d</b> Restore the natural characteristics of foreshore areas wherever possible.	CVA, CEA		
<b>4.2.3e</b> Provide vegetated setbacks to protect coastal ecosystems.	CWLRA, CVA, CEA, CUA		
<b>4.2.3f</b> Identify and plan for landward migration pathways for coastal wetlands to respond to climate change.	CWLRA, CEA		
<b>4.2.3g</b> Consider connectivity between the land and waterways holistically, including the effects of the development on ecological connectivity and ecosystem functions.	CWLRA, CEA		
<b>4.2.3h</b> Adopt lighting design that reduces light pollution to minimise effects on wildlife –refer to the <i>National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds</i> .	CWLRA, CVA, CEA, CUA		
<b>4.2.3i</b> Adopt acoustic design that minimises effects of construction and operational noise on wildlife.	CWLRA, CVA, CEA, CUA		
<b>4.2.3j</b> Naturalise drainage patterns and channels to manage overland flow, increase civic amenity, improve ecological connectivity and restore ecosystems.	CWLRA, CEA, CUA		

## 4.2 Design guidance for the natural environment

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.2.4 Ensure that the natural coastal environment is integrated into built coastal environments</b>			
<b>4.2.4a</b> Maintain the presence of beaches, dune systems, undeveloped headlands and other natural features of foreshores.	CVA, CEA		
<b>4.2.4b</b> Encourage filtered views throughout the built environment to reinforce the presence of coastal landforms.	CEA, CUA		
<b>4.2.4c</b> Use landscaping and planting of locally endemic species to connect habitat, water systems and settlements.	CWLRA, CVA, CEA, CUA		
<b>4.2.4d</b> Use planting of locally endemic species and landscape design to screen built structures that may be viewed from the foreshore or coastal waterways.	CEA, CUA		
<b>4.2.4e</b> Mitigate urban heat island and climate change effects in built coastal environments by preserving and expanding tree canopy cover, riparian vegetation, wildlife corridors and habitat.	CWLRA, CEA, CUA		
<b>4.2.5 Use nature-based solutions as the first option to address environmental challenges, avoiding hard engineering solutions where possible</b>			
<b>4.2.5a</b> Naturalise riparian corridors to support coastal processes and mitigate the effect of weather events, including on coastal floodplains.	CWLRA, CVA, CEA, CUA		
<b>4.2.5b</b> Site infrastructure and structures (for example, foreshore facilities) to minimise environmental impact and enable natural tidal flows, propagation of marine life and longshore drift.	CWLRA, CVA, CEA, CUA		
<b>4.2.5c</b> Encourage locally endemic planting and control weeds to promote and restore the functions and resilience of coastal dune systems.	CVA, CEA		
<b>4.2.5d</b> Improve the capacity of soils to absorb and filter water (for example, encourage vegetated swales and pervious surfaces).	CWLRA, CEA, CUA		
<b>4.2.5e</b> Avoid reclaiming land or constructing hard barriers. Instead, create re-naturalised zones to allow adaptation to coastal processes.	CWLRA, CVA, CEA, CUA		
<b>4.2.5f</b> When natural solutions are not possible, consider using techniques to reduce the environmental effect of engineering solutions, such as those described in the <i>Environmentally Friendly Seawall Guideline</i> .	CWLRA, CVA, CEA, CUA		

## 4.3 Design guidance for the built environment

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.3.1 Use built form to reinforce the beauty and character of coastal places</b>			
<b>4.3.1a</b> Use building type, scale, height and aspect to ensure development integrates with, and does not dominate, coastal landforms and other elements of the coastal environment (for example, keep building mass below tree canopy and ridge lines).	CWLRA, CVA, CEA, CUA		
<b>4.3.1b</b> Orient streets and structures towards significant features of the coast and to capture sea breezes for passive cooling.	CUA		
<b>4.3.1c</b> Protect and enhance view corridors to and from the foreshore, water bodies and natural features.	CEA, CUA		
<b>4.3.1d</b> Locate and design development to limit the visual intrusion of buildings when viewed from public spaces, and the overshadowing of beaches, foreshores and the public domain before 4 pm (midwinter) and 7 pm (Eastern Daylight Saving Time)	CEA, CUA		
<b>4.3.1e</b> Create built form that responds to, connects with and celebrates the cultural heritage of coastal Aboriginal peoples.	CWLRA, CVA, CEA, CUA		
<b>4.3.1f</b> Use materials that are resilient, sustainable and that weather well in coastal environments.	CWLRA, CVA, CEA, CUA		
<b>4.3.1g</b> Respond to the natural form of coastal landscapes and minimise cut and fill wherever possible.	CEA, CUA		
<b>4.3.1h</b> Avoid materials that are highly reflective. Use materials, finishes and colours that complement the coastal landscape.	CEA, CUA		
<b>4.3.1i</b> Provide green infrastructure to meet local needs for green space and tree canopy, in keeping with the principles of the <i>Greener Places Design Guide</i> .	CEA, CUA		

## 4.3 Design guidance for the built environment

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.3.2 Ensure connectivity through and between coastal places</b>			
<b>4.3.2a</b> Create continuous coastal connectivity (for example, by using natural pathways and boardwalks).	CWLRA, CVA, CEA, CUA		
<b>4.3.2b</b> Ensure local connectivity networks link transport nodes, settlement centres and significant coastal features.	CWLRA, CEA, CUA		
<b>4.3.2c</b> Design walkable access ways and road networks in response to significant coastal landforms and foreshore areas.	CWLRA, CVA, CEA		
<b>4.3.2d</b> Use open spaces to link significant natural, cultural and heritage features (for example, coastal walks, songlines, heritage trails).	CWLRA, CVA, CEA, CUA		
<b>4.3.3 Ensure civic amenity and appropriate access to the coastal environment</b>			
<b>4.3.3a</b> Prioritise walking (including all forms of equitable access), cycling and public transport over movement and parking for private vehicles along coastal foreshores.	CWLRA, CVA, CEA, CUA		
<b>4.3.3b</b> Provide clear and limited entry points to coastal environments to protect coastal vegetation, sensitive coastal ecosystems and important habitat, such as for migratory species.	CWLRA, CVA, CEA		
<b>4.3.3c</b> Restrict vehicular entries and encourage non-vehicular access to, and within, the coastal environment.	CWLRA, CVA, CEA, CUA		
<b>4.3.3d</b> Minimise and elevate roads, crossings and walkways over waterways and water bodies.	CWLRA, CVA, CEA, CUA		
<b>4.3.3e</b> In high-use areas such as foreshores, if space allows, create distinct pedestrian walks and cycle paths, separated from busy roads. In areas with more limited space, separate roads from combined pedestrian and cycle paths.	CWLRA, CVA, CEA, CUA		
<b>4.3.3f</b> Protect the character of town centre and foreshore access roads by ensuring development fronting onto these roads is consistent with the existing or desired local character.	CEA, CUA		
<b>4.3.3g</b> Where vehicular traffic ends, ensure pedestrian and cycle movement can continue to provide access to the coastal environment.	CWLRA, CVA, CEA, CUA		
<b>4.3.3h</b> With permission and guidance from local Traditional Custodians, protect sacred and significant areas through siting and consolidating access points appropriately.	CWLRA, CVA, CEA, CUA		



## 4.3 Design guidance for the built environment

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.3.4 Create spatial frameworks that are resilient to coastal hazards</b>			
<b>4.3.4a</b> Locate development, essential services and infrastructure away from coastal hazard and risk areas wherever possible.	CVA, CEA, CUA		
<b>4.3.4b</b> Accommodation, services and facilities for vulnerable communities must be located landward of coastal hazard and risk areas.	CVA, CEA, CUA		
<b>4.3.4c</b> Ensure that the location and design of development reduces exposure to risks from coastal hazards over the life of the development.	CVA, CEA, CUA		
<b>4.3.4d</b> Ensure service and infrastructure design considers risk to life, evacuation of public property and safety from coastal hazards, without relying on emergency responses, particularly during periods of peak demand.	CVA, CEA, CUA		
<b>4.3.4e</b> If development to reduce exposure to coastal hazards will increase erosion of the beach and/or adjacent land, provide for the restoration of the beach and/or adjacent land.	CVA, CEA, CUA		
<b>4.3.4f</b> Allow for temporary, seasonal and low-impact uses in coastal hazard and risk areas, maintaining the land in public ownership.	CVA, CEA, CUA		
<b>4.3.4g</b> Prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency.	CVA, CEA, CUA		
<b>4.3.5 If the proposal will locate structures in areas affected by coastal and other natural hazards, ensure that they can be adapted, relocated and transformed.</b>			
<b>4.3.5a</b> Locate development appropriately in relation to projected hazard timelines. Refer to applicable coastal management programs, policies and hazard studies adopted by council.	CVA, CEA, CUA		
<b>4.3.5b</b> Development must not increase the risk or effect of coastal hazards, either by intensifying land use or by altering coastal processes in a way that harms the natural environment or other land.	CVA, CEA, CUA		
<b>4.3.5c</b> In areas at immediate or short-term risk of coastal hazard impact, retrofit, upgrade, relocate or remove structures to protect life and property, and to improve resilience to climate change.	CVA, CEA, CUA		
<b>4.3.5d</b> Encourage design of buildings and structures that are modular, detachable and relocatable.	CVA, CEA, CUA		

## 4.3 Design guidance for the built environment

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.3.5e</b> In coastal hazard and risk areas, ensure that buildings, structures and works are engineered to withstand or accommodate coastal hazards for their design life.	CVA, CEA, CUA		
<b>4.3.5f</b> Ensure that infrastructure design and construction use appropriate climate-resilient materials and treatments, such as those described in the <i>Institute of Public Works Engineering Australia Practice Notes 12.1 and 12.2</i> (as modified from time to time).	CVA, CEA, CUA		

## 4.4.1 Encourage sustainable, productive use of the natural coastal environment

<b>4.4.1a</b> Maintain and improve, where possible, sustainable access for recreational and commercial fishing, including boat maintenance facilities.	CEA, CUA		
<b>4.4.1b</b> Support adaptive re-use of redundant maritime or industrial infrastructure.	CEA, CUA		
<b>4.4.1c</b> Support the changing demographics and economics of coastal areas by providing diverse commercial and retail spaces.	CUA		
<b>4.4.1d</b> Provide tourism and education opportunities associated with iconic local industries, such as aquaculture.	CUA		
<b>4.4.1e</b> Incorporate local environmental and cultural skills into built outcomes (for example, murals by local artists or a living breakwater propagated with oysters from local farmers).	CUA		
<b>4.4.1f</b> Deliver social infrastructure (such as public toilets and litter bins) to support the sustainable use of and visitation to natural assets.	CEA, CUA		
<b>4.4.1g</b> Provide all-weather access to amenities such as boat ramps, watercraft storage racks, showers and changing facilities to promote year-round visitation.	CEA, CUA		
<b>4.4.1h</b> Use environmental remediation as a local attraction – for example, by providing boardwalks across remediated land converted into coastal wetlands.	CWLRA, CEA, CUA		

## 4.4 Design guidance for the social and economic context

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.4.2 Ensure coastal infrastructure delivers civic space and community assets</b>			
<b>4.4.2a</b> Maintain public ownership of foreshores and reserves.	CWLRA, CVA, CEA		
<b>4.4.2b</b> Provide, improve and maintain coastal infrastructure to enable access (for example, upgrade paths along breakwaters and estuary foreshores to enable safe access for all).	CWLRA, CVA, CEA, CUA		
<b>4.4.2c</b> Provide social amenity and educational engagement opportunities in re-naturalised coastal spaces (for example, engineered benched seating merging into natural rock platform or tidal pools for marine habitat).	CEA, CUA		
<b>4.4.2d</b> Create high-quality urban amenity and recreational infrastructure (for example, showers and changing facilities, bicycle and surf craft racks, and seating along coastal walkways).	CWLRA, CVA, CEA, CUA		
<b>4.4.2e</b> Provide management facilities to support and enable community stewardship of coastal places (for example, equipment storage for surf lifesaving, bushcare or community garden groups).	CEA, CUA		
<b>4.4.2f</b> Promote adaptive reuse and integration of heritage items into development where appropriate.	CUA		
<b>4.4.3 Acknowledge and protect coastal Aboriginal peoples' spiritual, social, cultural, customary and economic connection to coastal Country</b>			
<b>4.4.3a</b> Enable Traditional Custodians to carry out traditional Aboriginal land management practices within coastal land and sea Country.	CWLRA, CVA, CEA, CUA		
<b>4.4.3b</b> With permission and guidance from Traditional Custodians, help protect coastal places with cultural significance for local Aboriginal communities (for example, scar trees, middens, tree groves, rock carvings, headlands and beaches).	CWLRA, CVA, CEA, CUA		
<b>4.4.3c</b> Where appropriate, work with Traditional Custodians to identify and emphasise culturally significant coastal places in a way that celebrates and supports ongoing cultural connection and practice.	CWLRA, CVA, CEA, CUA		
<b>4.4.3d</b> Where appropriate, introduce interpretive elements into the public realm to engage and educate the community about local Aboriginal culture and heritage values.	CWLRA, CVA, CEA, CUA		
<b>4.4.3e</b> Ensure built form responds to Country and the Aboriginal cultural landscape.	CWLRA, CVA, CEA, CUA		

## 4.4 Design guidance for the social and economic context

Design objective	Relevant coastal management area(s)	Applicable to design (Y/N)	The design is consistent with guidelines (Y/N) If 'No', justify this
<b>4.4.4 Support community adaptation to, and management of, current and future coastal hazards</b>			
<b>4.4.4a</b> Development in coastal hazard and risk areas must be consistent with any relevant certified coastal management program. Coastal management programs include adaptation strategies that consider a range of options – from hazard avoidance, accommodation and protection, to managed retreat and loss acceptance.	CWLRA, CVA, CEA, CUA		
<b>4.4.4b</b> For existing structures within coastal hazard and risk areas and foreshore setback areas, develop plans for adaptive management that minimise the effect on natural and cultural values, as well as expense to the community (current and future).	CWLRA, CVA, CEA, CUA		
<b>4.4.4c</b> Support greater public awareness, education and understanding of coastal processes and management actions.	CWLRA, CVA, CEA, CUA		
<b>4.4.4d</b> Include community consultation in the design development process, establishing clear opportunities for continued engagement.	CWLRA, CVA, CEA, CUA		