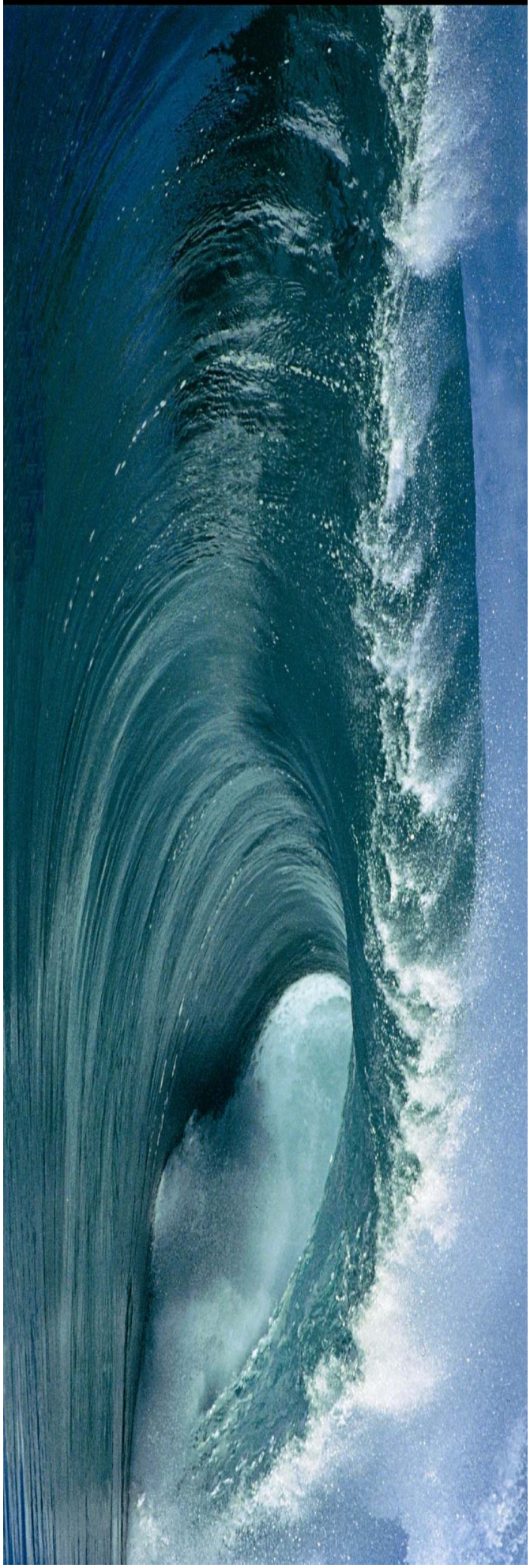

COASTAL ENGINEERING SOLUTIONS

Barlings beach
New South Wales

COASTAL HAZARD ASSESSMENT UPDATE 2009

Prepared for
President Property Group Pty Ltd

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Section 1

INTRODUCTION

In May 2005 Coastal Engineering Solutions (CES) in association with Coomes Consulting prepared a report "Barlings Beach Coastal Hazard Assessment" for Barlings Beach Community Pty Ltd. Estimates of beach width loss in relation to sea level rise were based on IPCC (2001).

In October 2009 the Department of Environment, Climate Change and Water, NSW published the "NSW Sea Level Rise Policy Statement" and a technical note "Derivation of the NSW Government's sea level rise planning benchmarks". In addition the CSIRO has produced a publication by McInnes K L, Abbs D J, O'Farrell S P, Macadam I, O'Grady J, and Ranasinghe R entitled "Projected Changes in Climatological Forcing for Coastal Erosion in NSW" for the NSW Department of Environment and Climate Change – August 2007.

The 2005 "Barlings Beach Coastal Hazard Assessment" derived a 100 year Risk Level line as depicted in Figure 1.1 and the setback values shown in Table 1.1.

Impact Line Parameter	**West Barlings Beach**		**East Barlings Beach**	
	50yr planning period	100yr planning period	50yr planning period	100yr planning period
Storm Bite	11 metres	18 metres	4 metres	6.5 metres
Long-term erosion	7.5 metres	15 metres	5 metres	10 metres
Sea level rise	10 metres	25 metres	10 metres	25 metres
Total setback distance	**28.5 metres**	**58 metres**	**19 metres**	**41.5 metres**

Table 1.1 Setback for Impact Lines

This report ***Coastal Hazard Assessment Update*** has been prepared to provide an updated erosion risk information for Barlings beach taking into account the information provided in the three government authorised documents referenced above.

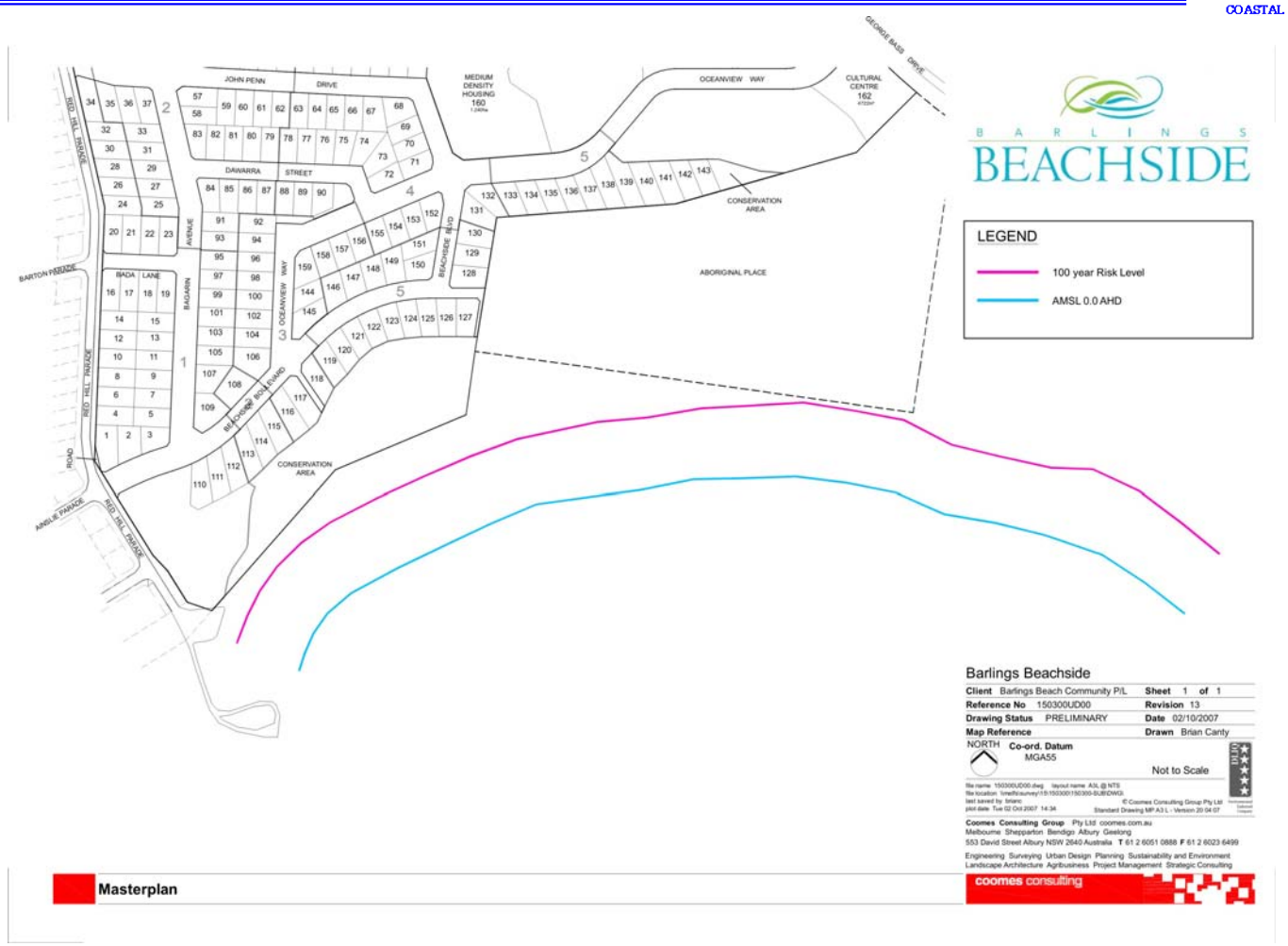

Figure 1.1: Barlings Beach 100 year Risk Setback Line (2005)

Section 2

ASSESSMENT PARAMETERS

2.1 Sea Level Rise

The NSW Sea Level Rise Policy Statement (2009) has revised the estimates for sea level rise due to global warming upwards as follows for the NSW coast:

- For 2050 the adopted value has increased from 0.2 metres to 0.4 metres;
- For the 2100 the adopted value has increased from 0.48 metres to 0.9 metres.

2.2 Storm Surge

CSIRO through McInnes et al (2007) do not predict any increase in the estimated storm surge values through to 2070, the horizon date for that study. In fact they predict a very small decrease. Consequently it is assumed that the storm surge values remain constant and for the 50 year return period are 0.68m for the southern NSW coast as per McInees et al (2007).

2.3 Coastal Processes

2.3.1 Wave Height

McInnes et al (2007) consider swell (longer period waves) and storm wave events separately. They conclude that there will be little change in the swell wave height characteristics but that during storms the significant wave height in deep water off the coast may increase by 32% for the southern NSW coast.

2.3.2 Wave Direction

The stable orientation of a shoreline is determined by the mean wave direction arriving at the coastline. McInnes et al (2007) predict that the average wave direction will shift anti-clockwise by not more than 2.1° by 2030 and clockwise by not more than 3.8° by 2070 at Batemans Bay which is representative of the southern NSW coast.

Section 3

ASSESSMENT OF COASTAL HAZARD SET-BACK

3.1 Beach Width Reduction due to Sea Level Rise

The potential reduction in beach width due to change in sea level can be estimated by the Bruun formula (Bruun, 1962). This was used in the 2005 estimates for required hazard set-back component sea level rise. For the 50 year planning period (nominally to 2050) the setback requirement is now 20 metres because the sea level rise estimate has increased from 0.2 to 0.4 metres. For the 100 year planning period (nominally to 2100) the setback the setback requirement is now 45 metres because the sea level rise estimate has increased from 0.48 to 0.9 metres.

3.2 Storm Bite Erosion Potential due to Increased Offshore Storm Waves

For the 2005 estimate the magnitude of the storm bite estimate was based on the historical aerial photo interpretation data for which it was assumed that there was no change in storminess (wave conditions and storm surge) over the period over which aerial photographs were available. McInnes et al (2007) suggest that whilst there will be no increase in the magnitude of the storm tide associated with climate change to 2070, there may be an increase in the offshore significant wave height for severe storms and that the significant wave height may increase by 32% and the wave period for the storm by 10%.

The model SBEACH has been used to estimate the likely change in storm bite resulting from this increased offshore wave height. The additional potential storm bite above that of the 2005 estimate is 3 metres for 2050 and 8 metres for 2100.

3.3 Affect of Changes in Mean Wave Direction

Whilst McInnes et al (2007) predict that the average wave direction will shift anti-clockwise by not more than 2.1° by 2030 and clockwise by not more than 3.8° by 2070, these predictions apply to deep water off the NSW southern coast. By the time these waves are refracted and diffracted into Barlings Beach the expected extent of directional shift is expected to have a negligible impact on beach orientation.

3.4 Summary

The revised 2009 setback values are shown in Table 3.1.

Impact Line Parameter	West Barlings Beach		East Barlings Beach	
	2050yr planning period	2100yr planning period	2050yr planning period	2100yr planning period
Storm Bite	14 metres	26 metres	7 metres	14.5 metres
Long-term erosion	7.5 metres	15 metres	5 metres	10 metres
Sea level rise	20 metres	45 metres	20 metres	45 metres
Total setback distance (2009)	**41.5 metres**	**86 metres**	**32 metres**	**69.5 metres**
Total setback distance (2005)	**28.5 metres**	**58 metres**	**19 metres**	**41.5 metres**

Table 3.1 Updated (2009) Setback for Impact Lines

For the 2100 planning period the impact line has moved up to 28 metres landward in comparison to the 2005 estimates which were based on IPCC (2001). If sea level rise follows the current predictions adopted by the NSW government, then referring to Figure 1.1 there may be some land loss from the "Conservation Area" and from the "Aboriginal Place". The properties at the western end of Barlings Beach that are closest to the sea would still have a buffer of the order of 50 metres from the edge of the dune.

Section 6

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