

5 Marsden Cove

Description and geomorphology

Marsden Cove is located at the entrance to Whangarei Harbour, approximately 16 km south of Whangarei.

The north east facing Marsden Cove shoreline is approximately 1 km long and is situated between the eastern extent of the One Tree Point site and Blacksmith Creek.

Marsden Cove consists of a sandy beach shoreline that is split by a marina channel and associated groynes. The sandy beach is approximately 20 m wide and is fronted by an intertidal flat that extends approximately 500 m out to the main harbour channel. Marsden Cove is relatively sheltered from incident wave energy. The predominant sediment transport direction is toward the east with sand building up at this end of the site. A small erosion scarp is evident along the western half of the shoreline.

The natural backshore topography at Marsden Cove is relatively low lying (RL 1.5 - 2 m) and includes existing residential development.

Local considerations

Marsden Cove has been largely modified since the last coastal hazard study. The main modifications to Marsden Bay include:

- NorthPort reclamation at Marsden Point
- training groyne at the entrance to Blacksmith Creek at the eastern end of the site
- creation of a lagoon at the western end of the bay (Marsden Cove) including entrance training groynes
- beach nourishment along the entire Marsden Cove shoreline.

The modifications to Marsden Cove have transformed the shoreline into a typical 'pocket beach' with control structures (i.e. groynes) at either end retaining the beach sand.



Site Photograph A (west)



Site Photograph B (east)



Site Photograph C (Blacksmith Creek)

Coastal Erosion Hazard Assessment

The site is split into four cells based on differences in dune height and geomorphology. All cells are characterised as nonconsolidated beach type.

Adopted component values are presented within Table 5-1. All backshore elevations are low at typically less than 3 m with less than 6 m of shore-term erosion expected. Long-term trends have been assessed excluding recent artificial beach nourishments and are generally erosional.

Histograms of individual components and resultant CEHZ distances using a Monte Carlo technique are shown in Figure 5-1 to Figure 5-3. Coastal Erosion Hazard Zone widths are presented within Table 5-2 to 5-4 and Figure 5-5.

For cell 5D the cliff projection method has been adopted with future shoreline distances shown

in Figure 5-4 and Table 5-2 instead of CEHZ distances.

CEHZ1 values range from 16 to 18 m. CEHZ2 values range from 38 to 41 m and CEHZ3 values range from 41 to 45 m. CEHZs have been mapped in agreement with the calculated values. Note that cell 5C has experienced accretion since about 1985 over approximately 500 m, with CEHZs offset from the accreted most recent shoreline.

Figure 5-6 shows the available historic shorelines for Marsden Cove.

Table 5-1 Component values for Erosion Hazard Assessment

Site		5. Marsden Cove			
Cell		5A	5B	5C	5D ¹
Cell centre (NZTM)	E	1732776	1732896	1733073	1733381
	N	6033603	6033540	6033336	6033183
Chainage, m (from N/W)		0-270	270-320	320-810	810-1170
Morphology		Estuary Bank	Estuary Bank	Estuary Bank	Soft Cliff
Short-term (m)	Min	2	2	2	0
	Mode	4	4	4	0
	Max	6	6	6	0
Dune/Cliff elevation (m above toe or scarp)	Min	1.2	0.4	1.7	1.4
	Mode	2.8	1.2	2.2	1.9
	Max	5.4	2.2	2.4	2.3
Stable angle (deg)	Min	30	30	30	26.6
	Mode	32	32	32	30.2
	Max	34	34	34	33.7
Long-term (m) -ve erosion +ve accretion	Min	-0.05	-0.05	-0.05	-0.02
	Mode	-0.15	-0.15	-0.15	-0.05
	Max	-0.25	-0.25	-0.25	-0.08
Closure slope (beaches)	Min	0.1	0.1	0.1	0.75
	Mode	0.1	0.1	0.071	0.5
	Max	0.1	0.1	0.067	0.25
SLR 2080 (m)	RCP 2.6	0.16	0.16	0.16	0.16
	RCP 4.5	0.21	0.21	0.21	0.21
	RCP 8.5M	0.33	0.33	0.33	0.33
	RCP 8.5H+	0.51	0.51	0.51	0.51
SLR 2130 (m)	RCP 2.6	0.28	0.28	0.28	0.28
	RCP 4.5	0.42	0.42	0.42	0.42
	RCP 8.5M	0.85	0.85	0.85	0.85
	RCP 8.5H+	1.17	1.17	1.17	1.17

¹Cliff projection method has been used, so distance to future cliff toe position has been tabulated. Actual CEHZ width will be greater depending on cliff height and stable slope angle.

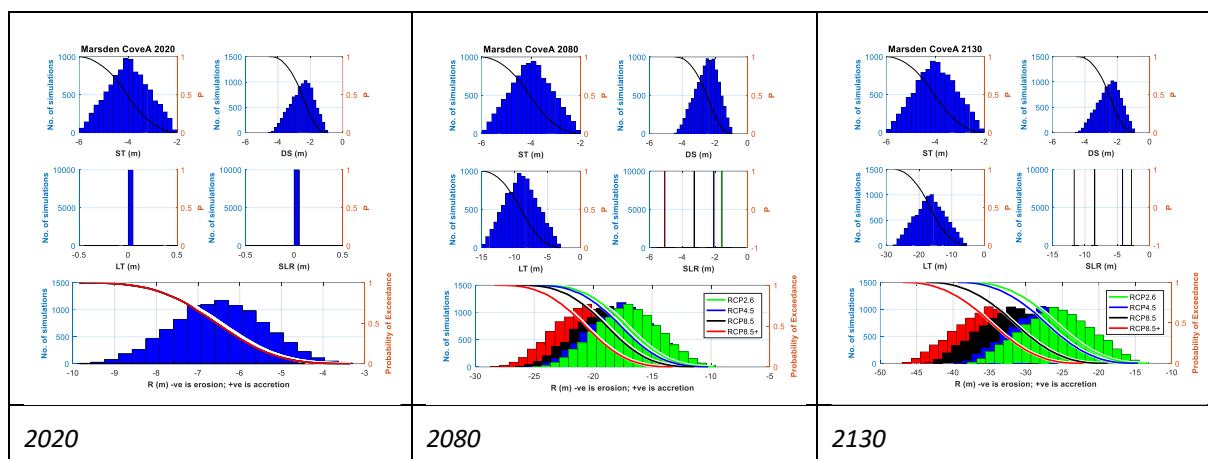


Figure 5-1 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 5A

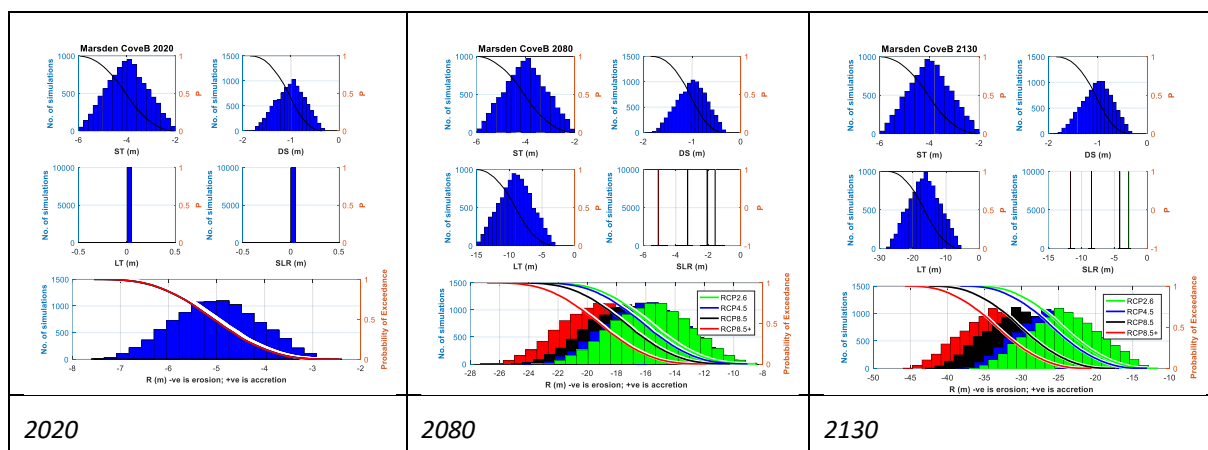


Figure 5-2 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 5B

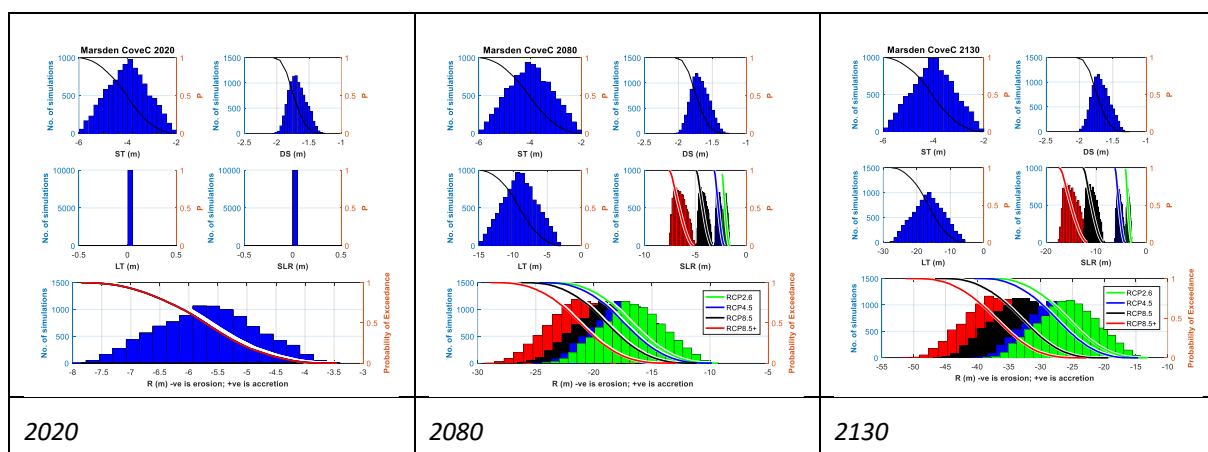


Figure 5-3 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 5C

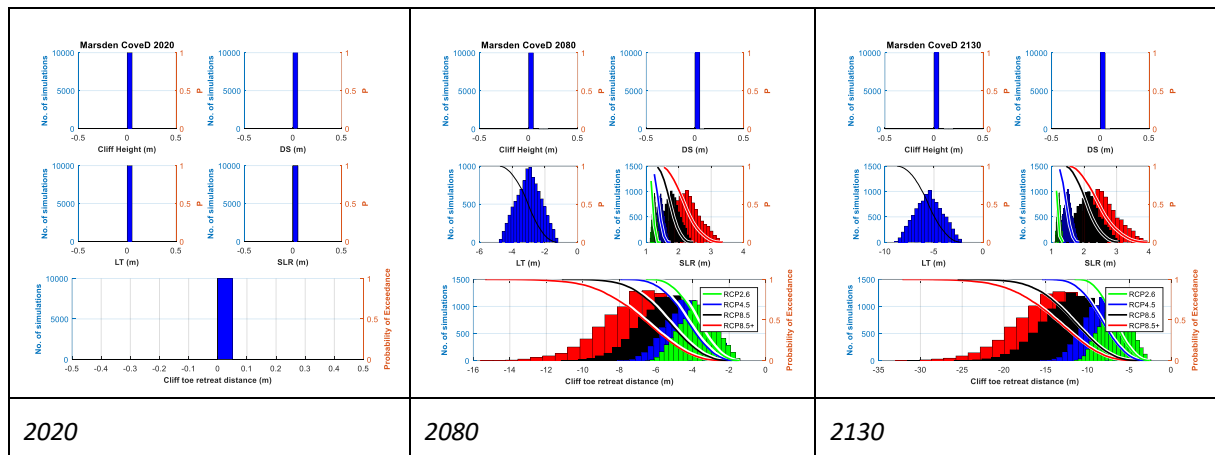


Figure 5-4 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 5D

Table 5-2 Coastal Erosion Hazard Zone Widths for 2020

Site		5. Marsden Cove			
Probability of CEHZ (m) Exceedance		A	B	C	D*
	Min	-3	-2	-3	0
	99%	-4	-3	-4	0
	95%	-5	-4	-4	0
	90%	-5	-4	-5	0
	80%	-6	-4	-5	0
	70%	-6	-5	-5	0
	66%	-6	-5	-5	0
	60%	-6	-5	-5	0
	50%	-7	-5	-6	0
	40%	-7	-5	-6	0
	33%	-7	-5	-6	0
	30%	-7	-5	-6	0
	20%	-7	-6	-6	0
	10%	-8	-6	-7	0
	5%	-8	-6	-7	0
	1%	-9	-7	-7	-4
	Max	-10	-7	-8	-4

*Cliff projection method has been used, so cliff toe position has been tabulated, which has been assumed to be unchanged from the adopted 2019 baseline. Actual CEHZ width will be greater depending on cliff height and stable slope angle.

Table 5-3 Coastal Erosion Hazard Zone Widths Projected for 2080

Site		5. Marsden Cove															
Cell		5A				5B				5C				5D			
RCP scenario		2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	-10	-10	-11	-13	-9	-9	-10	-12	-9	-10	-11	-13	-1	-2	-2	-2
	99%	-11	-12	-13	-15	-10	-11	-12	-14	-11	-12	-13	-15	-2	-2	-2	-3
	95%	-13	-13	-14	-16	-11	-12	-13	-15	-12	-13	-14	-17	-2	-2	-3	-3
	90%	-14	-14	-15	-17	-12	-13	-14	-16	-13	-14	-15	-18	-2	-3	-3	-4
	80%	-15	-15	-16	-18	-13	-14	-15	-17	-14	-15	-17	-19	-3	-3	-4	-4
	70%	-16	-16	-17	-19	-14	-15	-16	-18	-15	-16	-17	-20	-3	-3	-4	-5
	66%	-16	-16	-18	-19	-15	-15	-16	-18	-16	-16	-18	-20	-3	-4	-4	-5
	60%	-16	-17	-18	-20	-15	-15	-17	-18	-16	-17	-18	-20	-3	-4	-4	-5
	50%	-17	-18	-19	-21	-16	-16	-17	-19	-17	-17	-19	-21	-4	-4	-5	-6
	40%	-18	-18	-19	-21	-16	-17	-18	-20	-17	-18	-20	-22	-4	-4	-5	-6
	33%	-18	-19	-20	-22	-17	-17	-19	-20	-18	-18	-20	-22	-4	-4	-5	-6
	30%	-19	-19	-20	-22	-17	-18	-19	-21	-18	-19	-20	-23	-4	-5	-5	-6
	20%	-19	-20	-21	-23	-18	-18	-20	-21	-19	-20	-21	-23	-4	-5	-6	-7
	10%	-21	-21	-22	-24	-19	-20	-21	-23	-20	-21	-22	-25	-5	-5	-6	-8
	5%	-22	-22	-23	-25	-20	-20	-22	-23	-21	-22	-23	-26	-5	-6	-7	-8
	1%	-23	-24	-25	-27	-21	-22	-23	-25	-22	-23	-25	-27	-5	-6	-7	-9
	Max	-25	-25	-27	-28	-23	-24	-25	-27	-24	-25	-26	-29	-6	-7	-8	-10
CEHZ1		-18				-16				-18				-4*			

*Cliff projection method has been used, so distance to future cliff toe position has been tabulated. Actual CEHZ width will be greater depending on cliff height and stable slope angle.

Table 5-4 Coastal Erosion Hazard Zone Widths Projected for 2130

Site		5. Marsden Cove															
Cell		5A				5B				5C				5D			
RCP scenario		2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	-13	-15	-19	-22	-12	-13	-17	-21	-13	-15	-19	-23	-3	-3	-4	-4
	99%	-16	-17	-22	-25	-15	-16	-20	-23	-16	-18	-23	-27	-3	-4	-5	-5
	95%	-18	-20	-24	-27	-17	-18	-22	-25	-18	-20	-25	-29	-4	-4	-6	-7
	90%	-20	-21	-25	-29	-18	-19	-24	-27	-20	-22	-27	-31	-4	-5	-7	-8
	80%	-22	-23	-27	-31	-20	-22	-26	-29	-22	-23	-29	-33	-5	-6	-8	-9
	70%	-23	-25	-29	-32	-22	-23	-27	-31	-23	-25	-30	-34	-6	-7	-9	-10
	66%	-24	-25	-30	-33	-22	-24	-28	-31	-24	-26	-31	-35	-6	-7	-9	-10
	60%	-25	-26	-30	-34	-23	-25	-29	-32	-25	-26	-32	-36	-6	-7	-9	-11
	50%	-26	-27	-32	-35	-24	-26	-30	-33	-26	-28	-33	-37	-6	-8	-10	-11
	40%	-27	-28	-33	-36	-26	-27	-31	-34	-27	-29	-34	-38	-7	-8	-11	-12
	33%	-28	-29	-34	-37	-26	-28	-32	-35	-28	-30	-35	-39	-7	-8	-11	-13
	30%	-28	-30	-34	-37	-27	-28	-33	-36	-28	-30	-36	-40	-7	-9	-11	-13
	20%	-30	-31	-36	-39	-28	-30	-34	-37	-30	-32	-37	-41	-8	-9	-12	-14
	10%	-32	-33	-38	-41	-30	-32	-36	-39	-32	-34	-39	-43	-9	-10	-14	-15
	5%	-34	-35	-39	-43	-32	-33	-38	-41	-33	-35	-41	-45	-9	-11	-14	-17
	1%	-36	-37	-41	-45	-34	-36	-40	-43	-35	-37	-43	-47	-10	-12	-16	-18
	Max	-38	-39	-44	-47	-37	-38	-43	-46	-38	-40	-47	-51	-11	-13	-18	-21
CEHZ2		-39				-38				-41				-14*			
CEHZ3		-43				-41				-45				-17*			

*Cliff projection method has been used, so distance to future cliff toe position has been tabulated. Actual CEHZ width will be greater depending on cliff height and stable slope angle.

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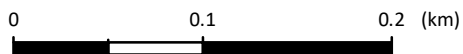


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- - - 2019 Shoreline
- ↔ Cell Extent
- CEHZ1
- CEHZ2
- CEHZ3

Notes: Dashed CEHZ indicates greater uncertainty around stream mouths and backshore topography.
Northland 0.4m Rural Aerial Photos (2014-2016).

A4 SCALE 1:4,000



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NORTHLAND REGIONAL COUNCIL

Coastal Erosion Hazard Assessment

Marsden Cove

Site: 5

FIGURE No.

Figure 5-5

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↔ Cell Extent

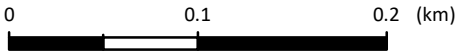
- - - 2019 Shoreline

Historic Shorelines

- 2014/01/14
- 2013/12/06
- 1985/12/13
- 1942/05/28

Notes: Dashed CEHZ indicates greater uncertainty around stream mouths and backshore topography.
Northland 0.4m Rural Aerial Photos (2014-2016).

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Historic Shorelines		
Marsden Cove		
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