

24 Hihi

Description and geomorphology

Hihi is located at the southern end of Doubtless Bay, approximately 29 km east of Kaitiaki.

The site is approximately 1.3 km long situated between Rangitoto Point in the south and Waitetoki Point in the north.

The northern 200 m of the site comprises a boulder beach shoreline backed by Basaltic Allocthon rock (cell 24A). A rock revetment exists at the base of the cliff bank along the entire 200 m. Waiaua Stream cuts through the shoreline at the southern extent of this rock unit.

The next 400 m of shoreline comprises unconsolidated beach (cell 24C to 24E), of which approximately 150 m is currently fronted by a vertical grouted rock seawall. Another stream mouth is located within the unconsolidated beach which has a localised effect on shoreline position. A boat ramp is located on the northern side of this stream. A low crested seawall comprising cemented sand exists along the beach shoreline south of the stream mouth. The beach comprises fine sand and has a minimal berm above the high tide line. The dune crest in this area is approximately RL 2 to 4 m.

The remainder of the shoreline is characterised by a cliff shoreline comprising weak sedimentary Mudstone Conglomerate (Mangonui Formation). The cliff height rises up to RL 23 m at the southern extent of the site.

Local considerations

Erosion protection structures exist along approximately 450 m of the sandy beach shoreline located in the centre of the site. A boat ramp is situated on the northern side of the central stream.

Two streams enter the site and provide sediment and form small deltas that will affect wave patterns. The streams also locally lower the foreshore level adjacent to the mouth resulting in fluctuations of shoreline position in these areas over time. There is a greater level of uncertainty in these areas because fluvial processes also effect shoreline movement.



Site Photograph A (north – grouted rock seawall)



Site Photograph B (central beach dune area)



Site Photograph C (south – cliff shoreline)

The resulting hazard zones are dashed in these areas to reflect this uncertainty.

Coastal Erosion Hazard Assessment

The site is split into six cells based on differences in geomorphology, exposure and dune height.

Adopted component values are presented within Table 24-1. Long-term erosion rates for the basalt range from 0 to -0.1 m/year and for the Mangonui Formation Mudstone from 0.1 to 0.4 m/year. The beaches are generally also eroding at between -0.1 and -0.2 m/year.

Histograms of individual components and resultant CEHZ distances using a Monte Carlo technique are shown in Figure 24-3 to Figure 24-5. Coastal Erosion Hazard Zone widths are presented within Table 24-2 and Figure 24-7.

CEHZ1 values range from 19 to 27 m. CEHZ2 values range from 34 to 59 m. CEHZ's have been

mapped in agreement with the calculated values. Note that at cell 24D an area with a length of 25 m have likely been reclaimed, with CEHZ offset from the most recent shoreline.

For cell 24A, 24B and 24F the cliff projection method has been adopted with future shoreline distances shown in Figure 24-1, Figure 24-2, Figure 24-6 and Table 24-2 instead of CEHZ distances. The future cliff toe distances range from 2 to 19 m to 2065 and 10 to 81 m to 2115.

Figure 24-8 shows the available historic shorelines for Hihi.

Table 24-1 Component values for Erosion Hazard Assessment

Site		24. Hihi					
Cell		24A ¹	24B ¹	24C ²	24D ²	24E ²	24F ¹
Cell centre (NZTM)	E	1649112	1649139	1649139	1649127	1649095	1648952
	N	6130425	6130298	6130180	6130066	6129966	6129725
Chainage, m (from N/W)		0-230	230-310	310-450	450-560	560-690	690-1250
Morphology		Basalt	Soft Cliff	Dune	Dune	Dune	Mangonui mudstone
Short-term (m)	Min	0	0	5	5	5	0
	Mode	0	0	10	10	10	0
	Max	0	0	15	15	15	0
Dune/Cliff elevation (m above toe or scarp)	Min	3.3	3.5	2.0	1.7	2.2	15.2
	Mode	5.6	6.1	2.5	2.0	3.1	17.9
	Max	7.3	8.8	2.9	2.4	3.5	22.3
Stable angle (deg)	Min	45	26.6	30	30	30	18.4
	Mode	57.5	30.2	32	32	32	22.5
	Max	70	33.7	34	34	34	26.6
Long-term (m) -ve erosion +ve accretion	Min	0	-0.02	-0.1	-0.1	-0.1	-0.1
	Mode	-0.05	-0.05	-0.15	-0.15	-0.15	-0.2
	Max	-0.1	-0.1	-0.2	-0.2	-0.2	-0.4
Closure slope (beaches)	Min	0.25	0.75	0.75	0.05	0.05	0.75
	Mode	0.125	0.5	0.5	0.034	0.034	0.5
	Max	0	0.25	0.25	0.025	0.025	0.25
SLR 2065 (m)	Min	0.19	0.19	0.19	0.19	0.19	0.19
	Mode	0.29	0.29	0.29	0.29	0.29	0.29
	Max	0.39	0.39	0.39	0.39	0.39	0.39
SLR 2115 (m)	Min	0.45	0.45	0.45	0.45	0.45	0.45
	Mode	0.77	0.77	0.77	0.77	0.77	0.77

Site		24. Hihi					
Cell		24A ¹	24B ¹	24C ²	24D ²	24E ²	24F ¹
	Max	1.1	1.1	1.1	1.1	1.1	1.1

¹Updated using cliff projection methodology.

²CEHZO included behind coastal protection structure.

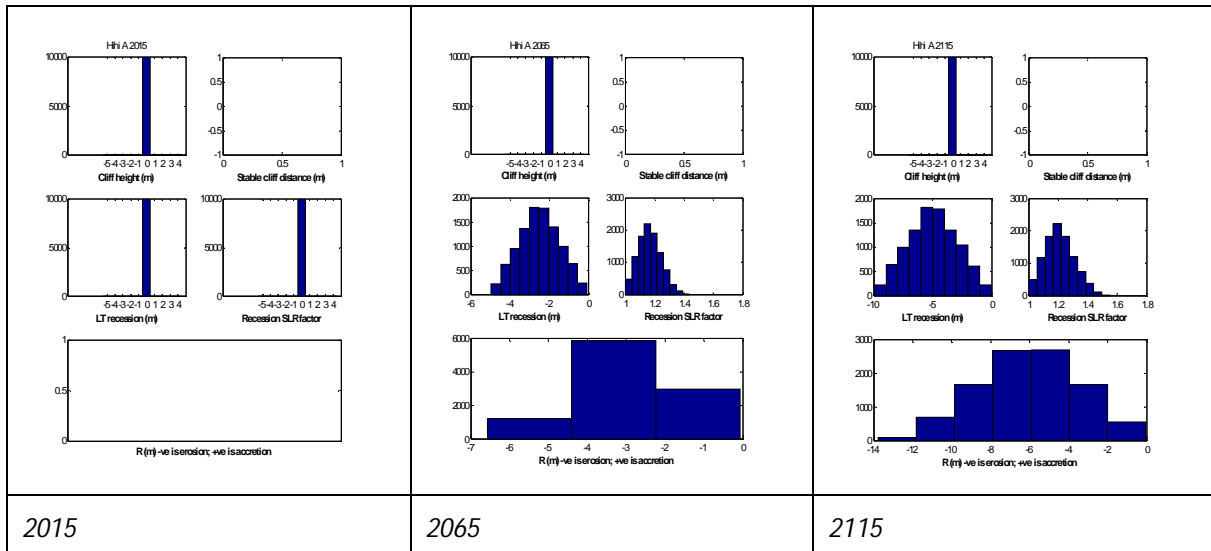


Figure 24-1 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 24A

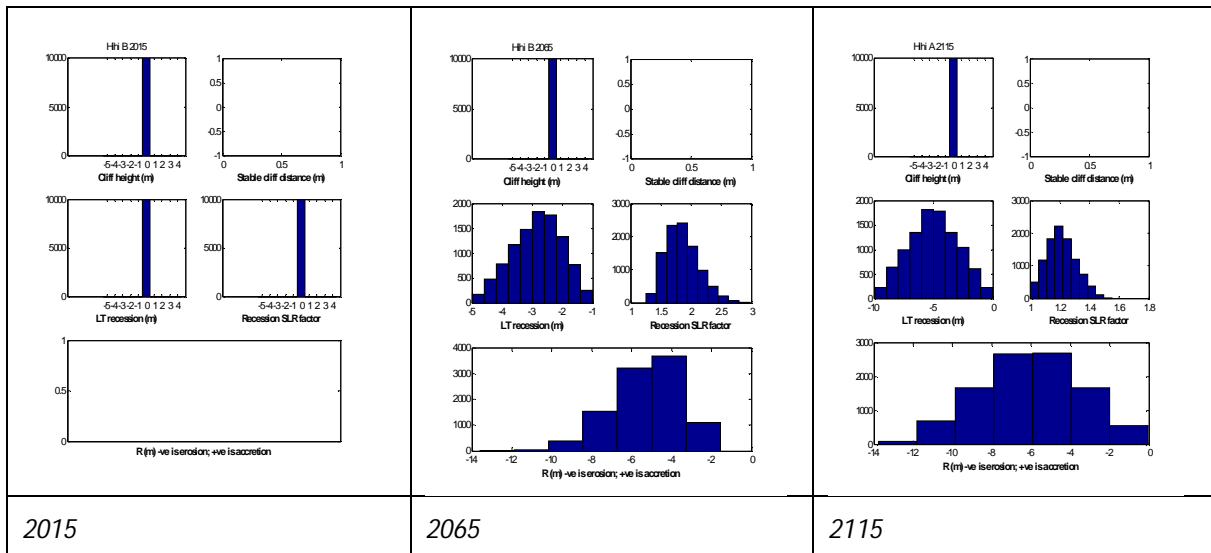


Figure 24-2 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 24B

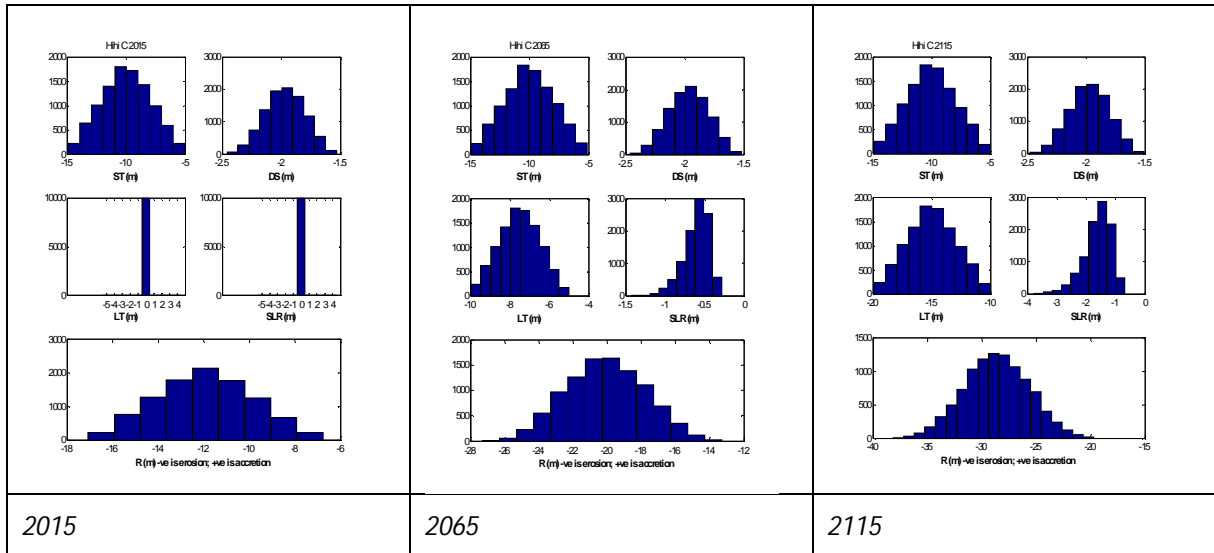


Figure 24-3 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 24C

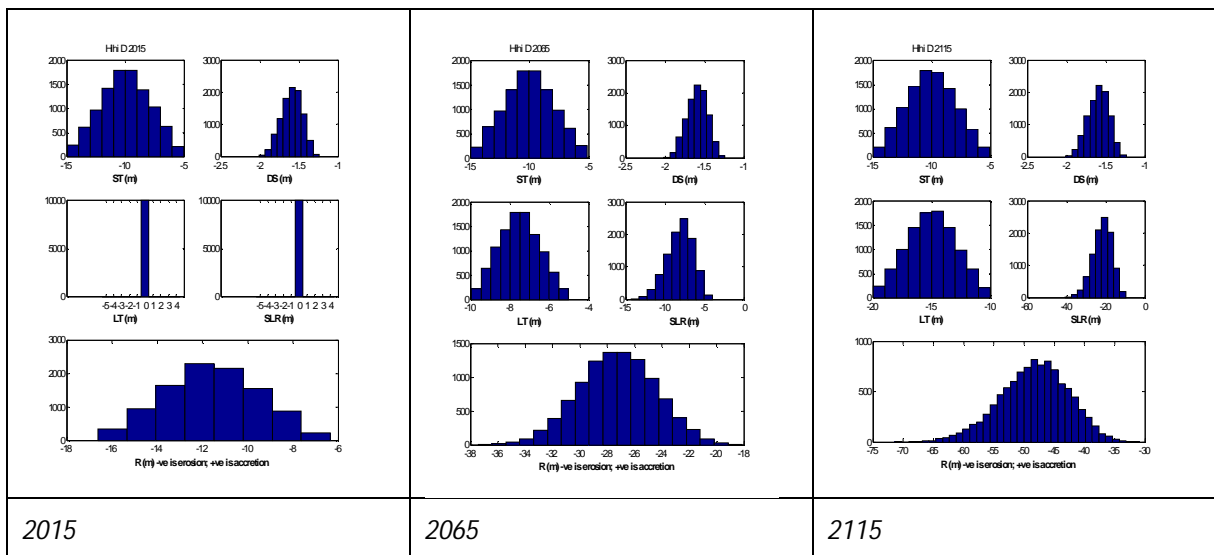


Figure 24-4 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 24D

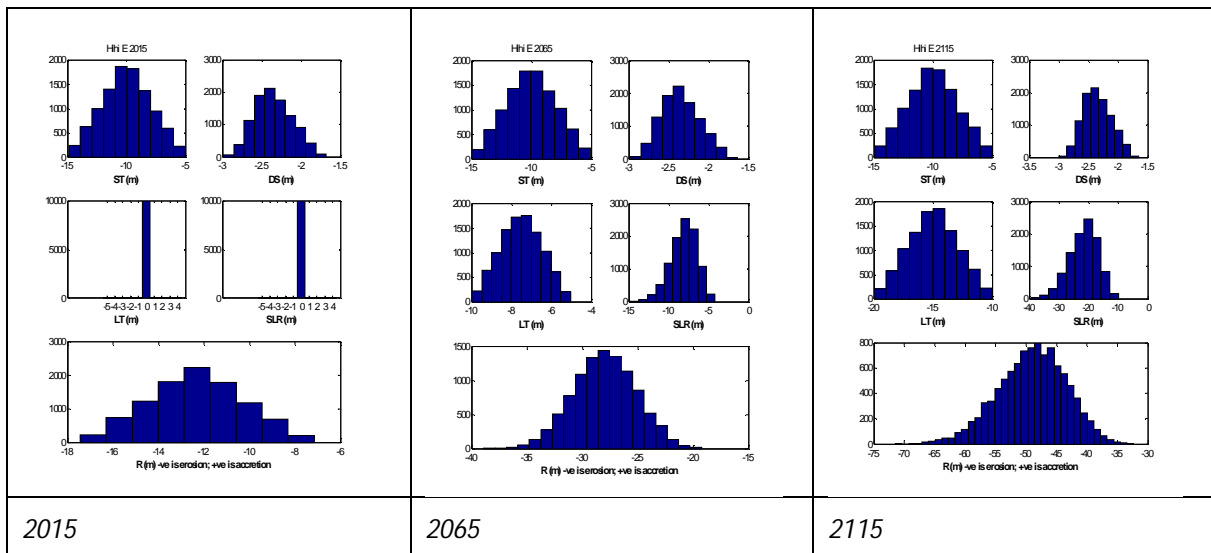


Figure 24-5 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 24E

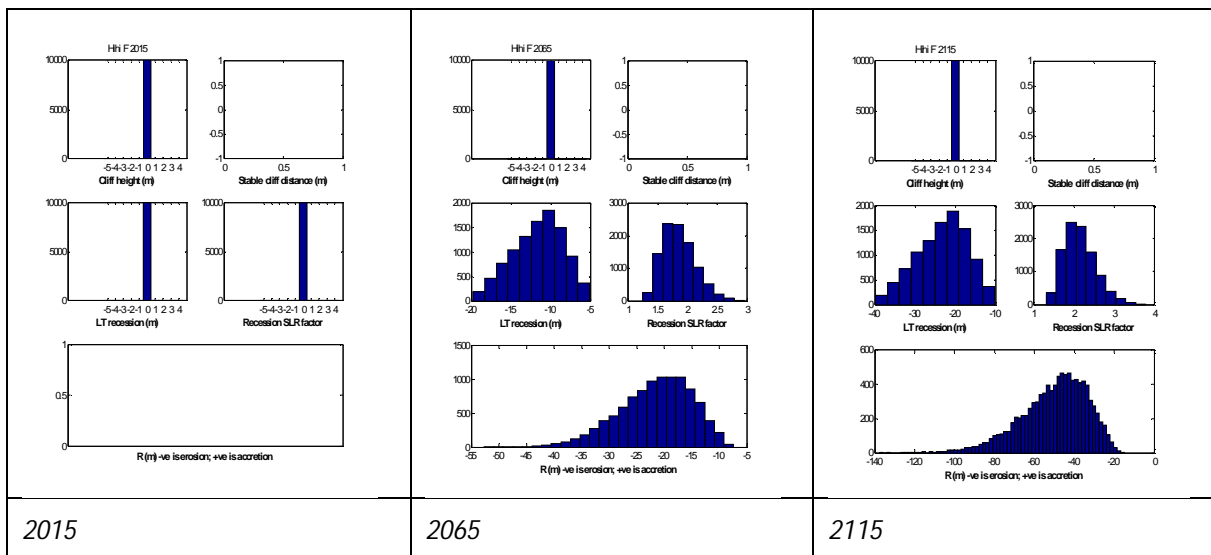
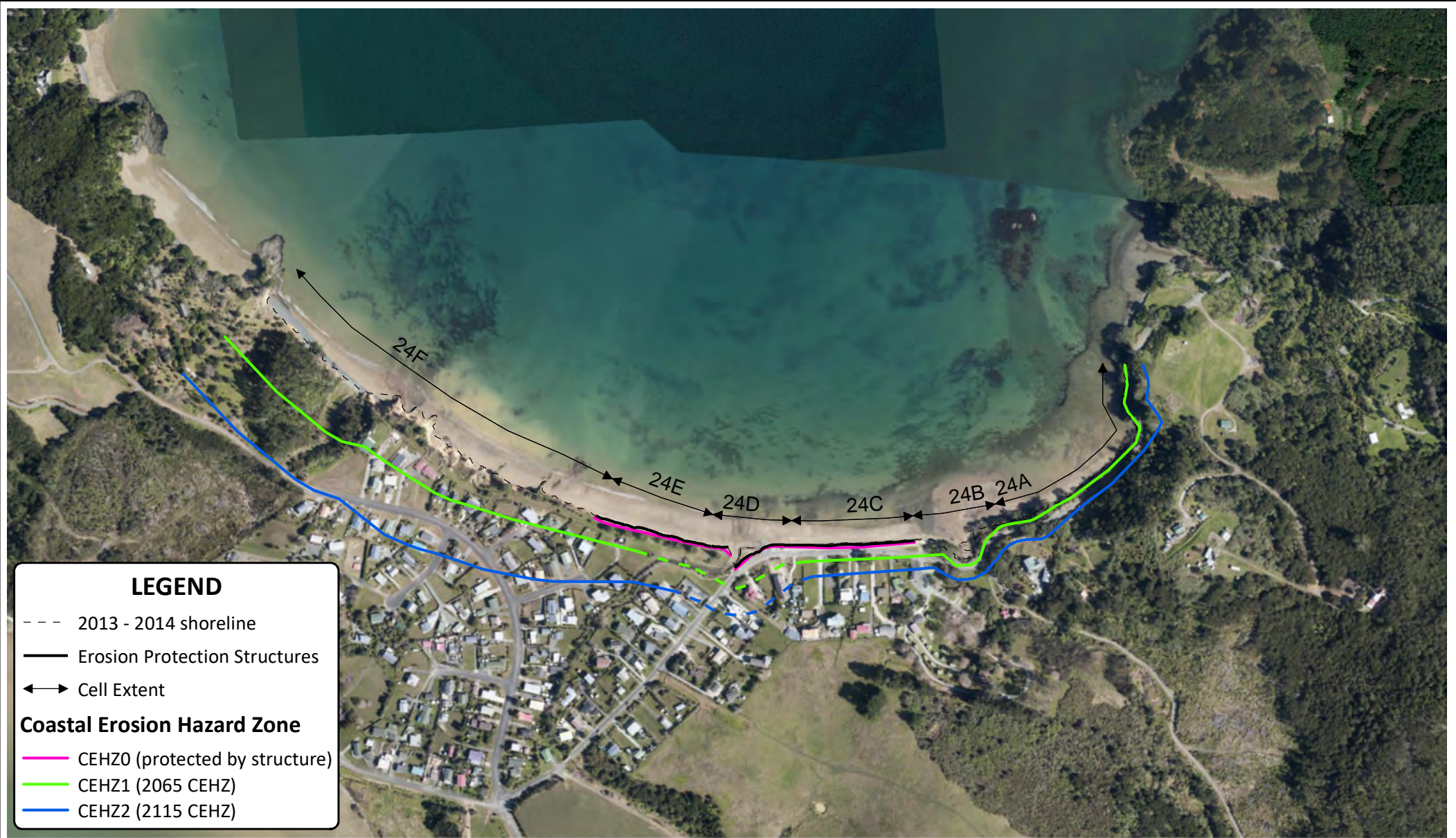


Figure 24-6 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 24F

Table 24-2 Coastal Erosion Hazard Zone Widths

Site		24. Hihi																	
Cell		24A			24B			24C			24D			24E			24F		
Time		2015	2065	2115	2015	2065	2115	2015	2065	2115	2015	2065	2115	2015	2065	2115	2015	2065	2115
Probability of CEHZ (m) Exceedance	Min	0	0	0	0	-2	-3	-7	-13	-20	-6	-18	-31	-7	-19	-32	0	-7	-15
	99%	0	0	-1	0	-2	-5	-8	-15	-22	-7	-21	-37	-8	-22	-37	0	-10	-22
	95%	0	-1	-2	0	-3	-6	-9	-16	-24	-8	-23	-40	-9	-23	-40	0	-12	-27
	90%	0	-1	-3	0	-3	-7	-9	-17	-25	-9	-24	-41	-10	-24	-42	0	-14	-31
	80%	0	-2	-4	0	-4	-9	-10	-18	-26	-10	-25	-44	-11	-26	-44	0	-16	-36
	70%	0	-2	-5	0	-4	-10	-11	-19	-27	-10	-26	-45	-11	-26	-46	0	-17	-40
	66%	0	-2	-5	0	-4	-10	-11	-19	-27	-11	-26	-46	-11	-27	-46	0	-18	-41
	60%	0	-3	-5	0	-5	-11	-11	-20	-28	-11	-27	-47	-12	-27	-47	0	-19	-44
	50%	0	-3	-6	0	-5	-12	-12	-20	-29	-12	-27	-48	-12	-28	-49	0	-21	-48
	40%	0	-3	-7	0	-6	-13	-12	-21	-29	-12	-28	-50	-13	-29	-50	0	-23	-52
	33%	0	-3	-7	0	-6	-14	-13	-21	-30	-13	-28	-51	-13	-29	-51	0	-24	-56
	30%	0	-4	-7	0	-6	-14	-13	-21	-30	-13	-29	-51	-13	-29	-52	0	-25	-57
	20%	0	-4	-8	0	-7	-16	-14	-22	-31	-13	-30	-53	-14	-30	-54	0	-27	-64
	10%	0	-5	-9	0	-8	-18	-15	-23	-33	-14	-31	-56	-15	-32	-56	0	-31	-73
	5%	0	-5	-10	0	-8	-20	-15	-24	-34	-15	-32	-58	-16	-33	-59	0	-33	-81
	1%	0	-6	-12	0	-10	-24	-16	-25	-35	-16	-34	-63	-17	-35	-63	0	-39	-98
	Max	0	-7	-14	0	-14	-30	-17	-27	-38	-17	-37	-71	-17	-39	-71	0	-53	-138
CEHZ1		-2*			-4*			-19			-26			-27			-18*		
CEHZ2		-10*			-20*			-34			-58			-59			-81*		

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



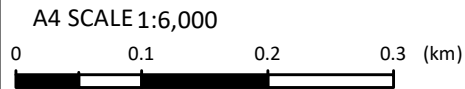
LEGEND

- 2013 - 2014 shoreline
- Erosion Protection Structures
- ↔ Cell Extent

Coastal Erosion Hazard Zone

- CEHZ0 (protected by structure)
- CEHZ1 (2065 CEHZ)
- CEHZ2 (2115 CEHZ)

Notes: Dashed CEHZ indicates greater uncertainty around stream mouths and backshore topography. Northland 0.1m Rural Aerial Photos (2014-2015).



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PROJECT No.		
1001049		

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 Coastal Erosion Hazard Assessment
 Hihi
 Site: 24

FIGURE No. Figure 24-7

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Legend

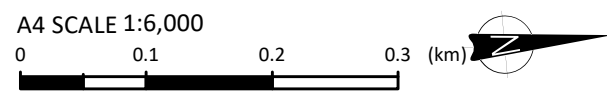
↔ Cell Extent

Shorelines

- 2014 baseline
- 14/01/2014
- 30/03/2006
- 04/03/2000
- 15/05/1999
- 28/10/1981
- 02/05/1966
- 09/04/1948

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographic IGN, and the GIS User Community

Notes: Dashed CEHZ indicates greater uncertainty around stream mouths and backshore topography. Northland 0.1m Rural Aerial Photos (2014-2015).



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PROJECT No. 1001049		

NORTHLAND REGIONAL COUNCIL
Historic shorelines
Hihi
Site: 24

FIGURE No. Figure 24-8	Rev. 2
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