

6 One Tree Point

Description and geomorphology

One Tree Point is located at the entrance to Whangarei Harbour, approximately 15 km south of Whangarei.

The site is approximately 4 km long and extends from Marsden Cove in the east around One Tree Point down to the western tip of the sand spit located in Takahiwai Estuary. The majority of the site is cliff shoreline and approximately 600 m of the site shoreline forms the barrier spit.

The cliff shoreline is a coastal barrier plain formed from Pleistocene coastal sand deposits. The Pleistocene deposits comprise cemented dune sands overlying sandy beach and nearshore seabed deposits. The crest elevation of the ridges at One Tree Point ranges from RL 4 to 10.5 m. This stratigraphy was formed as the shoreline advanced under falling sea level during the last interglacial period approximately 125,000 years ago.

Areas of slumping and landslides are apparent along the site, where coastal processes are undercutting the cliff toe causing instability over time. A sandy beach comprising fine to medium sand exists along the cliff toe from One Tree Point to Marsden Cove. There is a minimal berm above high tide and no dune system has developed.

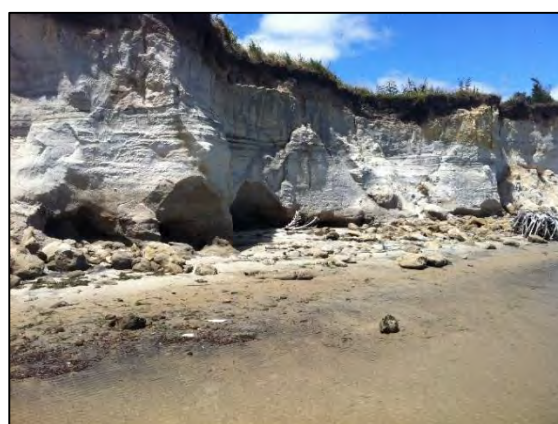
The barrier spit located at the western end of the site has a relatively low backshore elevation and is experiencing erosion over the southern half of its extent. A sandy beach comprising fine sand exists along the spit shoreline, which transitions to intertidal mud flats approximately 10 m offshore.

Local considerations

Erosion protection structures exist along the majority of the toe of the cliff. The structures range from loose rock revetments to timber seawalls. There are also a number of stormwater outlets located at the base on the cliff. These type of structures can lower the adjacent foreshore level resulting in more wave induced erosion at the toe of the cliff. A boat ramp is situated at One Tree Point.



Site Photograph A (east facing shoreline)



Site Photograph B (west facing shoreline)



Site Photograph C (western spit shoreline)

Coastal Erosion Hazard Assessment

The site is split into five cells based on differences in geomorphology, exposure and dune/cliff height. All coastal cells are weakly cemented dune in fixed transverse dune ridges except at the western end where the shoreline is non-consolidated.

Adopted component values are presented within Table 6-1. The cliffed coastline has stable angles of 18 to 27°, heights of 4 to 10.5 m and long-term erosion rates of up to -0.1 m/year. The non-consolidated shoreline has long-term trends ranging from slightly accretional to erosional.

Histograms of individual components and resultant CEHZ distances using a Monte Carlo technique are shown in Figure 6-1. Coastal Erosion Hazard Zone widths are presented within Table 6-2 and Figure 6-6. CEHZ1 for cell A is 12 m and CEHZ2 is 41 m. CEHZ's have been

mapped in agreement with the calculated values.

For cell 6B to cell 6D the cliff projection method has been adopted with future shoreline distances shown in Figure 6-2 to Figure 6-5 and Table 6-2 instead of CEHZ distances. The future shoreline (cliff toe) distances range from 3 to 7 m to 2065 and 14 to 25 m to 2115.

Figure 6-7 shows the available historic shorelines for One Tree Point.

Table 6-1 Component values for Erosion Hazard Assessment

Site		6. One Tree Point				
Cell		6A	6B ^{1,2}	6BB ^{1,2}	6C ^{1,2}	6D ^{1,2}
Cell centre (NZTM)	E	1730299	1730968	1730968	1731838	1732603
	N	6034249	6034921	6034921	6034670	6033913
Chainage, m (from N/W)		0-680	680-1420	1420-1882	1890-3500	3500-3800
Morphology		Estuary Bank	Weakly cemented dune in fixed transverse dune ridges			
Short-term (m)	Min	2	0	0	0	0
	Mode	4	0	0	0	0
	Max	6	0	0	0	0
Dune/Cliff elevation (m above toe or scarp)	Min	1.1	6.1	4.0	5.6	4.2
	Mode	2.0	8.5	6.2	7.7	5.7
	Max	3.1	10.4	8.5	10.0	7.9
Stable angle (deg)	Min	30	18.4	18.4	18.4	18.4
	Mode	32	22.5	22.5	22.5	22.5
	Max	34	26.6	26.6	26.6	26.6
Long-term (m) -ve erosion +ve accretion	Min	0.1	-0.07	-0.02	-0.02	-0.06
	Mode	-0.1	-0.08	-0.04	-0.06	-0.08
	Max	-0.34	-0.1	-0.07	-0.1	-0.1
Closure slope (beaches)	Min	0.11	0.75	0.75	0.75	0.75
	Mode	0.095	0.5	0.5	0.5	0.5
	Max	0.086	0.25	0.25	0.25	0.25
SLR 2065 (m)	Min	0.19	0.19	0.19	0.19	0.19
	Mode	0.29	0.29	0.29	0.29	0.29
	Max	0.39	0.39	0.39	0.39	0.39
SLR 2115 (m)	Min	0.45	0.45	0.45	0.45	0.45
	Mode	0.77	0.77	0.77	0.77	0.77
	Max	1.1	1.1	1.1	1.1	1.1

¹Updated using cliff projection methodology.
²CEHZO included behind coastal protection structure.

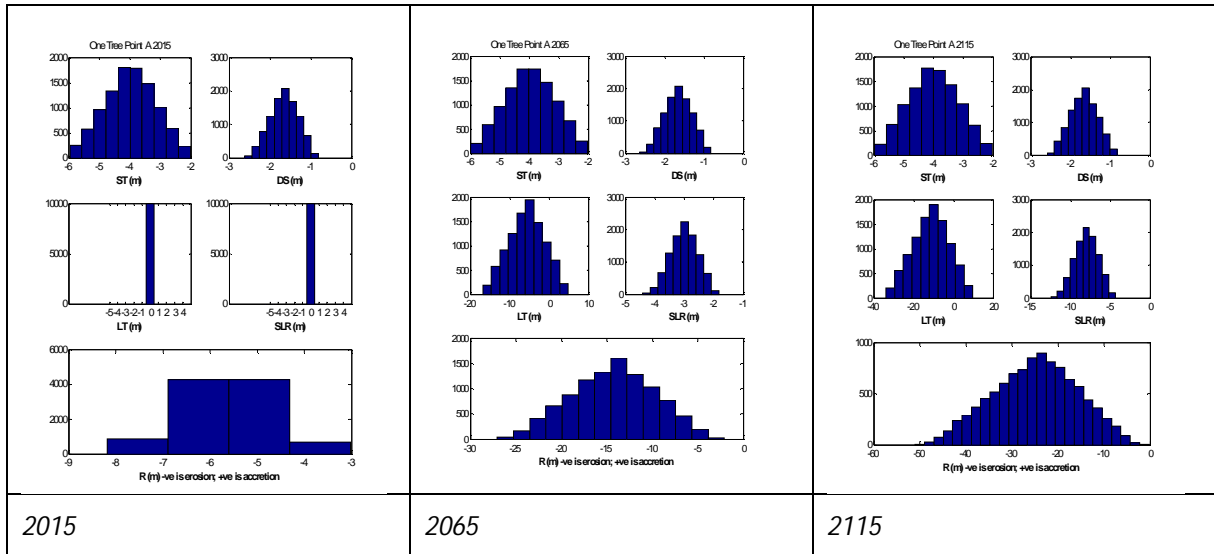


Figure 6-1 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 6A

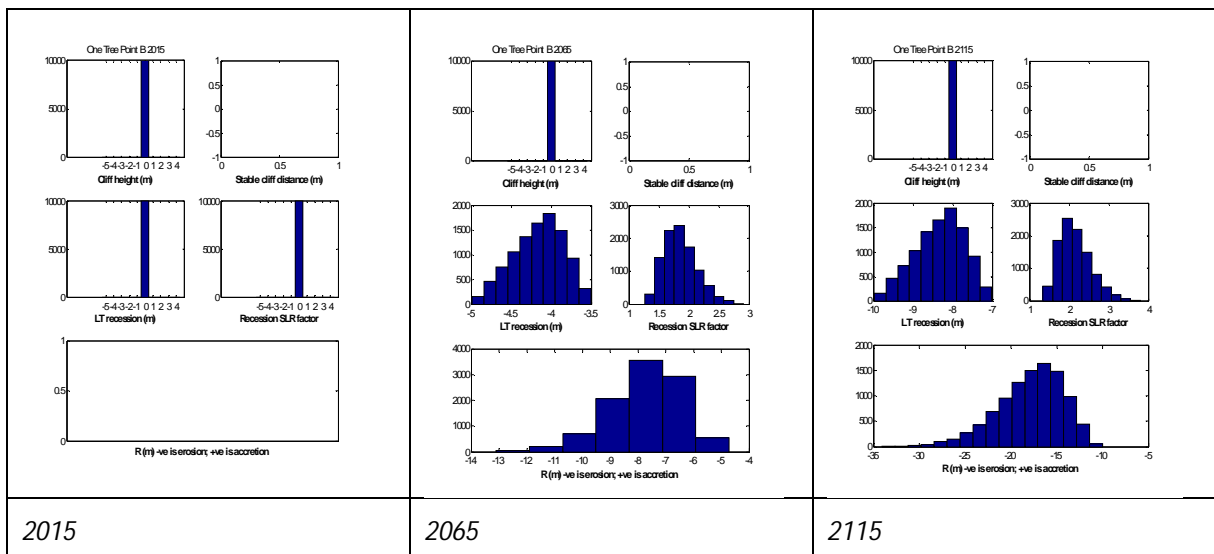


Figure 6-2 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 6B

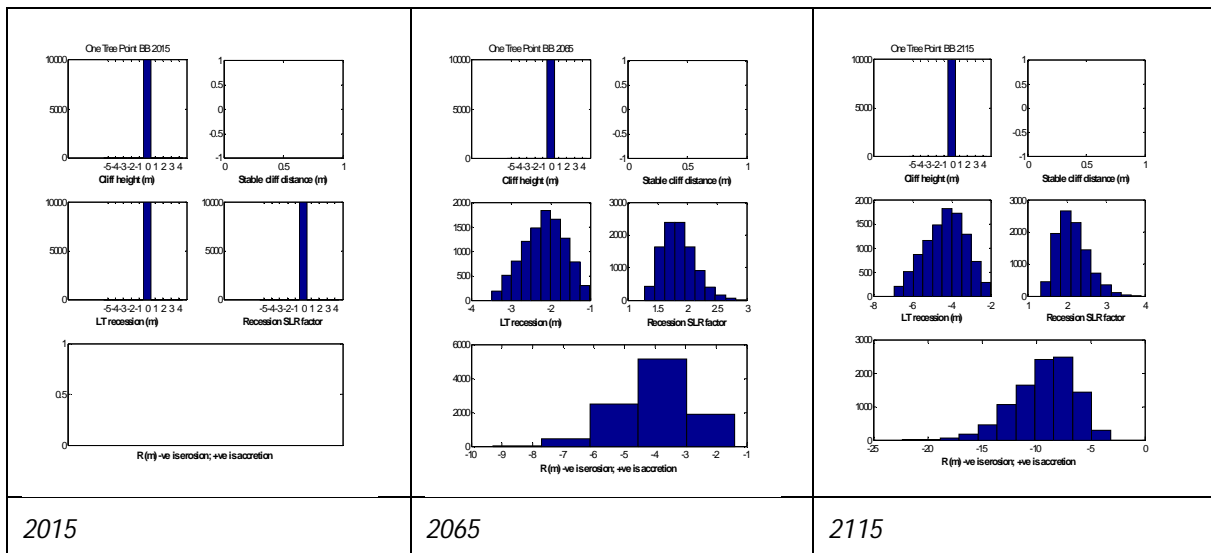


Figure 6-3 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 6BB

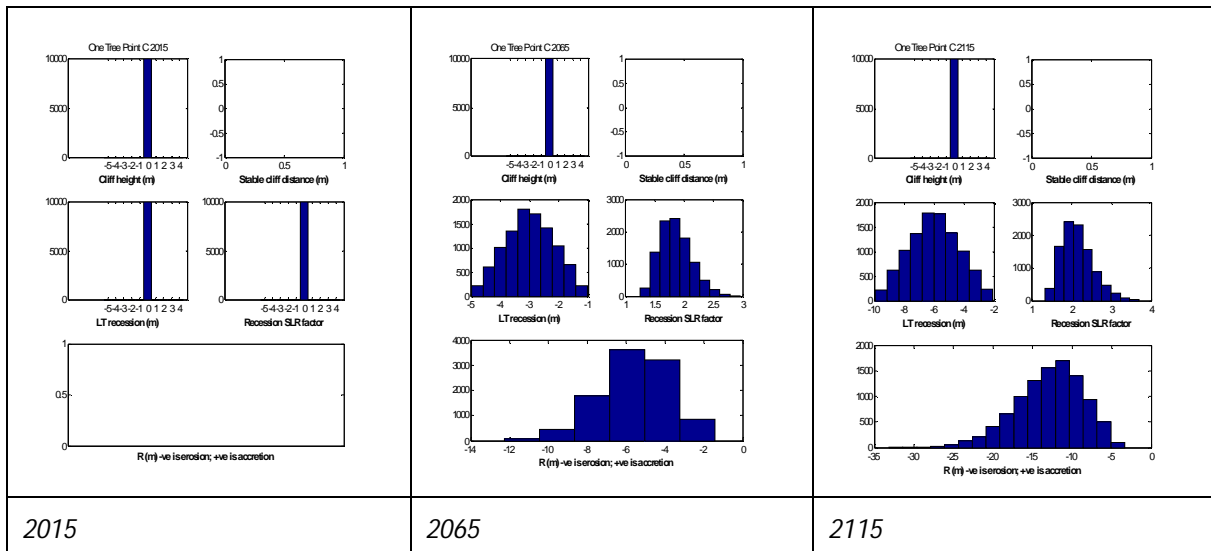


Figure 6-4 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 6C

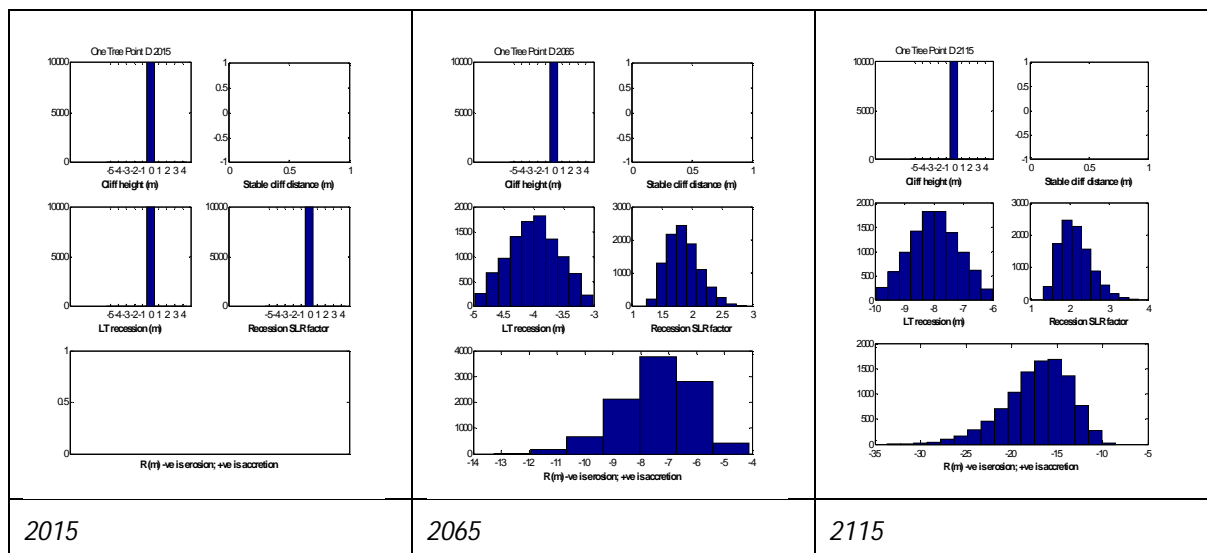


Figure 6-5 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 6D

Table 6-2 Coastal Erosion Hazard Zone Widths

Site		6. One Tree Point															
Cell		6A			6B			6BB			6C			6D			
Time		2015	2065	2115	2015	2065	2115	2015	2065	2115	2015	2065	2115	2015	2065	2115	
Probability of CEHZ (m) Exceedance	Min	-3	-2	0	0	-5	-10	0	-1	-3	0	-1	-3	0	-4	-9	
	99%	-4	-5	-6	0	-5	-12	0	-2	-4	0	-2	-5	0	-5	-11	
	95%	-4	-7	-10	0	-6	-13	0	-2	-5	0	-3	-7	0	-5	-12	
	90%	-4	-8	-13	0	-6	-14	0	-3	-6	0	-3	-8	0	-6	-13	
	80%	-5	-10	-17	0	-7	-15	0	-3	-7	0	-4	-9	0	-6	-14	
	70%	-5	-12	-20	0	-7	-16	0	-3	-8	0	-5	-10	0	-7	-15	
	66%	-5	-12	-21	0	-7	-16	0	-3	-8	0	-5	-11	0	-7	-15	
	60%	-5	-13	-22	0	-7	-17	0	-4	-8	0	-5	-11	0	-7	-16	
	50%	-6	-14	-25	0	-8	-17	0	-4	-9	0	-5	-12	0	-7	-17	
	40%	-6	-15	-27	0	-8	-18	0	-4	-10	0	-6	-14	0	-8	-18	
	33%	-6	-16	-29	0	-8	-19	0	-4	-10	0	-6	-14	0	-8	-18	
	30%	-6	-17	-30	0	-8	-19	0	-5	-10	0	-6	-15	0	-8	-19	
	20%	-6	-18	-33	0	-9	-21	0	-5	-12	0	-7	-16	0	-8	-20	
	10%	-7	-21	-37	0	-9	-23	0	-6	-13	0	-8	-19	0	-9	-22	
	5%	-7	-22	-41	0	-10	-25	0	-6	-14	0	-9	-21	0	-10	-24	
	1%	-8	-24	-45	0	-11	-28	0	-7	-17	0	-10	-24	0	-11	-27	
		Max	-8	-27	-51	0	-13	-34	0	-9	-22	0	-12	-33	0	-13	-34
		CEHZ1	-12			-7*			-3*			-5*			-7*		
	CEHZ2	-41			-25*			-14*			-21*			-24*			

*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.

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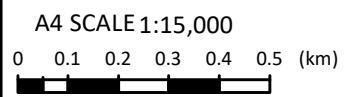
LEGEND

- 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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SCALE (AT A4 SIZE) 1:15,000		
PROJECT No. 1001049		

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 Coastal Erosion Hazard Assessment
 One Tree Point
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Legend

↔ Cell Extent

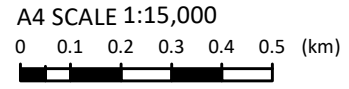
Shorelines

- 2014 baseline
- 14/01/2014
- 15/03/2007
- 13/12/1985
- 02/05/1966
- 28/05/1942



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, 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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