3 Ruakaka

Description and geomorphology

Ruakaka is located in the centre of Bream Bay, approximately 25 km south of Whangarei.

The site includes approximately 8 km of open coast shoreline situated either side of the Ruakaka River mouth and approximately 2 km of estuary shoreline within the river entrance.

The open coast shoreline has a sandy beach comprising fine sand. The beach has a minimal berm width of less than 5 m above the high tide line. The dune system is in a relatively healthy state mostly covered by spinifex vegetation. The dune system has crest elevations of between RL 3 to 9 m.

The shoreline within the estuary has a more varied dune crest elevation, which has experienced larger shoreline fluctuations over time. The river entrance has spit features located on both the north and south side of the channel. The spit features have grown in toward the channel over time. The main channel follows the southern shoreline and has caused some erosion to the inside of the spit.

Local considerations

The estuary shoreline and associated spits are dynamic and have changed significantly over time. The spit south of the river has generally built out in a northerly direction. A historic spit feature has been stranded within the estuary as the shoreline has prograded seaward. This is the current location of the Ruakaka camp ground. We have used the historic 1960 shoreline as a baseline in this area to allow for the inlet migration over time.

There is a grouted rock seawall located along the historic spit feature at the base on the camp ground. The shoreline is eroding on the western side of this feature and the seawall has been undermined and has slumped.

Coastal Erosion Hazard Assessment

The site is split into six cells based on differences in dune height and geomorphology. While most cells are characterised as nonconsolidated beach type, some of the estuarine shoreline is soft cliffed material.

Site Photograph A (estuary)

Site Photograph B (south)

Site Photograph C (north)

Adopted component values are presented within Table 3-1. Short-term fluctuations are generally larger along the northern beaches and much smaller within the estuary mouth. Long-term trends range from accretional to the north of the

rivermouth to erosional within the estuary and slightly accretional to the south.

Histograms of individual components and resultant CEHZ distances using a Monte Carlo technique are shown in Figure 3-1 to Figure 3-6. Coastal Erosion Hazard Zone widths are presented within Table 3-2 to Table 3-4 and Figure 3-7.

For cell 3CC the cliff projection method has been adopted with future shoreline distances shown in Figure 3-4 and Table 3-2 to Table 3-4 instead of CEHZ distances.

CEHZ1 distances are generally 10 to 30 m for all sites. CEHZ2 and CEHZ3 values are 35 to 55 m and 42 to 70 m on the open coast respectively and up to 73 m and 81 m respectively within the estuary where historic erosion rates have been high. CEHZs have been mapped in agreement with the calculated values, although the 1960 shoreline has been used as a baseline to allow for potential future inlet migration.

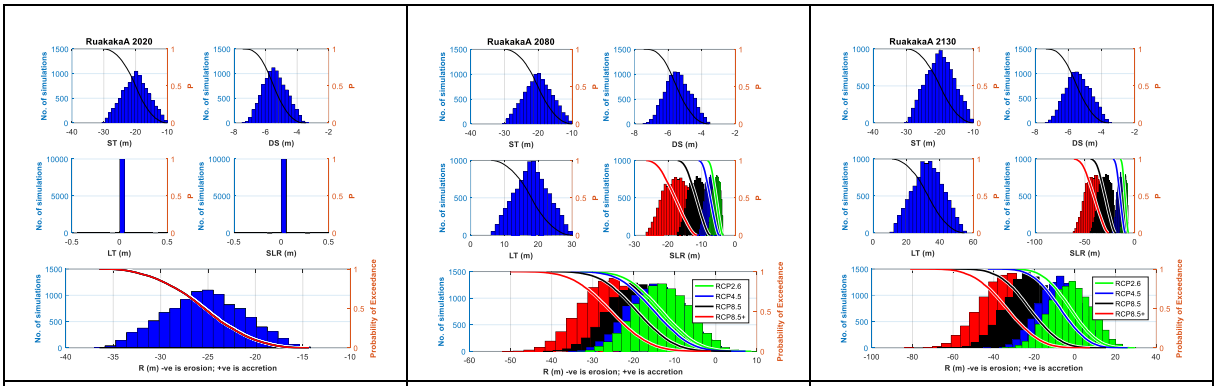
Note that cell 3A has experienced accretion since about 1961 over approximately 600 m, with CEHZs offset from the accreted most recent shoreline.

Figure 3-8 shows the available historic shorelines for Ruakaka.

Table 3-1 Component values for Erosion Hazard Assessment

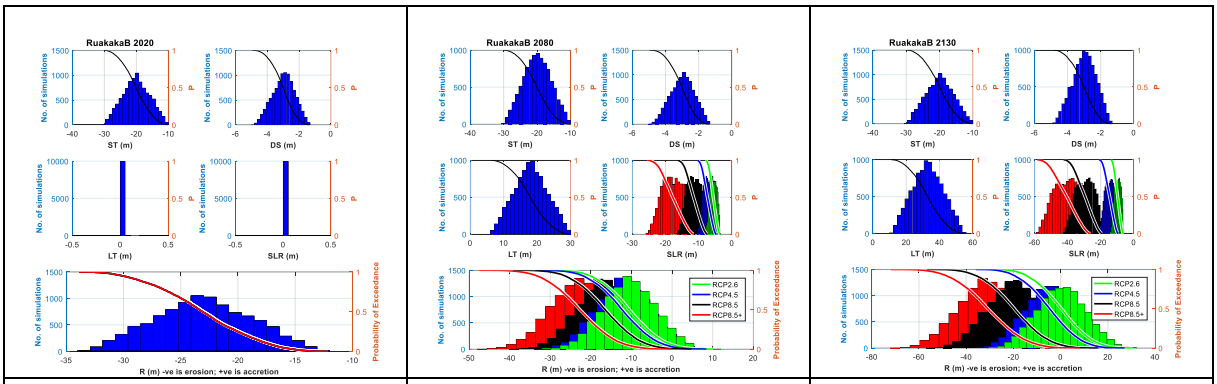
Site		**3. Ruakaka**					
Cell		3A	3B	3C	3CC[1]	3D	3E
Cell centre (NZTM)	E	1732400	1732097	1731661	0	1731961	1731961
	N	6027340	6026145	6026037	0	6025052	6025052
Chainage, m (from N/W)		0-2000	2000-2460	2460-3215	3215-3615	3615-4385	4385-9800
Morphology		Dune	Inlet	Estuary Bank	Soft Cliff	Inlet	Dune
Short-term (m)	Min	10	10	2	0	10	10
	Mode	20	20	4	0	15	15
	Max	30	30	6	0	25	25
Dune/Cliff elevation (m above toe or scarp)	Min	4.5	1.7	1.5	1.5	2.2	2.2
	Mode	7.0	3.6	3.2	3.2	4.5	6.1
	Max	8.8	5.9	6.3	6.3	5.9	7.9
Stable angle (deg)	Min	30	30	30	26.6	30	30
	Mode	32	32	32	30.2	32	32
	Max	34	34	34	33.7	34	34
Long-term (m) -ve erosion +ve accretion	Min	0.5	0.5	-0.1	-0.05	0.15	0.15
	Mode	0.3	0.3	-0.3	-0.1	0.05	0.05
	Max	0.1	0.1	-0.5	-0.15	0	0
Closure slope (beaches)	Min	0.045	0.045	0.045	0.75	0.06	0.06
	Mode	0.024	0.024	0.045	0.5	0.023	0.023
	Max	0.019	0.02	0.045	0.25	0.02	0.018
SLR 2080 (m)	RCP 2.6	0.16	0.16	0.16	0.16	0.16	0.16
	RCP 4.5	0.21	0.21	0.21	0.21	0.21	0.21
	RCP 8.5M	0.33	0.33	0.33	0.33	0.33	0.33
	RCP 8.5H+	0.51	0.51	0.51	0.51	0.51	0.51
SLR 2130 (m)	RCP 2.6	0.28	0.28	0.28	0.28	0.28	0.28
	RCP 4.5	0.42	0.42	0.42	0.42	0.42	0.42
	RCP 8.5M	0.85	0.85	0.85	0.85	0.85	0.85
	RCP 8.5H+	1.17	1.17	1.17	1.17	1.17	1.17

[1]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.



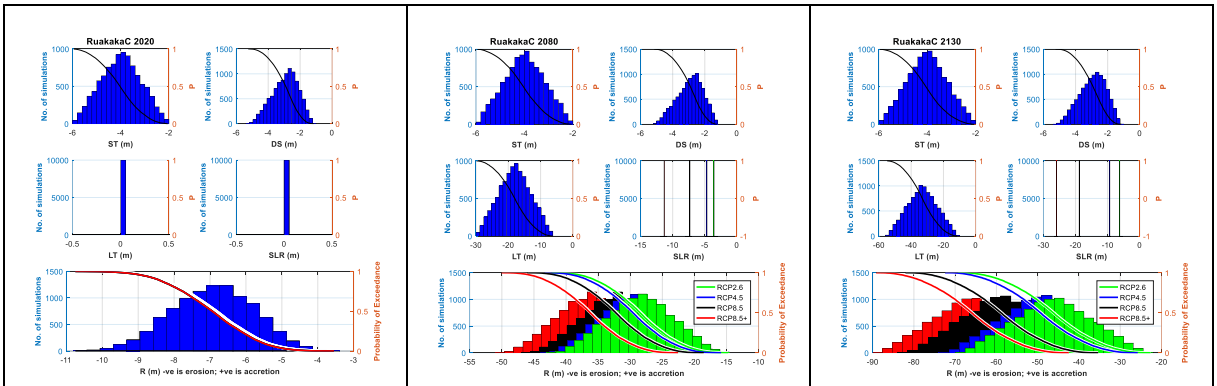
2020	2080	2130

Figure 3-1 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 3A



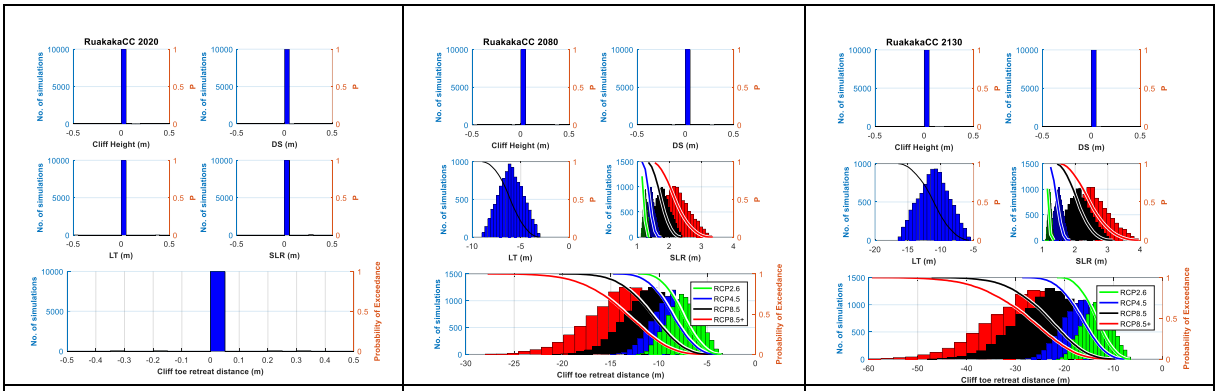
2020	2080	2130

Figure 3-2 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 3B



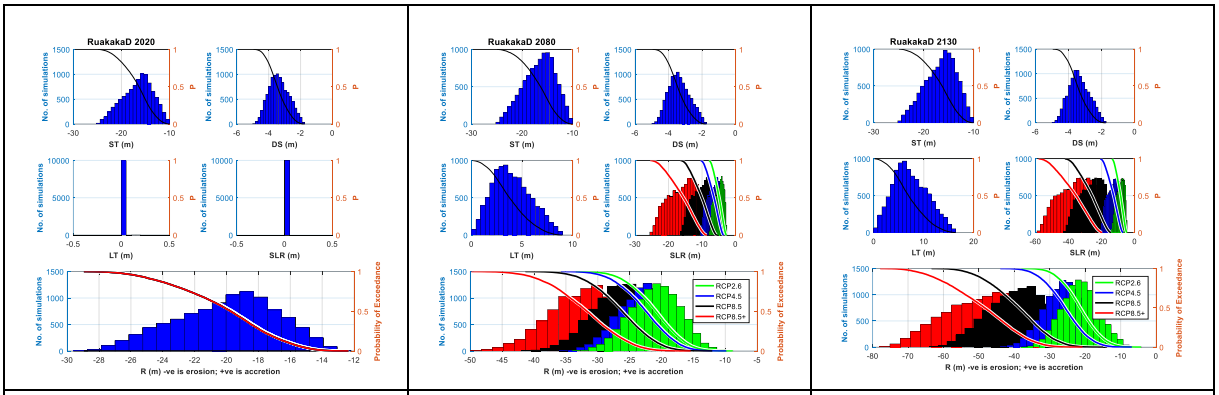
2020	2080	2130

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



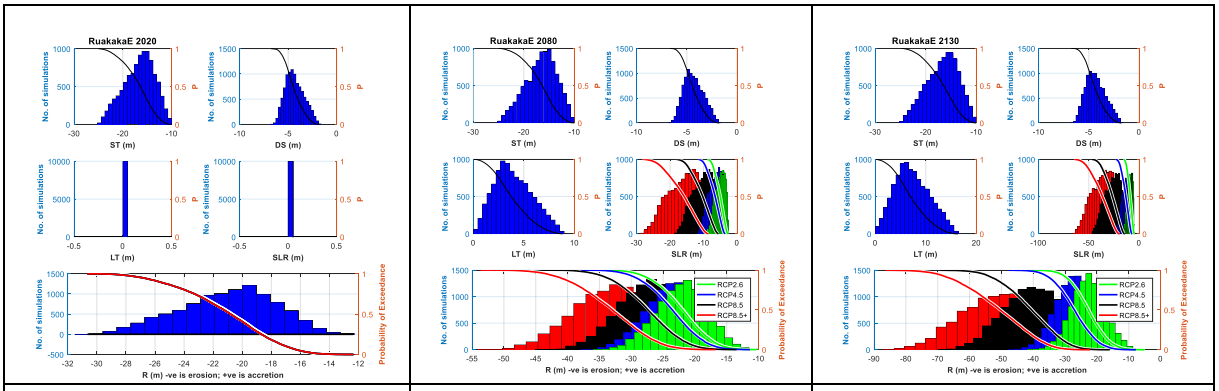
2020	2080	2130

Figure 3-4 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 3CC



2020	2080	2130

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



2020	2080	2130

Figure 3-6 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 3E

Table 3-2 Coastal Erosion Hazard Zone Widths for 2020

Site		3. Ruakaka					
		A	B	C	CC*	D	E
Probability of CEHZ (m) Exceedance	Min	-14	-12	-4	0	-12	-12
	99%	-17	-14	-4	0	-14	-15
	95%	-19	-16	-5	0	-15	-16
	90%	-20	-17	-5	0	-16	-17
	80%	-22	-19	-6	0	-17	-18
	70%	-23	-21	-6	0	-18	-19
	66%	-24	-21	-6	0	-18	-19
	60%	-24	-22	-7	0	-19	-20
	50%	-25	-23	-7	0	-20	-21
	40%	-26	-24	-7	0	-21	-22
	33%	-27	-25	-7	0	-21	-22
	30%	-28	-25	-8	0	-22	-23
	20%	-29	-27	-8	0	-23	-24
	10%	-31	-29	-8	0	-25	-26
	5%	-32	-30	-9	0	-26	-27
	1%	-34	-32	-10	0	-27	-29
	Max	-37	-34	-11	0	-29	-30

*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 3-3 Coastal Erosion Hazard Zone Widths Projected for 2080

Site		3. Ruakaka																							
Cell		3A				3B				3C				3CC				3D				3D			
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+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	9	7	4	-1	10	8	5	0	-15	-16	-19	-23	-4	-4	-4	-5	-9	-10	-12	-15	-10	-11	-13	-17
	99%	2	0	-4	-9	4	3	-1	-7	-18	-19	-21	-25	-4	-5	-5	-6	-13	-14	-16	-20	-13	-15	-17	-21
	95%	-2	-4	-8	-14	0	-1	-5	-11	-20	-21	-24	-28	-5	-5	-6	-7	-15	-16	-19	-23	-16	-17	-20	-24
	90%	-5	-6	-10	-16	-2	-4	-8	-14	-22	-23	-26	-30	-5	-6	-7	-8	-16	-17	-20	-25	-17	-18	-22	-26
	80%	-7	-9	-13	-19	-5	-7	-11	-17	-24	-25	-28	-32	-6	-7	-8	-9	-18	-19	-22	-27	-19	-20	-23	-28
	70%	-10	-11	-15	-22	-7	-9	-13	-19	-26	-27	-29	-33	-6	-7	-8	-10	-19	-20	-24	-29	-20	-21	-25	-30
	66%	-10	-12	-16	-22	-8	-9	-14	-20	-26	-27	-30	-34	-7	-7	-9	-10	-19	-21	-24	-29	-20	-22	-25	-30
	60%	-11	-13	-17	-24	-9	-11	-15	-21	-27	-28	-31	-35	-7	-8	-9	-11	-20	-21	-25	-30	-21	-22	-26	-31
	50%	-13	-15	-19	-25	-11	-12	-16	-23	-28	-30	-32	-36	-7	-8	-10	-11	-21	-22	-26	-32	-22	-24	-27	-33
	40%	-15	-17	-21	-27	-12	-14	-18	-24	-30	-31	-34	-38	-8	-8	-10	-12	-22	-23	-27	-33	-23	-25	-29	-35
	33%	-16	-18	-22	-29	-13	-15	-19	-26	-31	-32	-35	-39	-8	-9	-10	-13	-23	-24	-28	-34	-24	-25	-29	-36
	30%	-17	-19	-23	-29	-14	-16	-20	-26	-31	-32	-35	-39	-8	-9	-11	-13	-23	-25	-29	-35	-24	-26	-30	-36
	20%	-19	-21	-25	-32	-16	-18	-22	-29	-33	-34	-37	-41	-9	-9	-11	-14	-24	-26	-30	-37	-25	-27	-31	-38
	10%	-22	-23	-28	-35	-19	-21	-25	-32	-35	-36	-39	-43	-9	-10	-12	-15	-26	-28	-32	-39	-27	-29	-34	-41
	5%	-24	-26	-30	-37	-21	-23	-27	-34	-37	-38	-41	-45	-10	-11	-13	-16	-28	-29	-34	-41	-29	-31	-35	-43
	1%	-28	-30	-34	-42	-25	-27	-32	-39	-39	-40	-43	-47	-10	-12	-14	-17	-30	-32	-37	-45	-31	-33	-39	-47
	Max	-33	-35	-41	-50	-31	-34	-39	-47	-42	-43	-46	-50	-11	-13	-16	-19	-33	-36	-41	-50	-35	-38	-44	-54
	CEHZ1	-16				-14				-30				-9*				-24				-25			

*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 3-4 Coastal Erosion Hazard Zone Widths Projected for 2130

Site		3. Ruakaka																							
Cell		3A				3B				3C				3CC				3D				3D			
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+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	29	26	15	7	31	27	16	8	-23	-26	-35	-42	-6	-7	-9	-11	-4	-7	-15	-21	-5	-8	-16	-22
	99%	20	15	3	-6	23	18	6	-3	-27	-30	-40	-47	-7	-9	-11	-13	-10	-13	-22	-29	-11	-14	-23	-30
	95%	14	10	-4	-13	17	12	-1	-10	-31	-34	-44	-51	-9	-10	-13	-15	-13	-16	-26	-33	-14	-17	-27	-34
	90%	11	6	-8	-17	13	9	-5	-15	-34	-37	-47	-54	-9	-11	-15	-16	-15	-18	-29	-36	-16	-20	-30	-37
	80%	7	2	-12	-23	9	4	-10	-20	-38	-41	-51	-58	-11	-12	-16	-19	-17	-21	-32	-40	-18	-22	-33	-41
	70%	3	-2	-16	-27	6	1	-14	-24	-41	-44	-54	-61	-12	-14	-18	-20	-19	-23	-34	-43	-20	-24	-36	-44
	66%	2	-3	-17	-28	5	0	-15	-25	-42	-45	-55	-62	-12	-14	-18	-21	-19	-23	-35	-44	-20	-25	-37	-45
	60%	0	-5	-19	-30	3	-2	-17	-28	-44	-47	-57	-64	-12	-14	-19	-22	-20	-24	-36	-45	-21	-26	-38	-47
	50%	-2	-7	-22	-34	0	-5	-20	-31	-46	-49	-59	-66	-13	-15	-20	-23	-21	-26	-39	-48	-23	-27	-40	-50
	40%	-5	-10	-25	-37	-2	-7	-22	-34	-49	-52	-61	-68	-14	-16	-21	-24	-23	-27	-41	-51	-24	-29	-43	-54
	33%	-7	-12	-28	-39	-4	-9	-25	-36	-50	-53	-63	-70	-14	-17	-22	-25	-24	-28	-43	-54	-25	-30	-45	-56
	30%	-8	-13	-28	-40	-5	-10	-26	-37	-51	-54	-64	-71	-14	-17	-22	-26	-24	-29	-44	-55	-25	-30	-45	-57
	20%	-11	-16	-32	-45	-9	-14	-29	-41	-54	-57	-67	-74	-15	-18	-24	-27	-26	-31	-46	-59	-27	-32	-48	-61
	10%	-15	-21	-37	-50	-13	-18	-34	-47	-58	-61	-71	-78	-16	-19	-26	-30	-28	-33	-50	-63	-29	-35	-52	-66
	5%	-19	-24	-41	-55	-16	-22	-38	-51	-61	-64	-74	-81	-17	-20	-27	-31	-30	-35	-53	-67	-31	-37	-55	-70
	1%	-24	-30	-48	-62	-22	-27	-45	-59	-65	-68	-78	-85	-18	-22	-30	-35	-33	-39	-57	-72	-35	-41	-61	-77
	Max	-36	-43	-65	-81	-29	-36	-57	-72	-69	-72	-82	-89	-20	-24	-33	-38	-38	-44	-63	-78	-41	-48	-69	-86
	CEHZ2	-41				-38				-74				-27*				-53				-55			
	CEHZ3	-55				-51				-81				-31*				-67				-70			

*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.

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

A4 SCALE 1:35,000

0 0.4 0.8 1.2 1.6 2 (km)

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Coastal Erosion Hazard Assessment
Ruakaka
Site: 3

FIGURE No. Figure 3-7

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

A4 SCALE 1:35,000

0 0.4 0.8 1.2 1.6 2 (km)

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PROJECT No.	1012360	

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Historic Shorelines
Ruakaka
Site: 3

FIGURE No. Figure 3-8

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