

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.

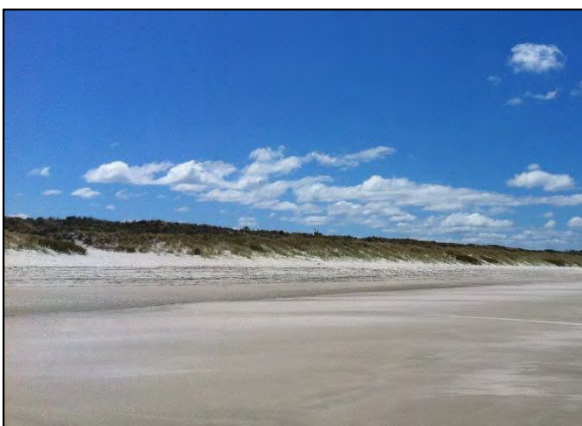
There is a grouted rock seawall located along the historic spit feature at the base on the camp ground. The shoreline is eroding on the western side of this feature and the seawall has been undermined and has slumped.

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 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 instead of CEHZ distances.

CEHZ1 distances are generally 21 to 26 m for all sites. CEHZ2 values are 39 to 55 m on the open

coast and up to 69 m within the estuary where historic erosion rates have been high. CEHZ's 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 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 | | 3. Ruakaka | | | | | |
| Cell | | 3A | 3B | 3C | 3CC ¹ | 3D | 3E |
| | Max | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |

¹Updated using cliff projection methodology.

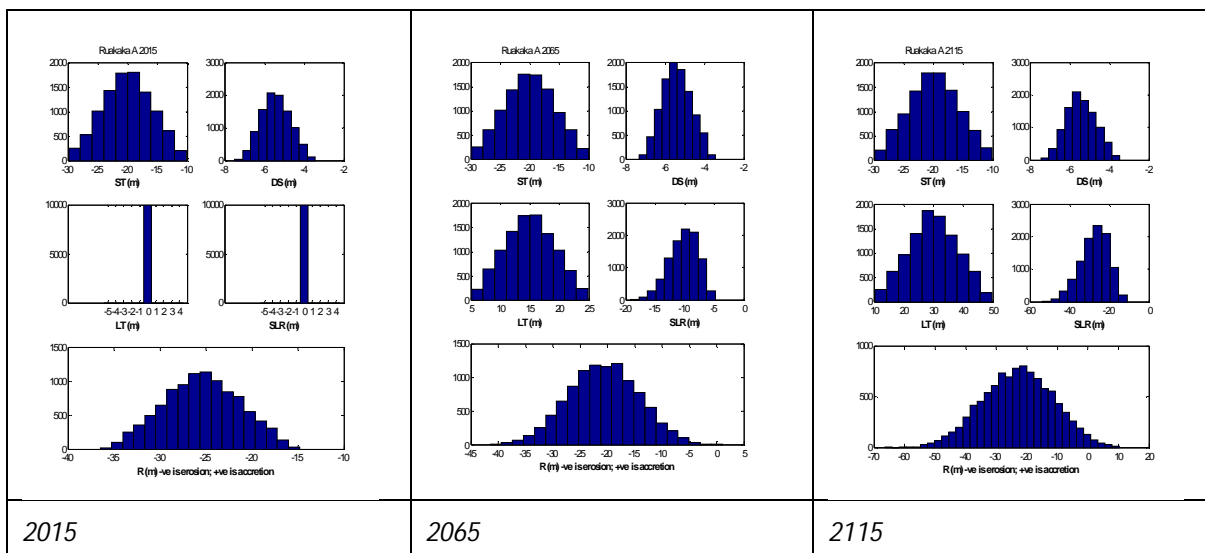


Figure 3-1 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 3A

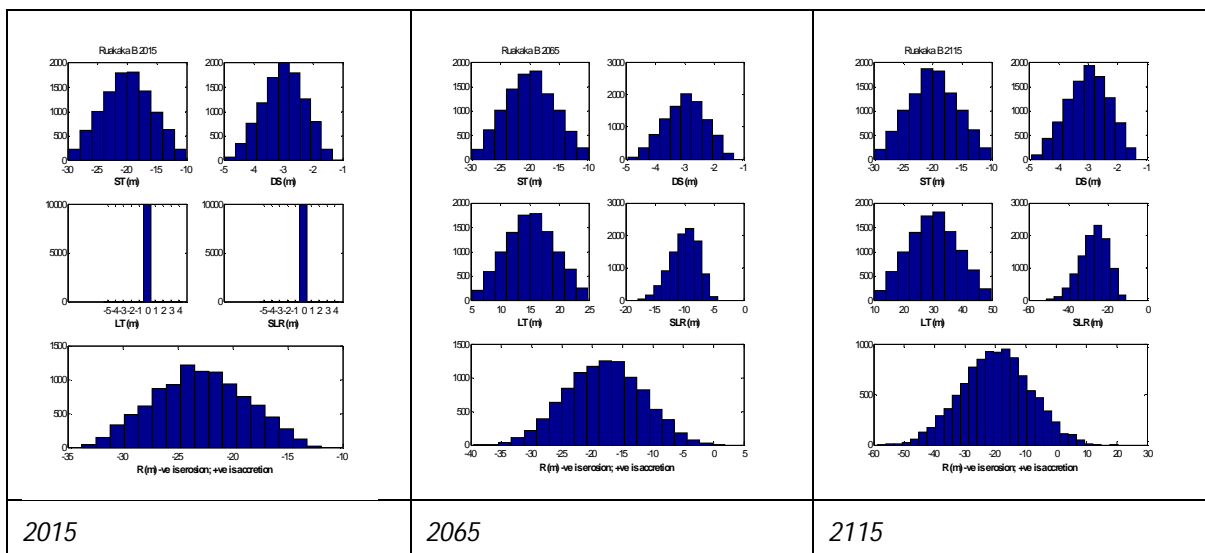


Figure 3-2 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 3B

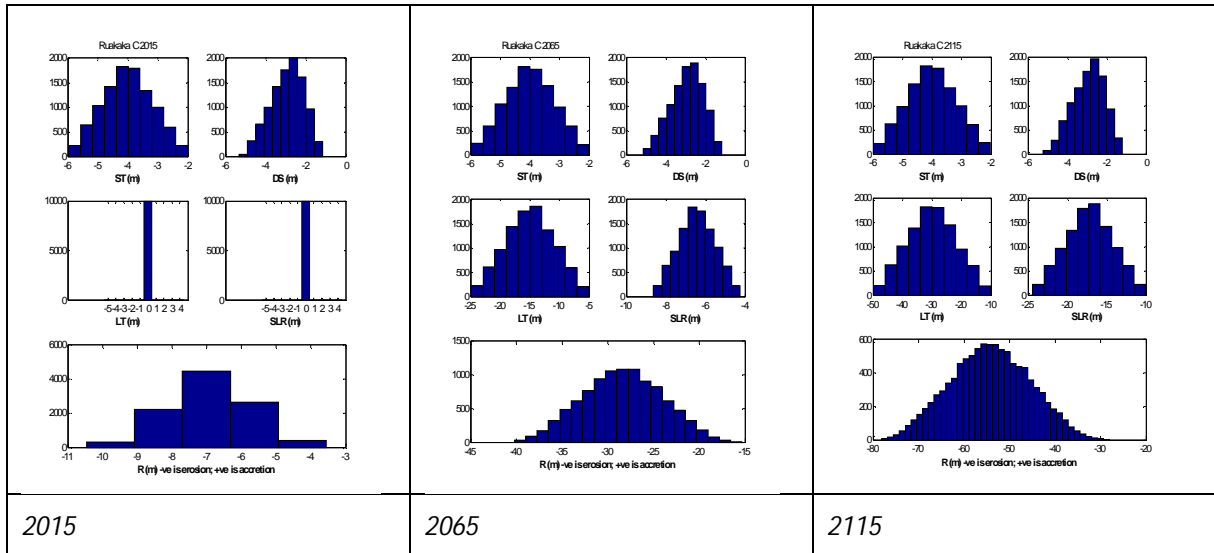


Figure 3-3 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 3C

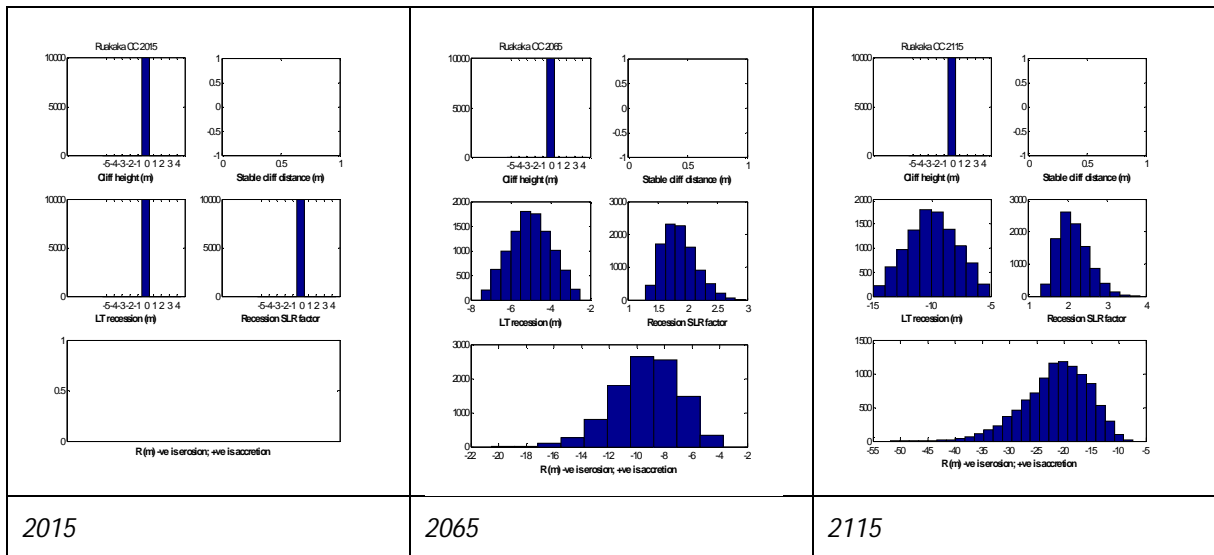


Figure 3-4 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 3CC

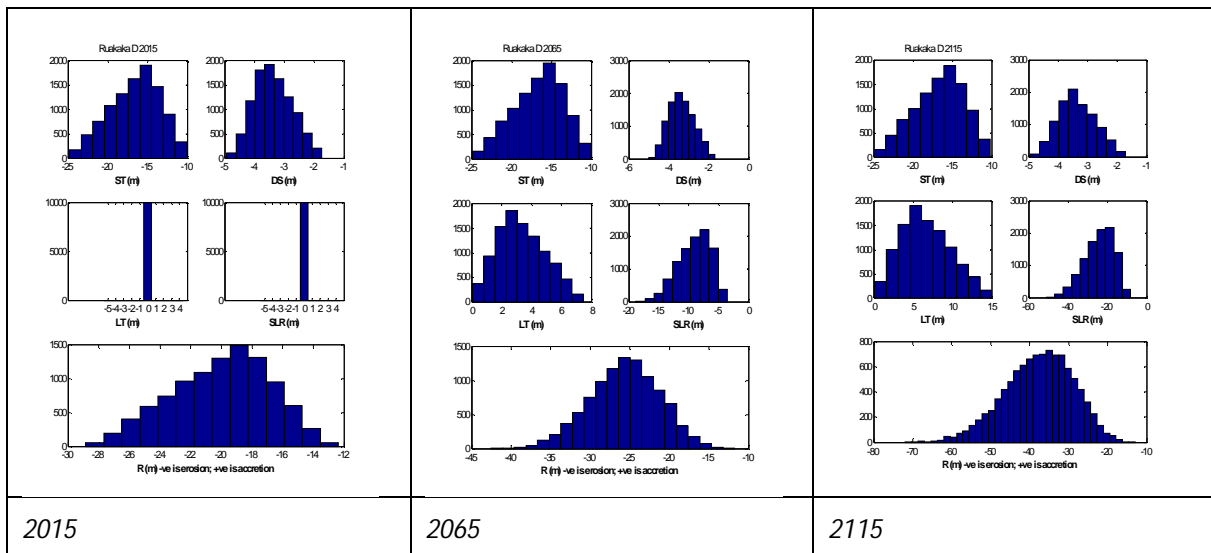


Figure 3-5 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 3D

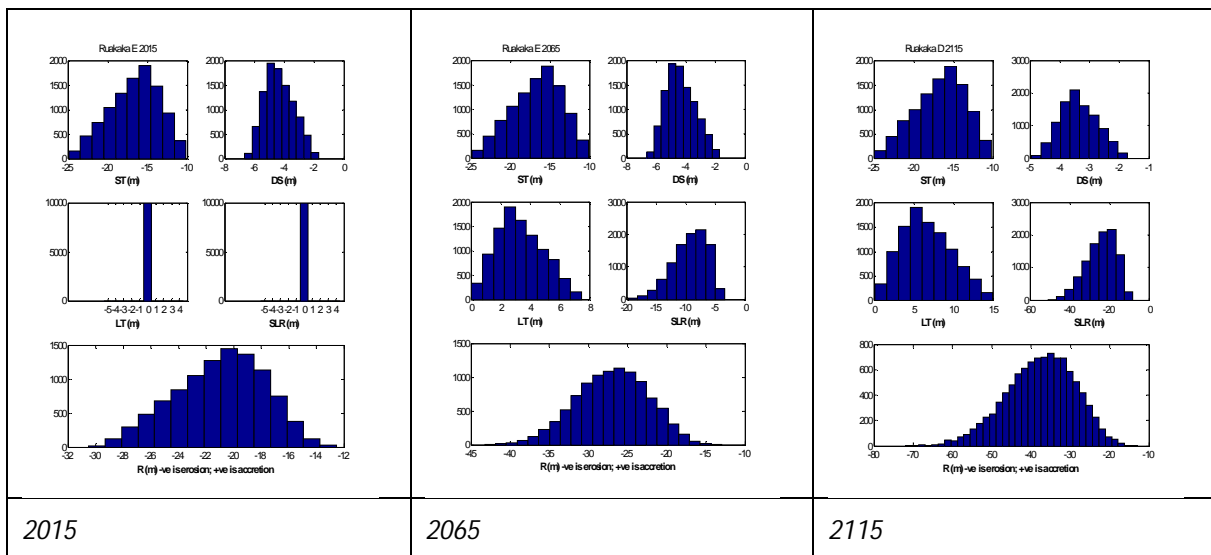


Figure 3-6 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 3E

Table 3-2 Coastal Erosion Hazard Zone Widths

| Site | | 3. Ruakaka | | | | | | | | | | | | | | | | | |
|------------------------------------|-------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Cell | | 3A | | | 3B | | | 3C | | | 3CC | | | 3D | | | 3E | | |
| 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 | -15 | 1 | 10 | -12 | 2 | 20 | -4 | -15 | -28 | 0 | -4 | -7 | -12 | -12 | -13 | -13 | -13 | -13 |
| | 99% | -17 | -6 | 2 | -14 | -4 | 6 | -4 | -19 | -35 | 0 | -5 | -11 | -14 | -16 | -20 | -15 | -17 | -21 |
| | 95% | -19 | -10 | -4 | -16 | -8 | -1 | -5 | -21 | -40 | 0 | -6 | -13 | -15 | -19 | -24 | -16 | -20 | -25 |
| | 90% | -20 | -13 | -8 | -17 | -10 | -5 | -5 | -23 | -43 | 0 | -6 | -14 | -16 | -20 | -27 | -17 | -21 | -28 |
| | 80% | -22 | -15 | -13 | -19 | -13 | -10 | -6 | -25 | -47 | 0 | -7 | -16 | -17 | -22 | -30 | -18 | -23 | -31 |
| | 70% | -23 | -17 | -17 | -21 | -15 | -14 | -6 | -26 | -49 | 0 | -8 | -18 | -18 | -23 | -33 | -19 | -24 | -34 |
| | 66% | -24 | -18 | -18 | -21 | -15 | -15 | -6 | -26 | -50 | 0 | -8 | -18 | -18 | -24 | -33 | -19 | -25 | -35 |
| | 60% | -24 | -19 | -20 | -22 | -16 | -17 | -7 | -27 | -52 | 0 | -9 | -19 | -19 | -24 | -35 | -20 | -26 | -36 |
| | 50% | -25 | -21 | -23 | -23 | -18 | -20 | -7 | -28 | -54 | 0 | -9 | -21 | -20 | -26 | -37 | -21 | -27 | -38 |
| | 40% | -26 | -22 | -26 | -24 | -20 | -23 | -7 | -30 | -57 | 0 | -10 | -22 | -21 | -27 | -39 | -22 | -28 | -41 |
| | 33% | -27 | -24 | -28 | -25 | -21 | -25 | -7 | -30 | -58 | 0 | -10 | -24 | -21 | -27 | -41 | -22 | -29 | -43 |
| | 30% | -28 | -24 | -29 | -25 | -22 | -26 | -8 | -31 | -59 | 0 | -10 | -24 | -22 | -28 | -42 | -23 | -29 | -44 |
| | 20% | -29 | -26 | -33 | -27 | -24 | -30 | -8 | -32 | -62 | 0 | -11 | -26 | -23 | -29 | -45 | -24 | -31 | -47 |
| | 10% | -31 | -29 | -38 | -29 | -26 | -35 | -8 | -34 | -66 | 0 | -12 | -30 | -25 | -32 | -49 | -26 | -33 | -52 |
| | 5% | -32 | -31 | -42 | -30 | -28 | -39 | -9 | -36 | -69 | 0 | -13 | -32 | -26 | -33 | -53 | -27 | -35 | -55 |
| | 1% | -34 | -35 | -50 | -32 | -32 | -46 | -10 | -38 | -73 | 0 | -16 | -38 | -27 | -36 | -60 | -28 | -38 | -62 |
| | Max | -36 | -41 | -66 | -34 | -40 | -59 | -10 | -40 | -78 | 0 | -21 | -52 | -29 | -43 | -72 | -31 | -43 | -76 |
| | CEHZ1 | -24 | | | -21 | | | -26 | | | -8* | | | -24 | | | -25 | | |
| CEHZ2 | -42 | | | -39 | | | -69 | | | -32* | | | -53 | | | -55 | | | |

*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.

Path: \\itgroup.local\files\AKLP\Projects\1001049\WorkingMaterial\GIS\FINAL\1001049-000-CEHZ001.mxd Date: 11/10/2017 Time: 11:55:49 AM



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).

A4 SCALE 1:35,000

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 105 Carlton Gore Rd, Newmarket, Auckland
 www.tonkintaylor.co.nz

| | | |
|------------------------------------|-----|--------|
| DRAWN | PPK | Dec.17 |
| CHECKED | TDS | Dec.17 |
| APPROVED | RRH | Dec.17 |
| ARCFILE 1001049-000-CEHZ001.mxd | | |
| SCALE (AT A4 SIZE) 1:35,000 | | |
| PROJECT No. 1001049 | | |

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 Coastal Erosion Hazard Assessment
 Ruakaka
 Site: 3

FIGURE No. **Figure 3-7**

Rev. **2**

Path: P:\11001049\WorkingMaterial\GIS\FINAL\HistoricShorelines.mxd Date: 4/10/2017 Time: 3:06:56 PM



Legend

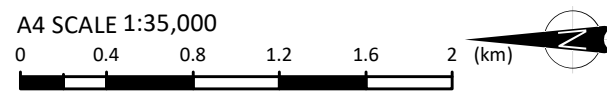
←→ Cell Extent

Shorelines

- 2014 baseline
- 14/01/2014
- 29/04/1998
- 13/12/1985
- 02/05/1966
- 20/05/1963
- 17/03/1961
- 13/09/1950
- 01/07/1920

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

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



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| | | |
|-----------------------------------|-----|--------|
| DRAWN | PPK | Dec.17 |
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| ARCFILE HistoricShorelines.mxd | | |
| SCALE (AT A4 SIZE) 1:35,000 | | |
| PROJECT No. 1001049 | | |

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Historic shorelines
Ruakaka
Site: 3

| | | | |
|------------|------------|------|---|
| FIGURE No. | Figure 3-8 | Rev. | 2 |
|------------|------------|------|---|