

## 4 Marsden Point

### Description and geomorphology

The Marsden Point site is located at the north end of Bream Bay, approximately 20 km south of Whangarei.

The site is situated between the North Port reclamation around Marsden Point down to the Ruakaka township at the southern extent. The Marsden Point site includes a north facing shoreline located inside the harbour entrance which is approximately 1.6 km long and an east facing open coast shoreline that is approximately 5 km long.

The harbour shoreline is a sandy beach dune system. The dunes are relatively low lying and well vegetated with spinifex and pingao. The sandy beach comprises fine sand fronted by intertidal flats which range in width between 30 m and 200 m out to the entrance channel.

The open coast section of the site has a sandy beach comprising fine sand. The beach has a minimal berm width of approximately 5 m above the high tide line. The site has a dune system that is relatively high with crest elevations of between RL 5 to 13 m along the open coast. The dune elevations increase toward the north. The dune face is generally over steep with recent erosion scarps located at the northern end of the open coast shoreline. Dune vegetation exists along the dune crest (spinifex). The lower half of the dune face is re-building with limited vegetation present.

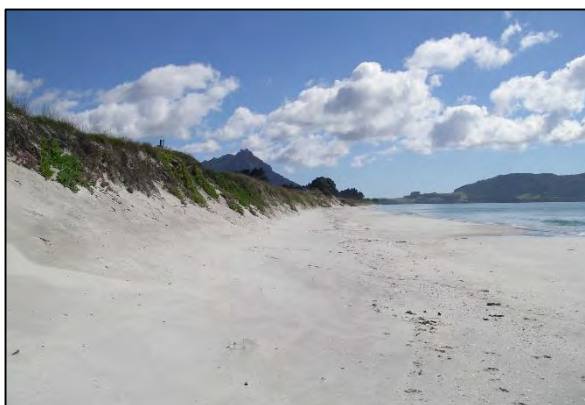
### Local considerations

The offshore ebb tide delta has a significant control on the shoreline position adjacent to the entrance to the Whangarei Harbour. Large variations in shoreline position have occurred over the last 60 years in this area of up to 80 m. Changes to the ebb tide delta may result in relatively rapid changes to shoreline position in this area, which may vary from historic trends.

There are no erosion protection structures at this site. The site is bounded at the north western end by the North Port reclamation, which shelters the shoreline from the westerly direction in this area. Two stormwater outlets



*Site Photograph A (south)*



*Site Photograph B (centre)*



*Site Photograph C (north)*

exist on the open coast shoreline, which have a relatively minor effect on the shoreline position.

### Coastal Erosion Hazard Assessment

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

presented within Table 4-1. The short-term erosion component increases to the south. The long-term shoreline trends are accretionary in the north within the harbour, becoming highly erosional along cells B and C on the open coast, likely due to changes in the ebb tidal delta and channels, and becoming stable to the south.

Histograms of individual components and resultant CEHZ distances using a Monte Carlo technique are shown in Figure 4-1 to Figure 4-7. Coastal Erosion Hazard Zone widths are presented within Table 4-2 and Figure 4-8.

CEHZ1 values range from 13 to 65 m with the current  $P_{66\%}$  being adopted for Cell A being larger than the 2065 value. CEHZ2 values range from 25 m within the harbour mouth to 162 m. Large open coast values are due to the long-term erosion trends at Cells B and C and also the very flat offshore profile associated with the ebb tidal delta which results in large recession distances with sea level rise. CEHZ's have been mapped in agreement with the calculated values.

Figure 4-9 shows the available historic shorelines for Marsden Point.

Table 4-1 Component values for Erosion Hazard Assessment

| Site                                          |      | 4. Marsden Point |           |           |           |           |           |           |
|-----------------------------------------------|------|------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cell                                          |      | 4A               | 4AA       | 4B        | 4C        | 4D        | 4E        | 4F        |
| Cell centre (NZTM)                            | E    | 1735472          | 1735472   | 1735472   | 1734590   | 1733854   | 1733041   | 1733041   |
|                                               | N    | 6033104          | 6033104   | 6033104   | 6031419   | 6030598   | 6029315   | 6029315   |
| Chainage, m (from N/W)                        |      | 0-1280           | 1280-1850 | 1850-2670 | 2670-4020 | 4020-4900 | 4900-6350 | 6350-7160 |
| Morphology                                    |      | Estuary Bank     | Dune      | Dune      | Dune      | Dune      | Dune      | Dune      |
| Short-term (m)                                | Min  | 5                | 5         | 5         | 10        | 10        | 10        | 10        |
|                                               | Mode | 10               | 10        | 10        | 20        | 20        | 20        | 20        |
|                                               | Max  | 20               | 20        | 20        | 30        | 30        | 30        | 30        |
| Dune/Cliff elevation (m above toe or scarp)   | Min  | 1.5              | 1.5       | 3.0       | 7.0       | 4.7       | 5.2       | 5.9       |
|                                               | Mode | 3.3              | 4.3       | 4.4       | 8.9       | 6.8       | 7.2       | 7.2       |
|                                               | Max  | 5.3              | 5.3       | 7.0       | 13.0      | 10.2      | 9.9       | 8.8       |
| Stable angle (deg)                            | Min  | 30               | 30        | 30        | 30        | 30        | 30        | 30        |
|                                               | Mode | 32               | 32        | 32        | 32        | 32        | 32        | 32        |
|                                               | Max  | 34               | 34        | 34        | 34        | 34        | 34        | 34        |
| Long-term (m)<br>-ve erosion<br>+ve accretion | Min  | 0.5              | 0.4       | -0.6      | -0.15     | 0.25      | 0         | 0.2       |
|                                               | Mode | 0.3              | 0.1       | -0.8      | -0.45     | 0.15      | -0.1      | 0         |
|                                               | Max  | 0                | -0.5      | -1        | -0.6      | 0         | -0.2      | -0.1      |
| Closure slope (beaches)                       | Min  | 0.045            | 0.045     | 0.045     | 0.045     | 0.045     | 0.045     | 0.045     |
|                                               | Mode | 0.045            | 0.019     | 0.019     | 0.019     | 0.019     | 0.019     | 0.019     |
|                                               | Max  | 0.045            | 0.008     | 0.008     | 0.008     | 0.008     | 0.008     | 0.008     |
| SLR 2065 (m)                                  | Min  | 0.19             | 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      | 0.29      |
|                                               | Max  | 0.39             | 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      | 0.45      |
|                                               | Mode | 0.77             | 0.77      | 0.77      | 0.77      | 0.77      | 0.77      | 0.77      |
|                                               | Max  | 1.1              | 1.1       | 1.1       | 1.1       | 1.1       | 1.1       | 1.1       |

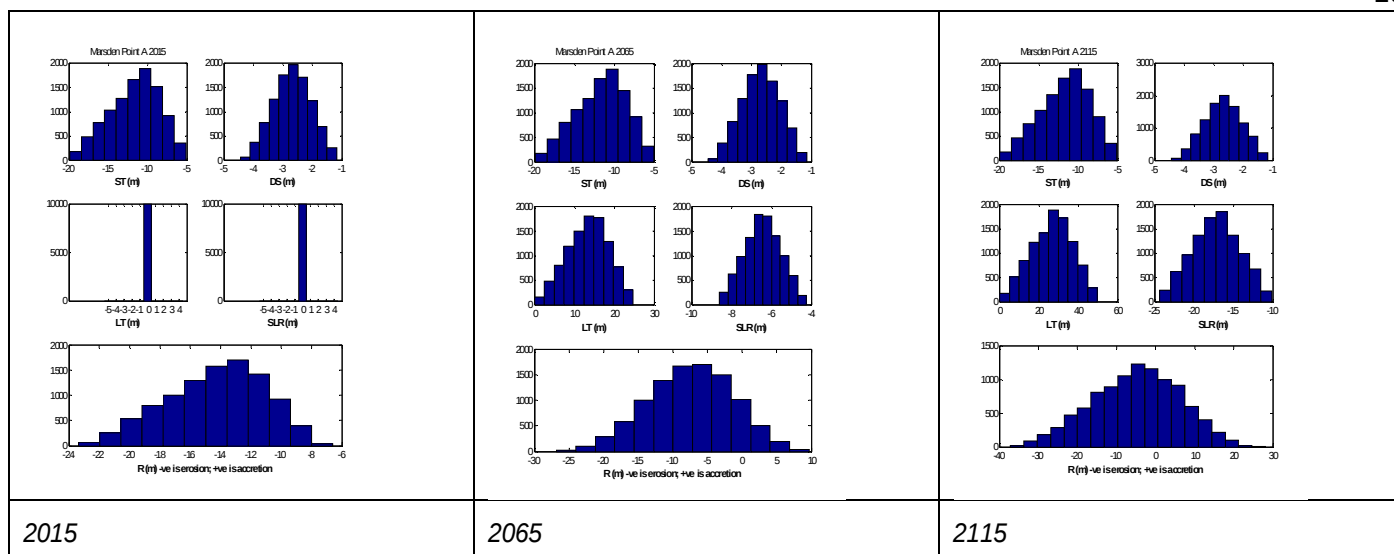


Figure 4-1 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4A

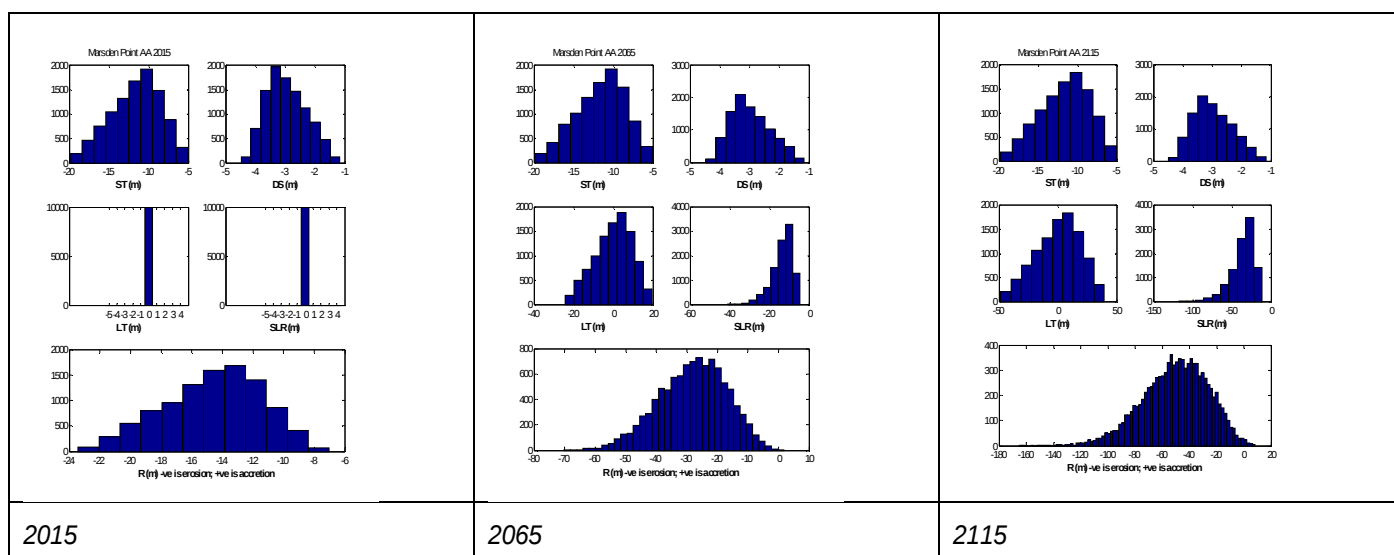


Figure 4-2 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4AA

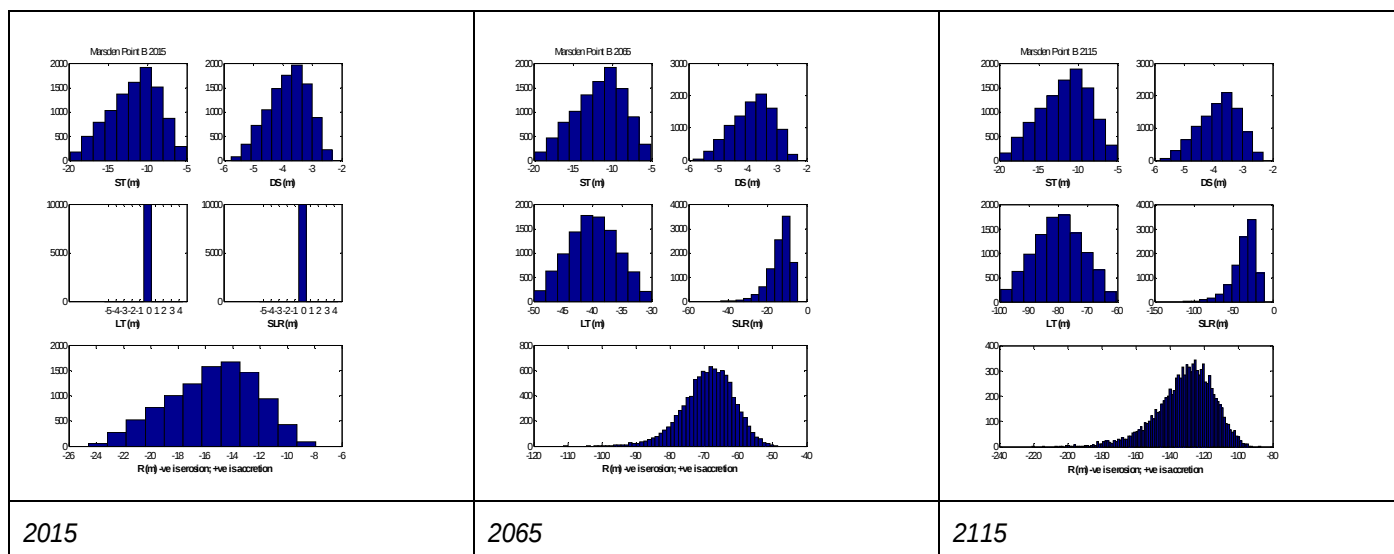


Figure 4-3 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4B

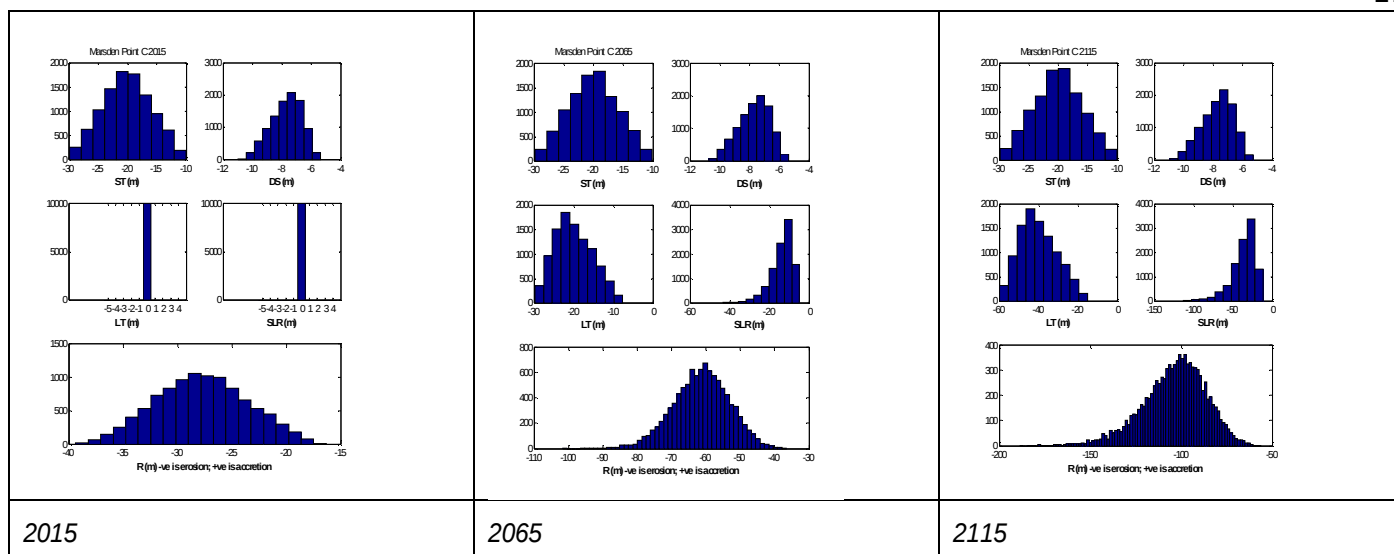


Figure 4-4 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4C

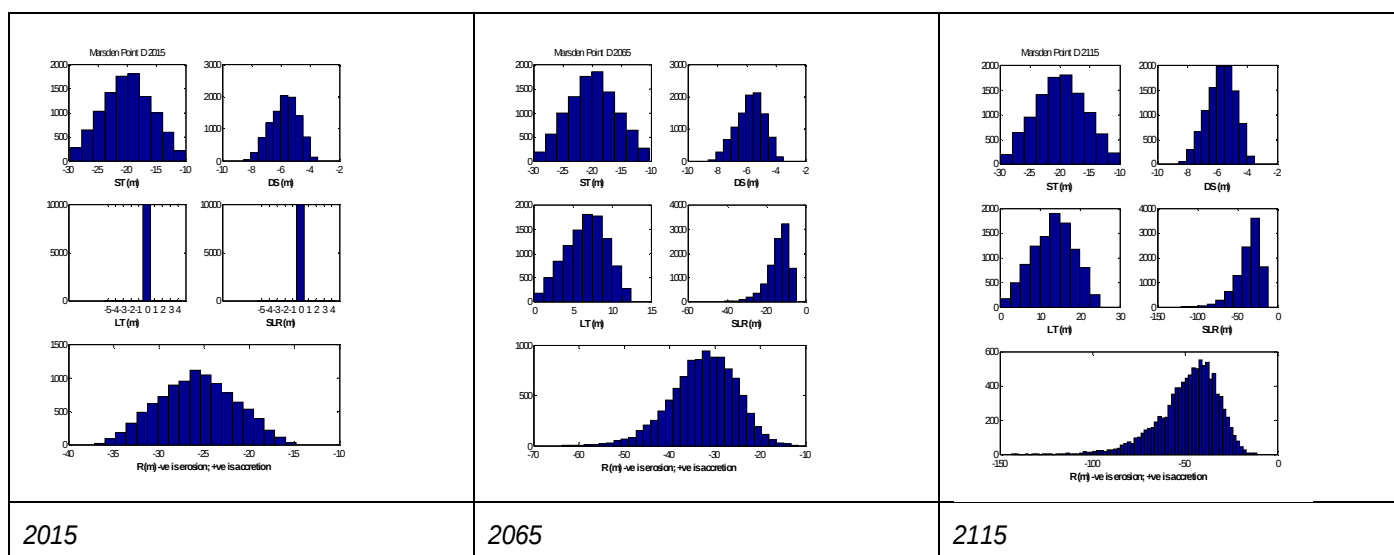


Figure 4-5 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4D

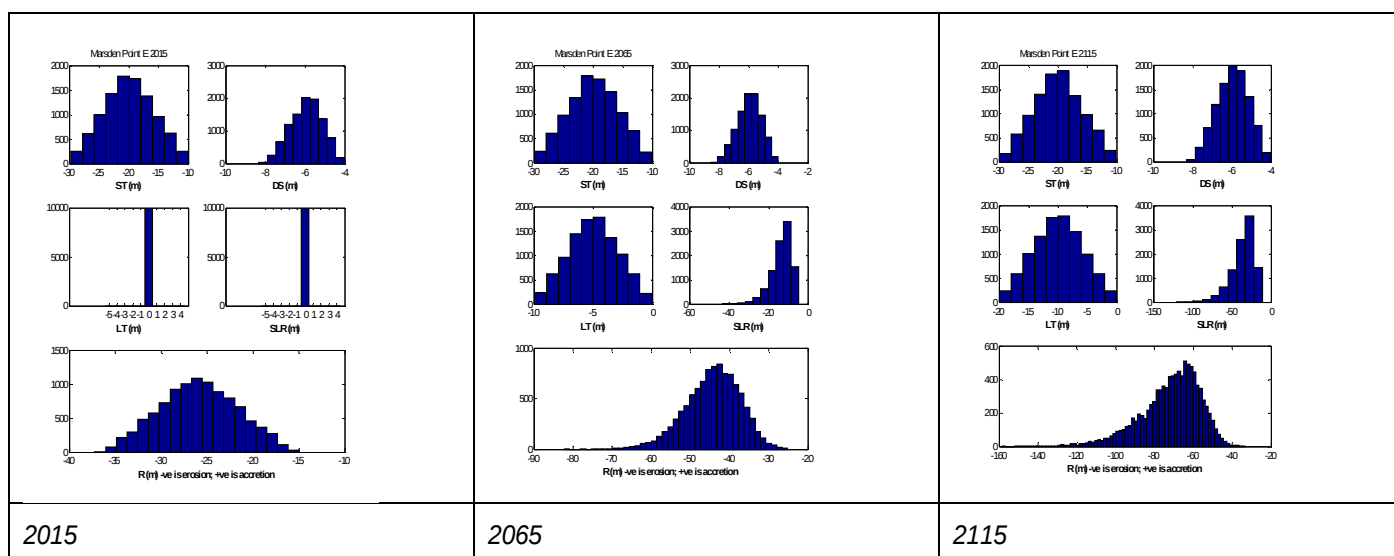


Figure 4-6 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4E

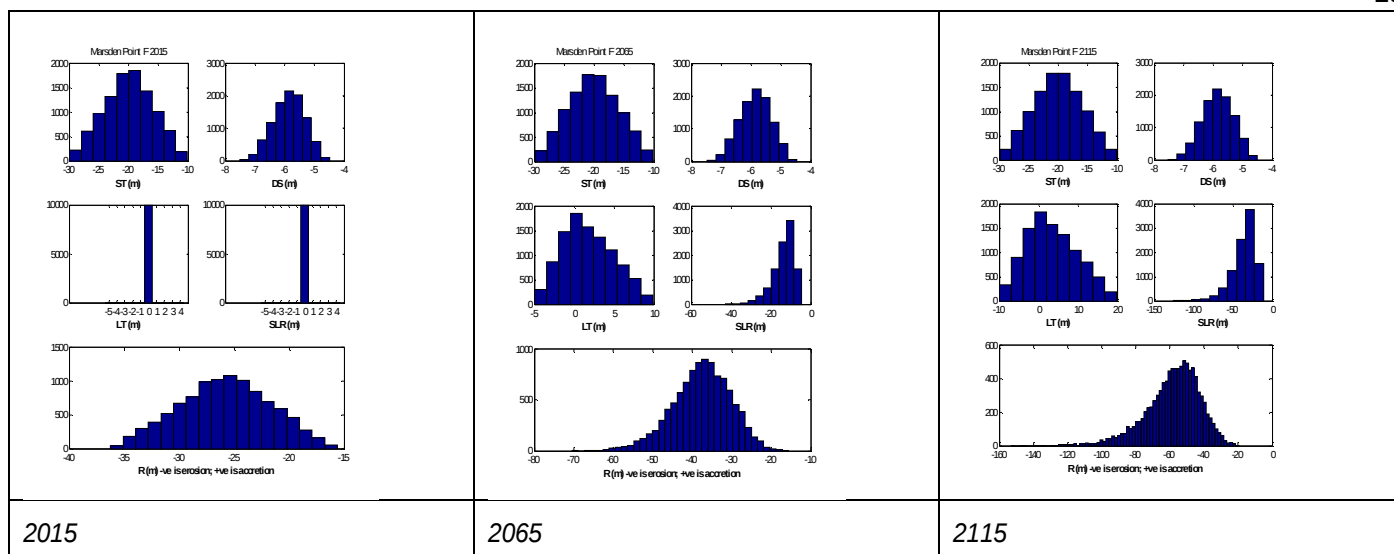


Figure 4-7 Histograms of parameter samples and the resultant shoreline distances for 2015, 2065 and 2115 timeframes for cell 4F

Table 4-2 Coastal Erosion Hazard Zone Widths

| Site                               |       | 4. Marsden Point |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------------------|-------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Cell                               |       | 4A               |      |      | 4AA  |      |      | 4B   |      |      | 4C   |      |      | 4D   |      |      | 4E   |      |      | 4F   |      |      |
| Time                               |       | 2015             | 2065 | 2115 | 2015 | 2065 | 2115 | 2015 | 2065 | 2115 | 2015 | 2065 | 2115 | 2015 | 2065 | 2115 | 2015 | 2065 | 2115 | 2015 | 2065 | 2115 |
| Probability of CEHZ (m) Exceedance | Min   | -7               | 10   | 28   | -7   | 2    | 8    | -8   | -49  | -87  | -16  | -37  | -56  | -15  | -12  | -11  | -15  | -25  | -33  | -16  | -16  | -20  |
|                                    | 99%   | -8               | 6    | 18   | -9   | -6   | -4   | -9   | -54  | -100 | -19  | -44  | -69  | -17  | -18  | -21  | -17  | -30  | -46  | -17  | -22  | -29  |
|                                    | 95%   | -10              | 2    | 13   | -10  | -11  | -14  | -11  | -58  | -108 | -21  | -48  | -78  | -19  | -22  | -27  | -19  | -34  | -51  | -19  | -26  | -36  |
|                                    | 90%   | -10              | 0    | 9    | -11  | -14  | -20  | -11  | -60  | -112 | -22  | -51  | -83  | -20  | -24  | -30  | -20  | -36  | -55  | -20  | -29  | -40  |
|                                    | 80%   | -11              | -2   | 5    | -12  | -18  | -30  | -13  | -63  | -117 | -24  | -54  | -89  | -22  | -27  | -35  | -22  | -38  | -59  | -22  | -31  | -45  |
|                                    | 70%   | -12              | -4   | 2    | -13  | -22  | -36  | -14  | -65  | -122 | -26  | -57  | -94  | -23  | -28  | -39  | -24  | -40  | -63  | -24  | -34  | -49  |
|                                    | 66%   | -13              | -5   | 0    | -13  | -23  | -38  | -14  | -65  | -123 | -26  | -58  | -95  | -24  | -29  | -40  | -24  | -41  | -64  | -24  | -34  | -50  |
|                                    | 60%   | -13              | -6   | -2   | -13  | -25  | -43  | -14  | -67  | -126 | -27  | -59  | -98  | -25  | -30  | -42  | -25  | -42  | -66  | -25  | -36  | -53  |
|                                    | 50%   | -14              | -7   | -4   | -14  | -27  | -49  | -15  | -68  | -130 | -28  | -61  | -102 | -26  | -32  | -46  | -26  | -44  | -69  | -26  | -37  | -56  |
|                                    | 40%   | -15              | -9   | -7   | -15  | -30  | -55  | -16  | -70  | -133 | -29  | -63  | -107 | -27  | -34  | -50  | -27  | -46  | -73  | -27  | -39  | -60  |
|                                    | 33%   | -16              | -10  | -10  | -16  | -33  | -60  | -17  | -72  | -136 | -30  | -65  | -110 | -28  | -35  | -53  | -28  | -47  | -76  | -28  | -40  | -63  |
|                                    | 30%   | -16              | -11  | -11  | -16  | -34  | -62  | -17  | -72  | -138 | -30  | -65  | -112 | -28  | -36  | -54  | -28  | -48  | -78  | -28  | -41  | -64  |
|                                    | 20%   | -17              | -13  | -15  | -17  | -38  | -71  | -18  | -75  | -144 | -31  | -68  | -118 | -30  | -38  | -60  | -30  | -50  | -84  | -30  | -44  | -70  |
|                                    | 10%   | -19              | -16  | -20  | -19  | -43  | -83  | -20  | -79  | -153 | -33  | -72  | -127 | -31  | -42  | -70  | -32  | -54  | -93  | -31  | -47  | -80  |
|                                    | 5%    | -20              | -18  | -24  | -20  | -48  | -93  | -21  | -82  | -162 | -35  | -75  | -136 | -33  | -45  | -79  | -33  | -57  | -101 | -33  | -51  | -88  |
|                                    | 1%    | -22              | -22  | -31  | -22  | -56  | -114 | -23  | -90  | -181 | -37  | -83  | -154 | -35  | -52  | -98  | -35  | -63  | -120 | -35  | -58  | -109 |
|                                    | Max   | -23              | -27  | -37  | -23  | -70  | -165 | -25  | -111 | -221 | -39  | -102 | -189 | -37  | -64  | -144 | -37  | -82  | -158 | -36  | -70  | -153 |
|                                    | CEHZ1 | -13              |      |      | -23  |      |      | -65  |      |      | -58  |      |      | -29  |      |      | -41  |      |      | -34  |      |      |
|                                    | CEHZ2 | -25              |      |      | -93  |      |      | -162 |      |      | -136 |      |      | -79  |      |      | -101 |      |      | -88  |      |      |

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### LEGEND

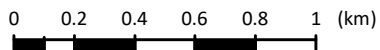
- 2013 - 2014 shoreline
- Erosion Protection Structures
- ↔ Cell Extent

### 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).

A4 SCALE 1:25,000



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|                         |     |        |
|-------------------------|-----|--------|
| DRAWN                   | PPK | Dec.17 |
| CHECKED                 | TDS | Dec.17 |
| APPROVED                | RRH | Dec.17 |
| ARCFIELD                |     |        |
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| SCALE (AT A4 SIZE)      |     |        |
| 1:25,000                |     |        |
| PROJECT No.             |     |        |
| 1001049                 |     |        |

## NORTHLAND REGIONAL COUNCIL

Coastal Erosion Hazard Assessment

Marsden Point

Site: 4

FIGURE No.

Figure 4-8

Rev.

2

Path: P:\1001049\WorkingMaterial\GIS\FINAL\HistoricShorelines.mxd Date: 4/10/2017 Time: 3:06:59 PM



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

A4 SCALE 1:25,000

0 0.2 0.4 0.6 0.8 1 (km)



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|                                    |     |        |
|------------------------------------|-----|--------|
| DRAWN                              | PPK | Dec.17 |
| CHECKED                            | TDS | Dec.17 |
| APPROVED                           | RRH | Dec.17 |
| ARCFIELD<br>HistoricShorelines.mxd |     |        |
| SCALE (AT A4 SIZE)<br>1:25,000     |     |        |
| PROJECT No.<br>1001049             |     |        |

## NORTHLAND REGIONAL COUNCIL

Historic shorelines

Marsden Point

Site: 4

FIGURE No. Figure 4-9

Rev. 2