

## **Annexure 2**

### **Takahiwai Coastline Study**

## **Preliminary estimate of future Takahiwai Estuary shoreline position due to predicted Sea Level Rise**

This preliminary assessment estimates the horizontal translation of the Takahiwai Estuary shoreline due to the effects of sea level rise (SLR) to 2060 and 2110.

The current shoreline position for this assessment was taken as the mean high water spring mark (MHWS) as plotted on LiDAR derived Digital Terrain Model (DTM). The MHWS level for Takahiwai was assumed to be the same as Whangarei Port located approximately 11 km to the north west. The New Zealand Nautical Almanac (LINZ 2008/2009) gives a MHWS level of 1.3 m above mean sea level (MSL) for Whangarei Port. This level was rounded up to 1.5 m to account for the accuracy (+/- 0.2 m) of the LiDAR derived Digital Terrain Model (DTM) used to extract elevation contours.

This estimate considers the horizontal translation of the Takahiwai shoreline position due to SLR of 0.36 m to 2060 and 0.9 m to 2110 (MfE,2008<sup>1</sup>). Estimating future shoreline position is difficult as the shoreline position is due to the combination and interaction of a number of parameters such as water level, topography, geology, wave energy, sediment transport, sedimentation and mangrove colonisation.

However, a preliminary 'back of the envelope' estimate can provide useful information. Therefore, a simple pragmatic approach was adopted which assumes the shoreline position will move inland to a new MHWS level of 1.86 m (1.5 m + 0.36 m) and 2.4 m (1.5 m + 0.9 m) for 2060 and 2110 respectively. This method provides a conservative estimate of shoreline position and does not allow for future control structures (e.g. stop banks) or morphological change.

Figure 1 (attached) shows the two shorelines plotted over the 2007 aerial photograph where:

- Shoreline A (2.4 m contour) = 2110 shoreline based on retreat due to SLR of 0.9 m.
- Shoreline B (1.86 m contour) = 2060 shoreline based on retreat due to SLR of 0.36 m.

The two elevation contours were derived from a DTM, based on LiDAR spot heights provided by Northland Regional Council (NRC). Therefore, the extent of this assessment is limited to the extent of the LiDAR survey (approximate extent of aerial image). The results of this assessment could be extended across the entire Takahiwai Estuary if further LiDAR information is acquired. We note that both shoreline positions are within the current Flood Susceptibility Area identified on the WDC Operative Planning Map 51 (April 2007).

The intertidal flats of Takahiwai Estuary are densely colonized by Mangroves. Mangroves attenuate incident wave energy and can reduce the erosion effects of storm surge events. Therefore, Mangrove removal is likely to result in an increase in erosion along the Takahiwai Estuary shoreline.

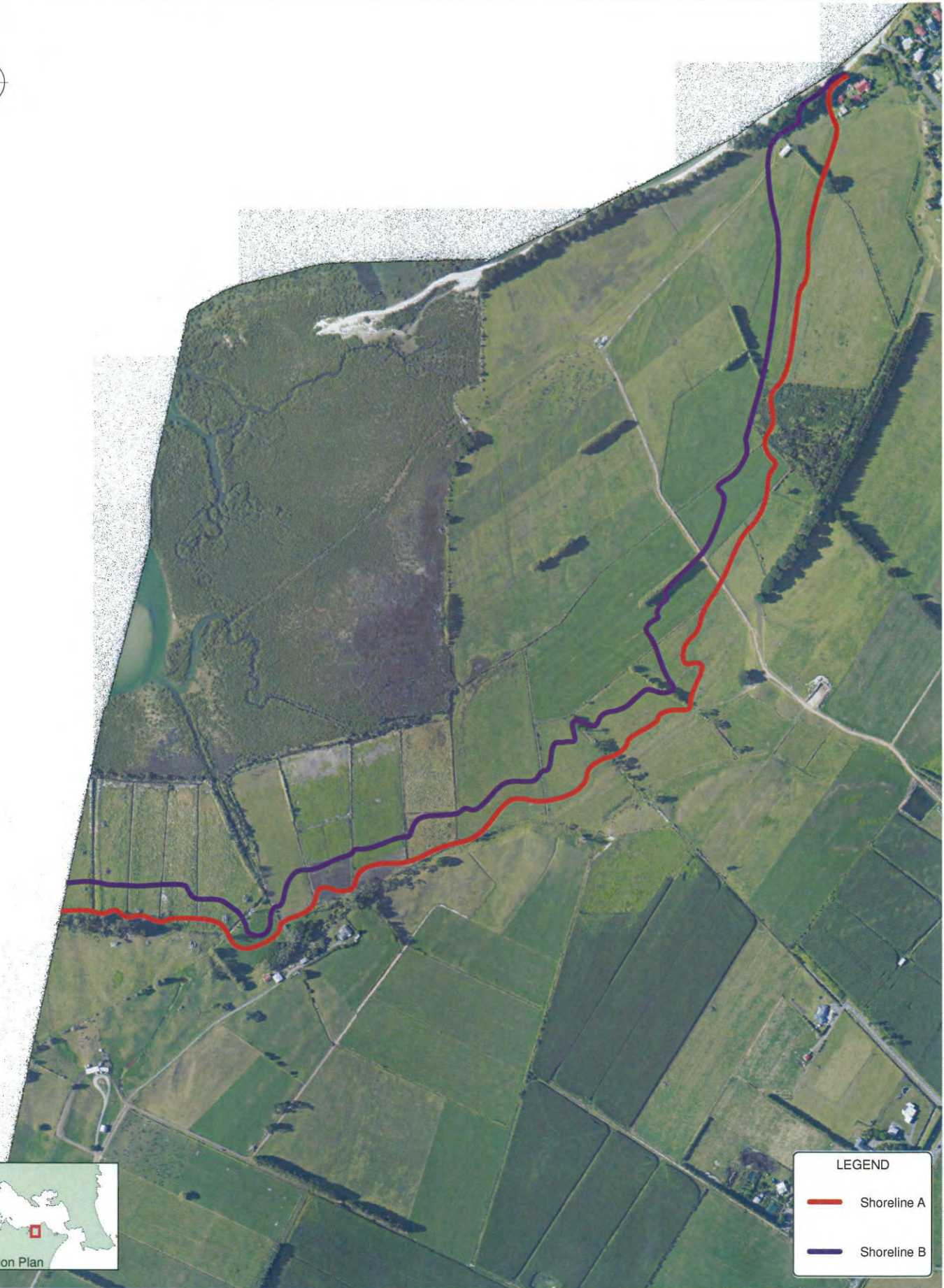
Therefore, the shorelines depicted are indicative only and should not be used directly into any planning documents.

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<sup>1</sup> Ministry for the Environment (2008): Coastal hazards and climate change. A guidance manual for local government in New Zealand. 2<sup>nd</sup> Edition. Revised by Ramsay, D. and Bell, R. (NIWA). Prepared for Ministry for the Environment. viii+127 p.

## **Applicability**

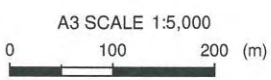
This report has been prepared for the benefit of Whangarei District Council with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.



**LEGEND**

- Shoreline A
- Shoreline B

Notes: Background aerial taken in 2007.  
Source WDC.



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**WHANGAREI DISTRICT COUNCIL  
COASTAL HAZARD REVIEW  
Preliminary Takahiwai Assessment  
Sheet A3**