

# Assessment of Effects on Surf Breaks at Te Ākau Bream Bay

The surfability of seven regionally significant surf breaks in Bream Bay (refer to Figure 1 & 2 below), as identified in the *New Zealand Surfing Guide Book* and Northland Regional Council's online portal, was assessed in relation to the proposed sand extraction activities. The study examined worst-case scenarios where the full volume of sand would be extracted over the consent term with no natural replenishment. Such scenarios represent maximum changes in bathymetry, though in reality, natural sand pathways would partially refill extraction areas over time.

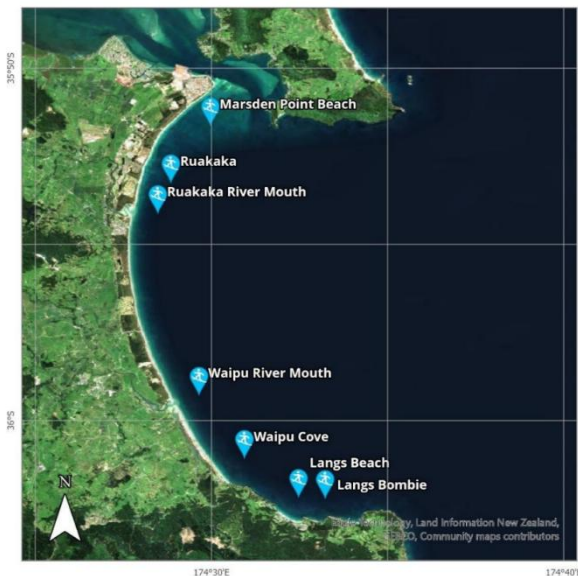


Figure 2: Reporting sites representative of surf breaks within Te Ākau Bream Bay.



Figure 1: Map showing the proposed sand extraction area (yellow rectangle) and extents of the highest resolution wave model nest (red rectangle).

Hindcast wave data for 2009, chosen as representative of average annual conditions, was used to evaluate changes in surfable conditions (refer to Figures 3, 4, & 5 below). Wave parameters, including significant wave height ( $H_s$ ), mean wave direction ( $D_m$ ), and mean wave period ( $T_m$ ), were analysed for typical good surfing events driven by swells incoming from the north-east, east, and south-east sectors.

Results showed **minimal changes** between pre- and post-extraction conditions. Variations in  $H_s$  were limited to  $\pm 0.04$  m (with a maximum relative decrease of 1.2% and an increase of 3.5%), while  $D_m$  changes were limited to  $\pm 2^\circ$ . Changes in mean wave period ( $T_m$ ) were under  $\pm 2$  seconds, corresponding to a relative change of -25.5% to +22.0%. These small variations were more pronounced at the edges of the extraction areas but did not significantly affect conditions at the surf breaks.

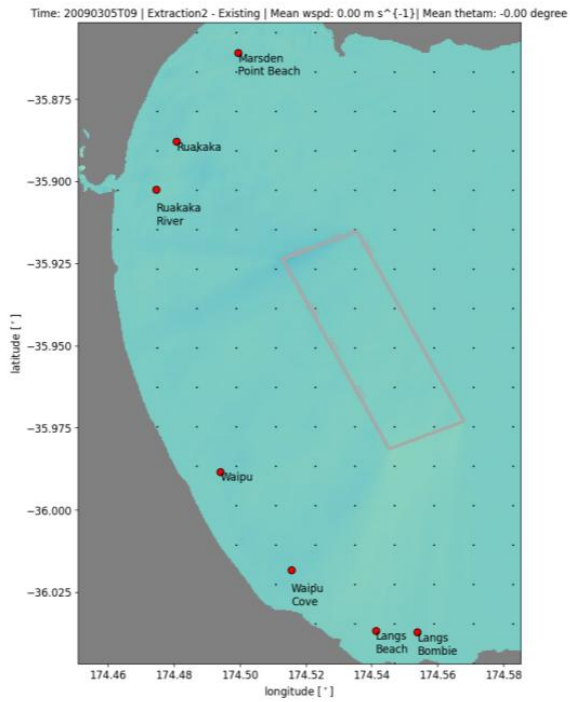


Figure 3 (left): Map showing the difference in mean wave direction (deg) between existing and post-extraction scenarios during the north-east wave event on 05/03/2009 09:00UTC. Positive/negative differences indicate clockwise/anticlockwise rotations. Surf breaks are indicated by red dots.

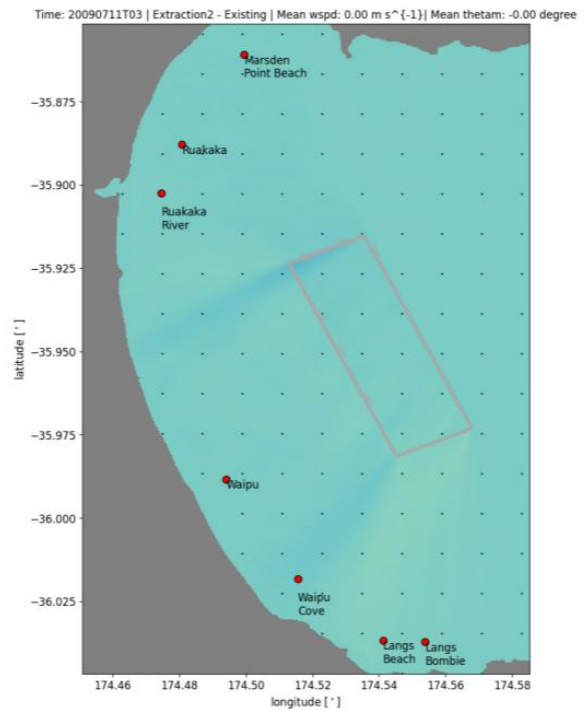


Figure 4 (right): Map showing the difference in mean wave direction (deg) between existing and post-extraction scenarios during the east wave event on 05/03/2009 09:00UTC. Positive/negative differences indicate clockwise/anticlockwise rotations. Surf breaks are indicated by red dots.

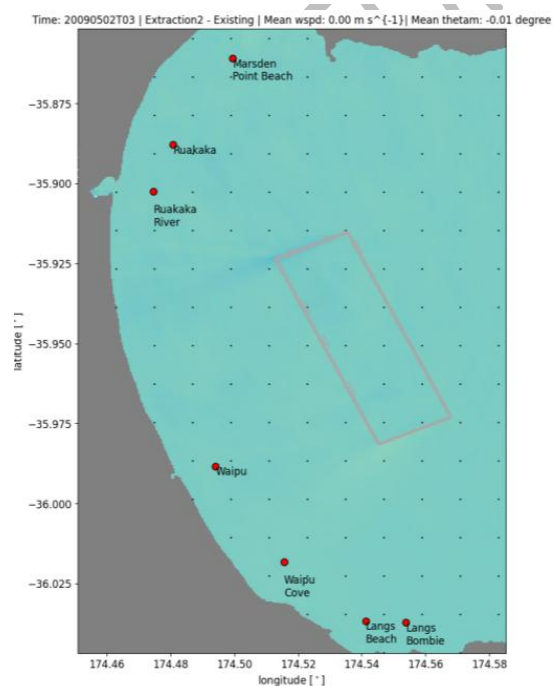


Figure 5 (bottom left): Map showing the difference in mean wave direction (deg) between existing and post-extraction scenarios during the south-east wave event on 05/03/2009 09:00UTC. Positive/negative differences indicate clockwise/anticlockwise rotations. Surf breaks are indicated by red dots.

**The impact of sand extraction on surfable conditions was negligible**, with changes ranging between -0.1% and +0.2%. While minor variations in wave height and period could slightly affect surf quality (with higher waves and longer periods improving conditions), **these changes would be imperceptible to surfers**. Given the open coastline and absence of sheltered embayments, small shifts in wave direction are unlikely to influence surf quality.

Although wind conditions were not included in this analysis, strong winds from the NE, E, or SE can deteriorate surf quality. However, such effects would apply equally under existing and post-extraction conditions, ensuring the comparison remains valid.

The study concludes that the worst-case bathymetric changes due to sand extraction would result in **negligible impacts on surfability** at the seven surf breaks, with no perceptible differences in wave height, direction, or period for surfers on site. Potential impacts on wave-driven rip currents are also expected to be **minor**. The findings are based on 2009 conditions, but interannual variations in wave climate, including higher swell years, are unlikely to significantly alter these conclusions.



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