

URC RESEARCH REPORT

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Project Title: Development of a calibrated numerical computer model of the Raglan coast, bar and harbour

1. What is(are) the research question(s)?

To determine the hydrodynamic and sediment transport of the Raglan coast, bar and harbour.

2. Rationale

This project is focussed on fundamental coastal processes on the North Island's west coast, and will provide much needed new knowledge that will direct decision-making, as well as inform and change current practice in the profession. There have been limited investigations in this area (none the same as that proposed) and at present a number of very topical issues associated with this research outcome are at the forefront of public interest. These include a number of proposals to mine the "black sand" from Taranaki to the Kaipara Harbour, selection of marine reserves, coastal erosion that is occurring all along this coast, and the impacts that these events can have on natural amenities (e.g. the fishing activity on adjacent reefs, quality of the surf, etc).

Tangata Whenua and local Iwi have voiced their concerns about sand mining and other seabed issues and how such activities will impact on the natural system of which they are custodians in their role as kaitiaki. Understanding will assist in providing vital knowledge to scientists, engineers, local iwi, regulators and decision makers who will decide on the viability of projects such as the proposed offshore mining and coastal protection strategies. The results will provide completely new scientific knowledge, and regulatory authorities such as Environment Waikato are very interested in the results. Discussions are currently underway to gain further funding to take this project further than what is proposed in this application.

3. Methodology

The following methodology has been utilised in the project.

- Use of west coast wave numerical model (SWAN), realtime/forecast 7 days in advance, updated twice daily (www.marineweather.co.nz).

- Use of rectified time series images of the wave activity on Raglan bar linked to wave and wind data.
- Use of a tidal model of the Raglan harbour.
- Use of time series bathymetry surveys and numerical modelling of a sand pulse moving down the Raglan headland and calibrated hydrodynamic and sediment transport models of Raglan headland.
- Bathymetry surveys undertaken of the Raglan bar area (during a very flat period).
- Bathymetry surveys undertaken of the extensive upper reaches of Raglan Harbour – the intertidal flats greatly influence the current flow in and out of the harbour entrance.
- Instruments deployed to collect data - Aquadopp wave/current meters, both inside the harbour and outside, off the bar.
- Collected data has been processed and being used to develop the model and calibrate it for use.
- Run the model to get the required results.

4. Outcomes / findings

The fieldwork was challenging but successful and extensive data was collected from both in the harbour environment and outside the harbour mouth. The large quantity of data is at present being analysed, and the numerical modelling undertaken with the data also being utilised to calibrate the model. As a test case, the behaviour and trajectory of treated effluent discharged from the Raglan sewage treatment plant has been investigated. The results show that if the official discharge guidelines are adhered to (i.e. on the outgoing tide), very little of the effluent remains in the harbour. However, if discharge continues into the flood phase of the tide, sewage effluent can be widely dispersed through out the harbour waters. Publications are being currently presented at a conference in South Africa, and other papers prepared for a conference later in the year where results will be disseminated. Once the full modelling is complete journal papers will be prepared for publication in either NZ or international publications.

5. Publications and dissemination

A number of publications are being prepared including one paper currently being presented at a refereed conference in South Africa (by the co-author)(attached), and 3 abstracts submitted to the IPENZ Coasts and Ports refereed conference to be held in September (attached). Papers are currently being prepared for this conference. On the completion of the modelling the outputs will be used for journal paper preparation.