

**BEFORE THE WHANGAREI DISTRICT COUNCIL AND NORTHLAND REGIONAL  
COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of a resource consent application by Northport  
Limited under section 88 of the Resource  
Management 1991 for a port expansion project  
at Marsden Point

**APPLICATION NO.** APP.005055.38.01

LU 2200107

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**REBUTTAL STATEMENT OF EVIDENCE OF RICHARD ANTHONY REINEN-HAMILL**

**COASTAL PROCESSES**

**3 October 2023**

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**Counsel instructed:**

Kitt Littlejohn  
Quay Chambers  
Level 7  
2 Commerce Street  
Auckland 1010

**Solicitors acting:**

CH Simmons / SJ Mutch  
ChanceryGreen  
223 Ponsonby Road  
Auckland 1011



## Introduction

1. This rebuttal statement of evidence responds to statements of evidence from Professor Karin Bryan<sup>1</sup> and Craig Davis.<sup>2</sup> I also briefly comment on the position of Ms Gibberd, whose evidence has been withdrawn.

## Response to Professor Karin Bryan evidence

2. Professor Bryan raises a concern that the numerical modelling carried out by Met Ocean Solutions (MOS) have not been well calibrated or verified with in-situ data, including longer term current and suspended sediment measurements.<sup>3</sup> Professor Bryan also raises concerns that the modelling is focussed on the entrance to the harbour and does not check on effects within the wider harbour or consider the effects of sea level rise.<sup>4</sup>
3. I would like to discuss both the calibration/verification approach done by Met Ocean Solutions and the ground truthing, or converting model results to the real-world situation based on data and information from previous studies and reports that I considered as part of my coastal process assessment. I believe the modelling calibration of water level, currents and morphological changes was done well and considered the wider harbour environment although I recognise that the model development and calibration was carried out and reported in earlier reports and studies.

### *Hydrodynamic studies*

4. MOS developed the hydrodynamic model for Whangarei Harbour as part of the modelling work carried out for Refining New Zealand Channel Dredging Project that I was also involved in. The modelling was calibrated and validated against both measured current velocities and four water level measurements within the central and upper harbour areas (see Figure 1). Water level monitoring was carried out over one month while the ADCP moving vessel deployment was done over three different zones over a 13-hour period from 19 May to 21 May 2015. I compared the modelled water level with measured water level at the four locations and saw good agreement between the modelled and measured data. Similarly, the ADCP comparison showed good agreement.

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<sup>1</sup> Dated 18 September 2023.

<sup>2</sup> Dated 8 September 2023.

<sup>3</sup> Refer paras 3.1-3.2.

<sup>4</sup> Refer paras 4.2-4.5.

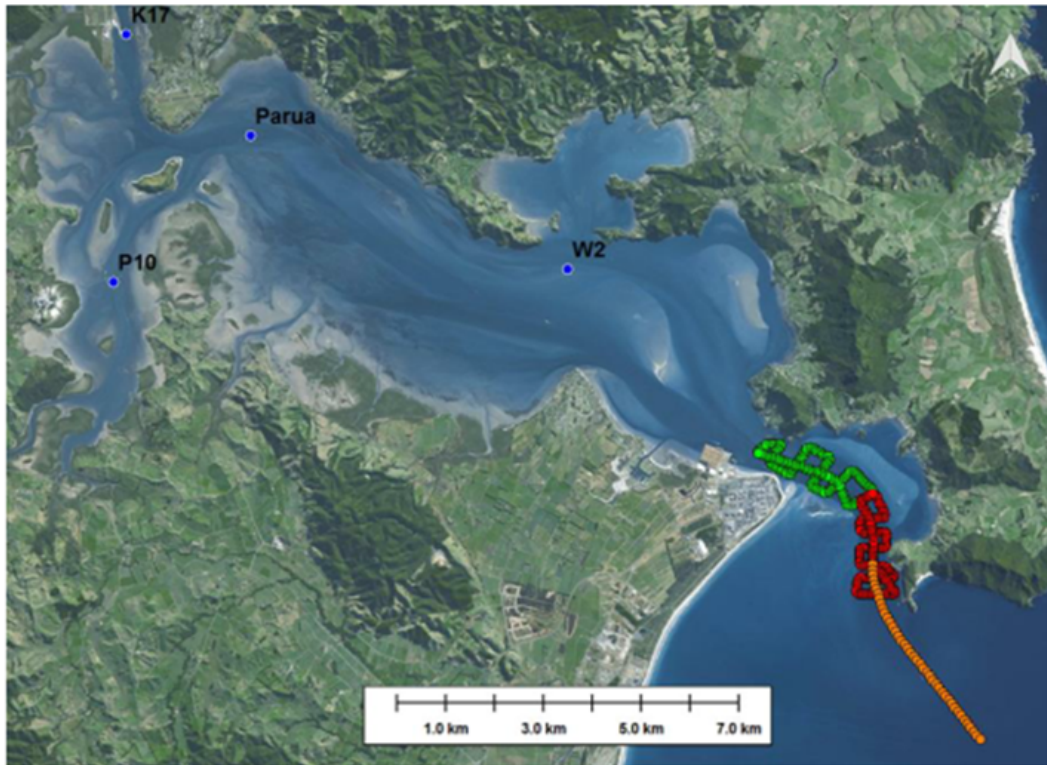


Figure 1: Locations of current velocity measurements (Zone A in green, B, in red and C in orange) and water level measurements (K17, P10, W2 and Parua) used to calibrate and validate the SELFE (and Delft3D) tidal model within Whangarei Harbour and Bream Bay (Source: MOS, 2017<sup>5</sup>).

#### *Morphological studies*

5. Based on published information of measured suspended sediment included in my Coastal Process report a key feature of this harbour entrance given the sandy nature of Bream Bay is low rates of suspended sediment transport. The main transport mechanisms are a combination of wave induced suspended sediment outside the harbour, tidal flows within the tidal inlet and a combination of wave and tidal flows in the mid and upper harbour area. This was also confirmed with the diver surveys, field investigations and the results of the multi-beam bathymetric surveys that showed shell lag and bedforms representative of these different environments that was included in Figure 2.4 of MOS (2018) included as Attachment 13 of the response to requests for information (copied below for convenience).

<sup>5</sup> MOS 2017. Crude Shipping Project, Whangarei Harbour: Establishment of numerical models of wind, wave, currents and sediment dynamics, report ref P0297-01 Rev G, unpublished report prepared for Chancery Green for Refining NZ, January 2017

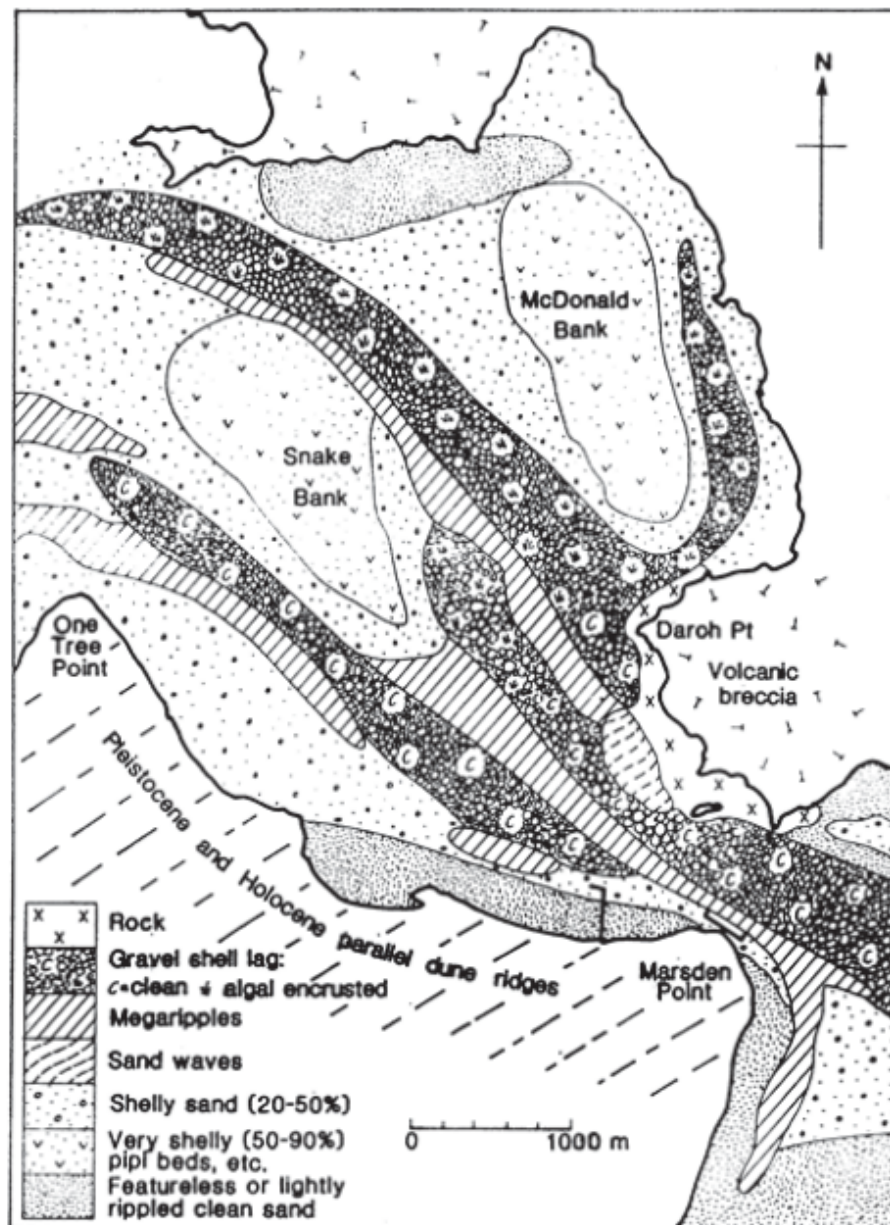


Figure 2.4 Simplified bottom sediment facies for Whangarei Harbour based on integration of side-scan sonar survey, underwater photographic and underwater video surveys, SCUBA diver observations, and bottom sediment analysis. The boundaries between facies are schematized (Source: Black et al., 1989).

6. As I discussed in Section 3.11 of the Coastal Processes Assessment (CPA) report,<sup>6</sup> morphological modelling studies carried out by MOS used extensive high-quality seabed survey information within the port and channel area and calibrated the model to represent the morphological trends observed in the seabed data. The modelling results represent observed trends from the physical data and observations that have been

<sup>6</sup> Appendix 10 to the application/AEE.

carried out for many years, and supported outcomes from earlier modelling studies, so I am confident that the results of the modelling can be applied to provide understanding of the relative changes of the proposed development as well as supporting the assessment of the location, magnitude and scale of effects.

#### *Sea level rise*

7. As I set out in my coastal process assessment (Section 4.1.8) based on my review of recently published papers, the effects of sea level rise on tidal inlets is very complex and still very much an area of new research. In my opinion modelling would require significant assumptions to be made that could also be challenged and could still be considered an academic exercise. As identified in (Wachler et al. 2020<sup>7</sup> and Khojasteh et al. 2023<sup>8</sup>) bathymetric scenarios need to be developed as the tidal inlet system is composed of many different elements, such as the inlet, tidal flats, the ebb tide delta, sediment availability and the interaction with freshwater supplies. To consider potential future scenarios, adjustments to the various elements need to be manually applied and could include lowering some parts of the harbour and raising others to better represent expected changes.
8. However, understanding the effect of the proposed development on the present-day environment is relatively localised and small scale. As there is no significant change of the inlet cross section due to the combination of reclamation and dredging, I consider the relative effect of the proposal on sea level rise should also be minor; with the exception of the likely trend of a change in the tidal inlet from ebb dominated to flood dominated conditions which could locally increase the rate of sedimentation to the east of the port due to the presence of the reclamation. This potential effect would be identified in the proposed monitoring of the area already included in the consent conditions.

#### **Response to Craig Davis evidence**

9. I have substantially addressed the issues raised by Mr Davis in my evidence in chief. I support the recommendations of Mr Treloar to provide additional monitoring and focus on potential effects in this area, and as identified in the Coastal Processes and Planning Joint Witness Statement, these matters have been considered and included in an update of the proposed conditions presented by Brett Hood.

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<sup>7</sup> Wachler, B., R. Seiffert, C. Rasquin, F. Kusters (2020) Tidal response to sea level rise and bathymetric changes in the German Wadden Sea, Ocean Dynamics, 70:1033-1052, <https://doi.org/10.1007/s10236-020-01383-3>

<sup>8</sup> Khojasteh, D., S. Felder, V. Heimhuber, W. Glamore (2023) a global assessment of estuarine tidal response to sea level rise, Science of the total environment, 894 (2023) <https://doi.org/10.1016/j.scitotenv.2023.165011>

10. The bird roost was added as an ecological response to the loss of high tide roost habitat due to the eastern reclamation. However, I believed that the results of the modelling and the coastal process assessment process was sufficient to enable an expert assessment of effects to be made for this feature without additional modelling, rather relying on observations and reporting within Marsden Bay that I made during the coastal process assessment I carried out for Marsden Cove Ltd in 2002 and site visits and inspections made for this study as set out in Section 2.3.6 of the CPA. Due to the port sheltering wave energy from the east, the predominant fetch orientation for wave energy is from the north and northwest which will result in an easterly to south-easterly movement of sand (i.e., towards the port and Blacksmiths Creek), although rates of transport were expected to be low. This is similar to my findings in 2002<sup>9</sup> which were also supported by earlier observations by Dr Gibb (1998<sup>10</sup>) in his earlier investigations. However, providing more specific monitoring and assessment to address Mr Davis' concerns regarding changes within the access channel and Blacksmiths' Creek that affect their function is supported and is consistent with the recommendations of Mr Treloar.
11. While in my view there may be options for designing and constructing the sandbank to minimise transport of material, I do not consider that to be necessary.

#### **Comment on Bronwen Gibberd evidence (withdrawn)**

12. I have had various discussions with Bronwen Gibberd and believe we have good alignment on the issues. I understand that some changes to conditions, including relating to management of coastal process issues, have been agreed between the parties. I further understand that, based on this agreed position, the evidence of Ms Gibberd has been withdrawn.

#### **Conclusion**

13. I am confident that the modelling prepared by MetOcean Solutions in combination with the significant resource of previous studies and site-specific data provide an excellent and reliable basis for understanding the existing environment and the potential effects of the proposed development.
14. In the same way, providing more specific monitoring and assessment to address Mr Davis's concerns regarding changes within the access channel and Blacksmiths' Creek

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<sup>9</sup> Reinen-Hamill, R. and H. Reynolds (2002) Marsden Cove Coastal Process Assessment, Report ref 19877 for Marsden Cove Ltd, October 2002

<sup>10</sup> Gibb, J.G. (1998) Coastal hazards and solutions for eastern One Tree Point, Whangarei Harbour, Whangarei District, Ref. C.R. 98/3, for Whangarei District Council, June 1998

that affect their function is supported and consistent with the recommendations of Mr Treloar.

15. I confirm nothing in submitter evidence has caused me to amend my fundamental position or conclusions, besides as set out above and in the JWS.

**Richard Anthony Reinen-Hamill**  
Tonkin + Taylor

3 October 2023