BEFORE INDEPENDENT HEARING COMMISSIONERS

AT WHANGAREI

I MUA NGĀ KAIKŌMIHANA WHAKAWĀ MOTUHAKE

KI WHANGAREI

IN THE MATTER	**of the Resource Management Act 1991**
AND	
IN THE MATTER	**of the hearing of submissions on applications by the Northport Ltd – Port Expansion project at Marsden Point**

STATEMENT OF PRIMARY EVIDENCE OF DR RICHARD BULMER ON BEHALF OF PATUHARAKEKE TE IWI TRUST BOARD

(MARINE ECOLOGY)

18 SEPTEMBER 2023

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1. EXECUTIVE SUMMARY

1.1 Northport Ltd is seeking consent to dredge 61 ha and undertake reclamation of 11.6 ha within Whangarei Harbour. The harbour is home to highly biodiverse marine ecosystems which are under a range of pressures. Key kaimoana species such as pipi and scallops have experienced rapid declines in recent years, associated with a range of stressors, prompting fisheries closures in an attempt to restore these populations.

1.2 The applicant's consultants summarise potential impacts of the proposed port developments on marine ecology with a focus on the direct impacts of dredging and reclamation on ecological communities within the development footprint. However, the assessment does not include a thorough assessment of the potential cumulative impacts of the development on the wider harbour, such as assessing how interactions with sea level rise, sedimentation, and ecological connectivity may impact marine ecology.

1.3 Cumulative effects arise from the combined impact of multiple interactive impacts or stressors. Individually each activity may appear low in impact, yet collectively the outcome on the environment may be significant. Each activity and their associated stressors generate distinct footprints. However, activity and stressor footprints do not necessarily inform ecosystem responses, which often occupy different space and time scales and are impacted by factors such as ecological connectivity. Given the scale of the potential consent, its occurrence at the entry/exit point to the harbour, and the high biodiversity values within the harbour, an in-depth analysis of the interactive impact of cumulative stressors, that accounts for ecological connectivity, is recommended in order to make an informed assessment of the impact of the proposed consent on marine ecology. Without this assessment it is not possible to confidently assess the level of impact of the proposal on marine ecology, and unless that further assessment is undertaken there is a risk that the impacts of the development are more substantial than predicted.

2. INTRODUCTION

2.1 My name is Dr Richard Bulmer. I hold an MSc (1st class honours) and PhD in marine science from the University of Auckland. I have worked as a marine ecologist for over 15 years, including 9 years at the National Institute of Water and Atmospheric research (NIWA). I am now the director of Tidal Research Ltd.

2.2 My area of expertise is marine ecology, with a focus on benthic ecology and ecosystem functioning. I have authored over 30 publications and dozens of reports on estuarine and coastal ecology. I currently lead the Ministry of Business, Innovation and Employments (MBIE) Smart Idea project "Carbon sequestration via Aotearoa's estuarine environments: Implications for greenhouse gas budgets" which includes the collection and collation of ecological and environmental data from Whangarei harbour. I also lead the Sustainable Seas National Science projects "Management of cumulative effects for ecosystem resilience & recovery" and co-lead "Awhi mai awhi atu: Enacting a kaitiakitanga-based approach to Ecosystem Based Management".

2.3 I was asked by the Patuharakek Te Iwi Trust Board to provide an expert review of the marine ecology evidence submitted for the proposed port expansion project at Marsden Point by Northport Ltd.

Code of Conduct

2.4 Although this is a Council hearing, I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this statement of evidence are within my area of expertise.

Material reviewed

2.5 I have reviewed the following material:

(a) Appendix 11 Assessment of Marine Ecological Effects (AMEE)

(b) Section 92 Attachment 5 (Marine Ecology)

(c) Section 42A Appendix C3 (Marine Ecology)

3. MAGNITUDE AND SCALE OF EFFECT ON KAIMOANA SHELLFISH AND BENTHIC BIODIVERSITY

3.1 I have reviewed S42AAppendix C3 (Marine Ecology) by Dr Drew Lohrer and broadly agree with Dr Lohrer's assessment.

3.2 Dr Lohrer identifies key points of difference with Northport's Assessment of Marine Ecological Effects (AMEE). I have summarised some of these key points and added my own comments below:

(a) Dr Lohrer assessed the magnitude of effect and scale on kaimoana shellfish being Moderate at the OHEZ scale (not low at the Harbour scale as identified in the AMEE). While I broadly agree with this, given the potential impacts on ecological connectivity due to the dredge/reclamation action have not been assessed within the AMEE, this impact may be higher than Moderate. The assumption that is made in the AMEE is that the consent will not have more than a Low effect on kaimoana/shellfish stocks (including scallops, pipi, and cockles) outside of the footprint of the dredge/reclamation. However, an assessment of the dependency of kaimoana/shellfish located elsewhere in the harbour on this key potential habitat/transport corridor into and out of the harbour (which will be impacted by the consent), and their associated vulnerability, is not included. For example, Lundquist et al. 2009 found that cockle beds closer to the mouth of the estuary contributed larvae to much of the estuary and therefore were disproportionately important to cockle abundance throughout the harbour. Understanding how shellfish larvae move around estuaries involves considering larval behaviours, hydrodynamic processes, and habitat suitability. This understanding is critical to ensure the sustainability of both shellfish populations and the overall estuarine ecosystem. It is

also important to note that while shellfish may exist in locations elsewhere in the harbour, they may not be considered a food source (e.g., due to contamination) and therefore the cultural and recreational value may also be spatially conditional.

(b) I have similar concerns with the AMEE assessment that the effects will be Moderate on intertidal sediment habitats and macrofauna. There is a risk that this effect will be greater than Moderate, but I do not think that this can be confidentially assessed given the current AMEE assessment does not include an assessment of ecological connectivity or meaningfully address cumulative effects.

(c) Cumulative effects arise from the combined impact of multiple interactive impacts or stressors. Individually each activity may appear low in impact, yet collectively the outcome on the environment may be significant. Each activity and the associated stressors generate distinct footprints. However, activity and stressor footprints do not necessarily inform ecosystem responses, which often occupy different space and time scales and are impacted by factors such as ecological connectivity (Figure 1, *Low et al. 2023*). Dr Lohrer identifies that assessment of cumulative effects within the AMEE does not adequately assess many potential interactive impacts of multiple stressors, an opinion which I agree with. This includes the need to better assess the potential disruption to ecological connectivity due to port developments (as described above) as well as cumulative interactions with other stressors to the harbour, such as sedimentation and sea level rise, which will impact the ecosystem over the timeline of the consent. The importance of considering multiple interacting stressors when assessing potential environmental impacts has been raised by the Parliamentary Commissioner for the Environment in a review of estuarine management in Aotearoa (PCE, 2020), who state that "looking at stressors in isolation rather than as a whole

might lead to a profound misunderstanding of the processes at play and their likely outcomes, and in turn, misguided management proposals."

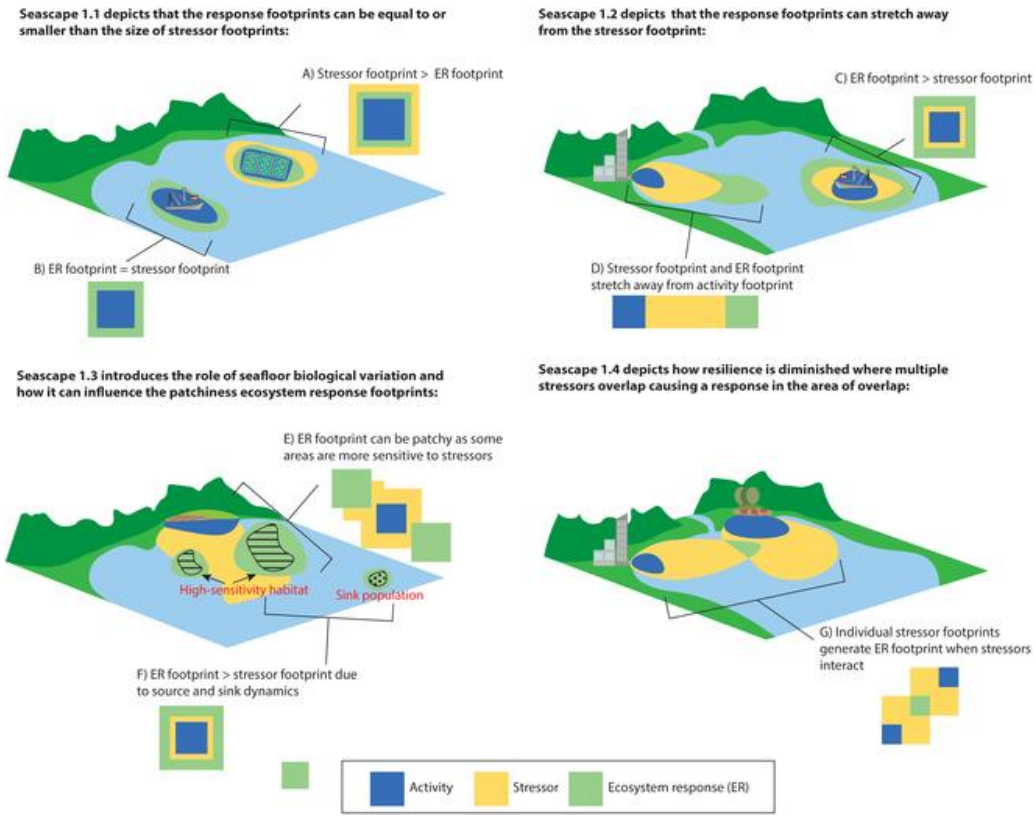

Figure 1: Activity and stressor footprints generate ecosystem response (ER) footprints because seascapes can have varying levels of physical and biological variation and connectivity. For simplicity, seascapes 1.1, 1.2, and 1.3 show single-stressor responses, but in reality, seascapes are mosaics of responding patches to multiple stressors (Low et al. 2023).

4. HIGH BENTHIC BIODIVERSITY IN AREAS OF WHANGAREI HARBOUR

4.1 The AMEE collected and collated an extensive macrofaunal dataset from the port development and surrounding areas. This data identified that areas of Whangarei harbour and the proposed port development area sustains very high benthic biodiversity, which is under stress by a range of impacts including coastal development, sedimentation, dredging, and fishing.

(a) I agree with this broad conclusion. This finding is consistent with another recent study summarising benthic biodiversity within Whangarei harbour (Mangan, Bulmer et al. 2022), which also identified that the harbour supported high benthic biodiversity (over 200 unique macrofaunal species observed throughout the harbour).

(b) I note that disproportionately high benthic biodiversity was observed in the deeper and sandier subtidal areas of the harbour (within the OHEZ zone), suggesting that these areas are disproportionately important to harbour scale ecological dynamics.

5. IMPACTS ON COCKLES, PIPIS AND SCALLOPS

5.1 The AMEE identified that cockles were observed throughout the proposed reclamation area and adjacent locations, however given that cockles were also observed in many other locations throughout the harbour, the AMEE suggested that the reclamation and dredging would have a negligible impact on cockles.

5.2 The AMEE acknowledged that pipi were once abundant at Marsden and Mair Banks, supporting a commercial fishery, but that stock levels have dropped and the fishery is now closed to harvest. It was noted that juvenile pipi are found up to 300 m west of Northport and within the proposed reclamation area. The AMEE suggested that given that pipi were present in relatively low numbers and below harvestable size within the reclamation and are absent within the dredge area, the impact of the reclamation and dredging was considered to be negligible.

5.3 Low numbers of patchily distributed scallops were observed within the dredge area and were proposed to be moved prior to dredging/reclamation if found, therefore the impacts on scallops were determined to have negligible impact (although whether this was informed by a proven technique, or how new areas for scallop translocation were identified, was not detailed).

(a) I disagree with the assessment that the impacts on cockles, pipi and scallops will be negligible. Given the response of ecological communities to impacts such as dredging and reclamation are not stationary in space and time, I don't think it is possible to confidently come to a conclusion regarding the impact on ecological communities (including shellfish and benthic biodiversity) without providing an assessment of the impact of the reclamation or dredge activities on ecological connectivity or cumulative multiple stressor impacts (see below).

(b) That assessment would include an assessment of how ecological communities throughout the harbour use the proposed dredge and reclamation area as a transport corridor/nursery habitat/etc, their status and vulnerability elsewhere in the harbour, and how dependent the fate of key shellfish and other biodiversity may be on this pathway (and therefore how vulnerable they may be to the proposed development) (as reflected in Dr Lohrer's evidence).

6. TABLE OF EFFECTS, INCLUDING CUMULATIVE EFFECTS

6.1 Within the AMEE, there is a table summary of potential impacts as well as cumulative impacts of the proposal. As both tables are identical in level of impact, the implication is that there are no cumulative impacts of the development on the marine ecosystem.

6.2 As mentioned above, this conclusion implies that impacts on ecological connectivity and the current and future stressed position of many of the species within the wider harbour, including key shellfish species such as scallops and pipi, do not cumulatively impact the ecosystem response sufficient to drive a change in impact level. Without assessing the ecological connectivity and cumulative multiple stressor response dynamics of the harbour I don't think it is possible to make this assessment. For example, changes in sedimentation and sea level rise which occur over the period of any future consent and may drive significant changes in the

response of the ecology (and presumably hydrodynamics) to the proposed development yet does not appear to have been incorporated in the assessment of cumulative effects. Further, it is likely that ecological communities both within and outside of the proposed consent area will continue to decline over the next 30 years+ due to cumulative impact of multiple stressors, including sedimentation and sea level rise. There are likely to be spatial variability in the response of ecological communities to these cumulative stressors. For example, communities that are living nearer to mud tolerance thresholds may decline before communities nearer to the mouth. This would mean that the relative importance of ecological communities within the proposed consent area increases through time.

7. SUMMARY

7.1 Ports can create physical barriers that disrupt the natural movement of aquatic organisms. Shipping channels and other structures can impede the movement of fish, larvae, and other aquatic organisms that rely on connecting habitats for different life stages. Many species, such as fish and marine mammals, rely on established migratory pathways between breeding, feeding, and nursery areas.

7.2 Port development can interrupt these pathways, potentially leading to reduced populations and genetic isolation. The construction of ports and associated infrastructure can fragment habitats, making it difficult for species to move freely between different areas. Fragmentation can limit genetic exchange and lead to population decline. Dredging activities associated with port development can disturb sediment habitats, affecting benthic organisms and disrupting the natural sediment dynamics of estuaries and coastal areas. Land reclamation and construction can alter tidal patterns and hydrological flows, which can impact the distribution of nutrients, sediments, food sources, and organisms within estuaries and coastal ecosystems.

7.3 Proposed dredging will directly impact 61 ha and reclamation 11.6 ha. This equates to approx. 73 football fields of area, or approximately ~50% of the width of the channel in parts of the harbour (Figure 2) with uncertainty in regard to impacts of cumulative stressors and ecological connectivity throughout the harbour.

7.4 Many species (including key shellfish species such as pipi, cockles and scallops, as well as migratory freshwater fish such as eels and whitebait) are not stationary through space or time and move from one area to another for food, habitat, reproduction, life stage etc. Given the scale of the potential impact, its occurrence at the entry/exit point to the harbour, and the high biodiversity values within the harbour, an in-depth analysis of the impact of cumulative stressors which accounts for ecological connectivity is recommended in order to make an informed assessment of the impact of the proposed consent on marine ecology.

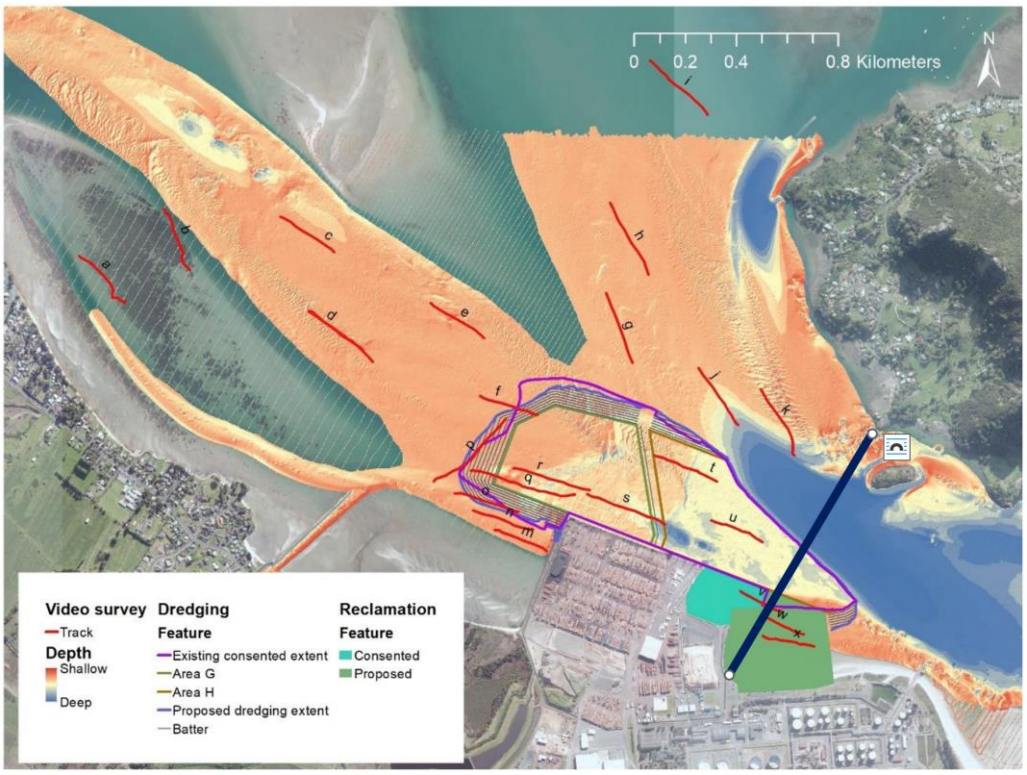

Figure 2: Adaption of figure 48 from the AMEE illustrating the potential width of the channel impacted by reclamation and dredging (black line).

Dr Richard Bulmer

18 September 2023

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