

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of a Board of Inquiry appointed under s149J of the Resource Management Act 1991 to consider Notice of Requirements and applications for Resource Consent made by the New Zealand Transport Agency in relation to the East West Link roading proposal in Auckland.

**SUMMARY OF EVIDENCE OF MARCUS JOHN CAMERON ON BEHALF OF
AUCKLAND COUNCIL
MARINE SEDIMENTS AND ASSOCIATED CONTAMINANTS**

1. Overview of Key Conclusions of Evidence

Effects from Subtidal dredging:

- (a) The proposed subtidal dredging of Māngere Inlet to source material for the reclamation will result in:
 - i. Removal of all benthic ecology over an area of ~15Ha, approximately 45% of the total subtidal habitat of Māngere Inlet,
 - ii. Disturbance and dispersal of sediment and associated contaminants,
 - iii. Changes to the hydrodynamics of the inlet and;
 - iv. Increased sedimentation on the flanks of the dredged area
- (b) Removal of subtidal habitat and increased sedimentation on the flanks of the dredged area are likely to result in the greatest short and longer term ecological effects from subtidal dredging (Figures 1 and 3). Whilst less of a long term risk, disturbance and mobilization of sediment and associated contaminants poses an additional risk to organisms in the water column and in adjacent habitats. In my view, when all these factors are considered together, subtidal dredging for mudcrete is best avoided. This conclusion is also supported by the ecology joint witness statement which concludes that “avoiding dredging would be a better ecological outcome”. Alternatives to subtidal dredging to provide material for the reclamation should therefore be pursued.

Effects from Intertidal dredging:

- (c) The most highly contaminated sediments measured in Māngere inlet are predominantly found across the northern foreshore of the inlet within the footprint of the proposed reclamation, particularly around existing stormwater outfalls and at the outlet of Miami Stream. Dredging of this area is predicted to create a plume of sediment extending east into the SEA-M1 around Anns Creek (Figures 2 and 3), risking adverse effects on the habitat in this area and the endangered wading birds that utilize it. Therefore, dredging in this area would best be avoided, minimized and contained within a coffer dam or other structure to limit dispersal of sediment and associated contaminants.
- (d) If subtidal or intertidal dredging is to go ahead, the footprint of the dredging should be minimized and additional monitoring conditions for sediment and associated contaminants should be included as part of the consent, to better characterise and respond to any adverse effects. I have suggested

conditions to this effect in communications with NZTA, however as yet these proposed conditions have not been agreed to.

2. Summary of Issues Resolved and Unresolved

Issues resolved:

- (a) A number of predicted adverse effects caused by the reclamation were agreed between experts in the coastal processes conferencing. However, as yet alternatives to, or mitigation for, most of these effects have not been established, as no particular approach to the creation of the reclamation has been agreed by all parties. These unresolved aspects are outlined below.

Issues unresolved:

- (b) A question remains regarding what proportion of the contaminant levels seen in Māngere Inlet are from natural background sources such as volcanic soils, rather than from direct anthropogenic contamination. The lowest values seen in the estuary should indicate what these background levels are. For example the lowest recoded arsenic value is 4.5mg/kg while the highest is 69mg/kg and the average is 25mg/kg (Appendix E Technical report 15 – Coastal Processes). This indicates that there has been significant enrichment of arsenic levels over and above natural background levels in Māngere Inlet.
- (c) The need for subtidal dredging to supply material for mudcrete is also still in question. However, alternative options to subtidal dredging have been proposed in the rebuttal evidence of Mr Priestley as outlined below.
- (d) Option 2 from Mr Priestley's rebuttal proposes coffering the eastern end of the reclamation area and using sediment from within the reclamation footprint to make mudcrete. This option would remove the need for subtidal dredging for mudcrete and reduce the risk of a plume of sediment and associated contaminants extending into the SEA-M1 around Anns Creek. However, this option would still involve extensive dredging of the more highly contaminated intertidal sediments and risk their dispersal through exposure to tidal and wind driven currents.
- (e) Option 4 from Mr Priestley's rebuttal would fully coffer the reclamation area and not involve any intertidal or subtidal dredging for mudcrete, effectively removing most of the risk of dispersal of sediment and associated contaminants around the inlet from dredging for mudcrete. In my view Option 4 is therefore the preferred approach if the reclamation is to go ahead. However, I note that Option 4 is predicted to cost ~\$8 Million more

than Option 1, while Option 2 would cost ~\$4 Million less than Option 1. If the \$4 Million saving from Option 2 was put towards further mitigation as described below, I would then be comfortable with the adoption of Option 2.

(f) An agreed position is also yet to be reached on monitoring conditions for the dredging activities, if they are to go ahead. However, I note from Mr Udema's hearing summary that he agrees there would be merit in undertaking a more comprehensive water quality sampling programme at the commencement of the dredging to test assumptions regarding contaminant mobility from sediments into the water column. I agree with this approach and have suggested conditions to this effect in communications with NZTA, however as yet these proposed conditions have not been agreed to.

(g) Given that contaminant levels in Māngere Inlet appear to be relatively stable over time the biggest ongoing issue for the marine environment is high levels of suspended and deposited sediment. The stormwater wetlands are predicted to reduce the sediment load to Māngere Inlet from the treated catchment (of 610 Ha – 680 Ha) from 870 tonnes per annum to 200 tonnes per annum, a 670 tonne reduction (Section 9.3 (a) EIC of Dr Robin Allison). This compares to a predicted sediment load to the Inlet from outside its immediate catchment of 43,000 tonnes per annum.

However, the current mitigation package does not consider addressing this external sediment loading issue, despite the reclamation exacerbating sedimentation issues within the Inlet. In my view the conditions should therefore include actions to reduce the sediment load to Māngere Inlet. One way of doing this would be through funding existing initiatives¹ that undertake fencing and planting of riparian areas or erosion prone land in sediment source catchments of the harbour. I consider this planting should be additional to the similar recommendation by Dr Bishop for terrestrial planting mitigation and sufficient to offset the increase in suspended and deposited sediment caused by the reclamation. Furthermore, if Option 2 is chosen, the savings gained by adopting this approach will be in the order of ~\$4 Million dollars. Riparian planting generally costs between \$10 and \$40 per m², indicating that \$4 Million dollars would provide at least 10Ha of riparian planting. Both Dr Bishop and I have suggested this approach to NZTA as part of discussions on draft conditions. However, as yet, neither of these planting proposals has been agreed to by NZTA.

¹ Such as Auckland Council's Regional Environment and Natural Heritage (RENH) grants programme, the Mayors 1,000,000 trees programme, Manukau Harbour Forum Initiatives or Fonterra's fifty catchments project.

Conclusion

Overall I consider that subtidal dredging for mudcrete will have adverse effects that are significant in the short term and more than minor in the longer term. Ecological effects from disturbance and dispersal of sediment and associated contaminants from intertidal dredging are also likely to be more than minor. Both sets of effects could be avoided by capping the full area of the reclamation and bringing in fill from elsewhere. This is the approach outlined in Option 4 of Mr Priestley's rebuttal and I therefore recommend taking that approach unless additional mitigation is included with Option 2. This additional mitigation could address some of the effects of suspended and deposited sediment which will be exacerbated by the reclamation, through fencing and planting of erosion prone land and riparian margins in sediment source catchments of the Manukau Harbour. The extent of this mitigation could be determined by the savings gained from proceeding with Option 2 for construction of the reclamation.

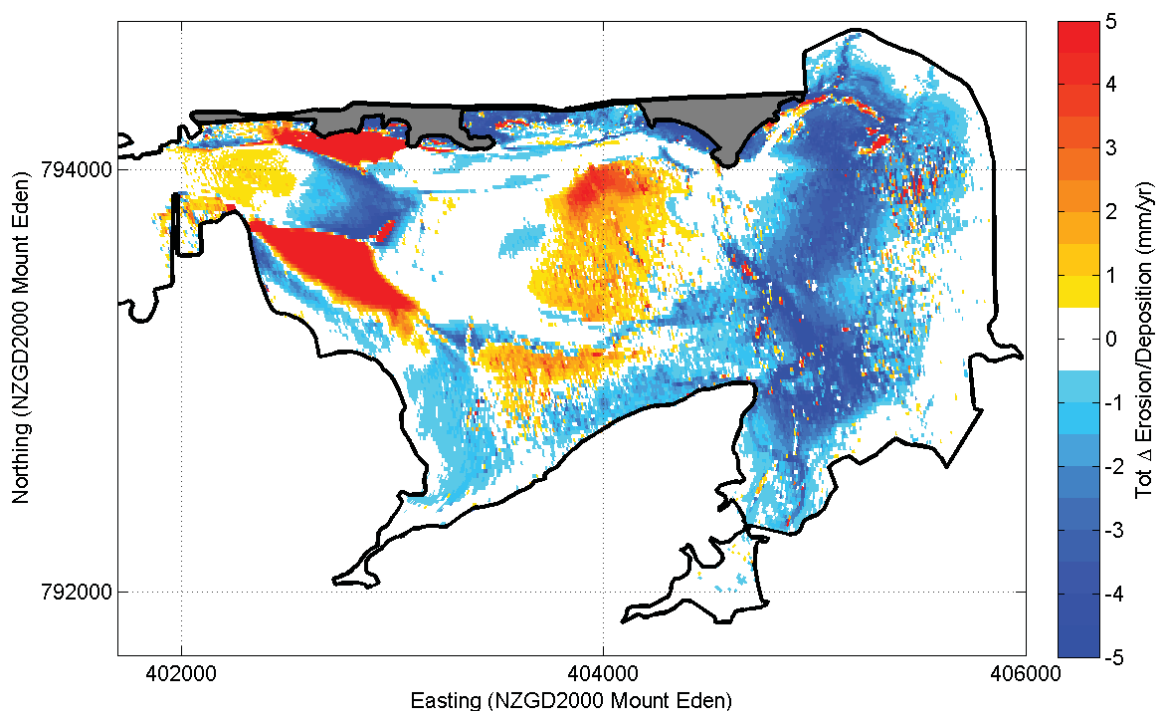


Figure 1: Predicted changes in sedimentation rate caused by subtidal dredging operations. Reproduced from Figure 7.2 of the NIWA report in Appendix A of Stephen Priestley's Evidence in Chief.

