

SUMMARY STATEMENT

1. My name is Derek John Todd. I am a coastal geomorphologist with over 35 years working experience in investigating coastal processes, assessing potential future changes in shoreline stability. I am employed as Principal Coastal and Hazards Scientist at Jacobs New Zealand Limited.
2. I have prepared evidence on behalf of the **Christchurch City Council** in respect of matters arising from the submissions on the proposed Qualifying Matter Coastal Hazard Risk Management Areas (**QM-CH**) for coastal erosion.
3. In terms of determining the QM-CH for coastal erosion, my relevant experience includes being the Technical Peer Reviewer of the *Coastal Hazards Assessment for Christchurch District* (CHA 2021) prepared by Tonkin & Taylor Ltd (T&T), and the co-author of Jacobs reports, addendums and updates (2021, 2022, 2023) to CCC on *Risk Based Coastal Hazard Analysis for Land-use Planning*. These reports established the relative sea level rise (**RSLR**) scenarios and thresholds to be used in determining the spatial extents of Medium and High Risk Coastal Hazard Management Areas for land-use planning.
4. Subsequent to my evidence I have also considered the recently updated Vertical Land Movement (**VLM**) data for Christchurch (GNS 2023,2024) to increase the rate of RSLR and therefore impact on the spatial extend of the Medium and High Risk Coastal Hazard Management Areas.
5. The base RSLR data for the determination of the QM-CH is from the CHA (2021), which presents the information in 0.2 m increments of SLR for nominal time frames of 2050, 2080 and 2130 to a maximum SLR of +1.5 m by 2130. My recommendations in the Jacobs reports (2021, 2022, 2023) was that the most appropriate RSLR increments from the CHA for use in a risk-based approach to land-use planning were 0.6 m by 2080 and 1.2 m by 2130 to be uniformly applied across the Christchurch City urban area. These increments are close to the magnitude of projected rise in 2080 and 2130 from the medium value of RSLR under the SSP5-8.5 SLR scenario (IPCC (2021) combined with a locally averaged (e.g. Christchurch coastal sites) 'inter-seismic' VLM prior to the Canterbury Earthquake Sequence as reported by the NZSeaRise programme (2022) sites (-0.656 mm/yr). The use of this scenario is consistent with national guidance that is based on international best practice science.

6. The methodology employed in the CHA (2021) to calculate Areas Susceptible to Coastal Erosion (**ASCE**) are standard best practice that include the parameters listed in Policy 24 of the NZCPS, and in my opinion meets the test of precautionary approach under Policy 3 of the NZCPS. The calculations included the most recent relevant data and appropriate consideration of measured long-term accretion, short-term storm responses, wave climate sand gain size, and potential sea-level rise impacts on Christchurch City's shoreline.
7. In the Jacobs 2023 report, I recommended the following high-medium and low coastal erosion hazard zones for Christchurch City's open coast:
 - a. A High-Medium Hazard Coastal Erosion Zone defining the area from the existing shoreline to the 66% probability of erosion distance for 0.6 m RSLR by 2080 with an additional 'dune resilience' width based on short term erosion in a 100-year ARI coastal storm event.
 - b. A Low Hazard Coastal Erosion Zone defining the area between the high hazard zone and the 10% probability of erosion with 1.2 m RSLR by 2130 with an additional 'dune resilience' width based on short term erosion in a 100-year ARI coastal storm event.
8. I consider that the 'dune resilience factor' should be included in the hazard zones to allow for future continuation of dune protection and to provide resilience to coastal hazards at the end of the planning timeframes. The inclusion of this factor aligns with NZCPS Policy 26 (Natural defences against coastal hazards). The addition of the 'dune resilience factor' in the proposed hazard zones removes any dependence on the certainty of future sediment supply scenarios used in the calculation of the ASCE in the CHA 2021.
9. The updated VLM data for Christchurch (GNS 2023, 2024) reports that there has been higher 'post-seismic' VLM experienced since the Canterbury Earthquake Sequence, which GNS advises are likely to continue to possibility around 2050 before dropping back to the NZSeaRise programme rates. As a result, at a number of NZSeaRise sites in the Southshore and north of Waimairi Beach areas the projected RSLR in 2080 are closer to the 0.8 m increment than the 0.6 m increment, and the projected RSLR in 2130 are closer to the 1.5 m increment than the 1.2 m increment along the whole open

coast from Brooklands Lagoon to Southshore and along the western edge of the Avon-Heathcote Estuary.

10. Future modelling would be required to confirm the consequence to the extent of the of Management Areas for Erosion from a change the RSLR increment used to calculate the erosion distances. I understand that is something that will be considered in the context of Plan Change 12. However, a preliminary high level assessment suggests that the landward extent of the High-Medium Erosion Risk area would extend a further 6-8 m further west that currently mapped hence include some of the currently defined Low Risk Management Area. Conversely, the time required for erosion to reach the landward boundary of the currently defined High-Medium Risk Management Areas for Erosion would occur over a shorter duration, possibility up to 15 years earlier than 2080.
11. Concluding statement: The methodology employed in the CHA (2021) to calculate Areas Susceptible to Coastal Erosion are standard best practice that include the most recent relevant data, and the sea level rise scenarios and thresholds used to define high-medium and low risk coastal hazard Management Areas are appropriate. The updated VLM data available since the setting of these Management Areas will not reduce the spatial extent of the high-medium risk areas, and most likely increase the extent.

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Derek Todd