

SUMMARY STATEMENT

1. My name is Damian Debski. I am a civil engineer with over 25 years' working experience in investigating coastal, fluvial and pluvial flood processes, providing flood risk assessments for major infrastructure developments and developing flood risk management strategies and interventions. I am employed as a Principal Hydraulic Engineer at Jacobs New Zealand Limited.
2. I have prepared evidence on behalf of Christchurch City Council (**CCC**) in respect of matters arising from the submissions on the proposed Qualifying Matter Coastal Hazard Risk Management Areas (**QM-CH**) for coastal inundation.
3. I was a co-author of Jacobs reports, addendums and updates (2021, 2022, 2023) to CCC on *Risk Based Coastal Hazard Analysis for Land-use Planning* with responsibility for the coastal inundation thresholds section of the reports. These reports established two relative sea level rise (**RSLR**) scenarios (0.6 m and 1.2 m) and water depth thresholds for four coastal inundation risk categories for Christchurch City – High Risk, Medium Risk, Low Risk and Very Low Risk.
4. The base data for the determination of the QM-CH for coastal inundation is from the Coastal Hazards Assessment for Christchurch District (**CHA 2021**) by Tonkin & Taylor Limited (**Tonkin & Taylor**). The methodology employed in this assessment to calculate extreme sea levels follows standard practices, makes use of current datasets, and is in accordance with the parameters listed in Policy 24 of the New Zealand Coastal Policy Statement (**NZCPS**). The 'bathtub' method used to map the areas susceptible to coastal inundation from the extreme sea levels is an accepted and precautionary method, which in my opinion is consistent with the precautionary approach to the use and management of the coastal area in Policy 3 of the NZCPS.
5. The proposed risk categories take account of the consequences of inundation to people's safety, as evaluated in published scientific guidelines, and the likelihood of inundation. Likelihood is considered both in terms of the probability of occurrence of coastal storms – expressed as annual exceedance probability (**AEP**) – and the timing or certainty of occurrence of the given magnitudes of RSLR.

6. The proposed QM-CH for coastal inundation covers the combined extent of the proposed Coastal Hazard High Risk Management Area and the proposed Coastal Hazard Medium Risk Management Area which are defined as:
 - a. High Coastal Inundation Risk where the water depth under the 0.2% AEP extreme sea level with 0.6 m RSLR is greater than 1 m. The corresponding water depth with 1.2 m RSLR is 1.6 m.
 - b. Medium Coastal Inundation Risk where the water depth under the 0.2% AEP extreme sea level with 0.6 m RSLR is between 0.4 m and 1 m. The corresponding water depth with 1.2 m RSLR would be between 1 m and 1.6 m.
7. Subsequent to my evidence, I have also considered implications of new data for Vertical Land Movement (**VLM**) in the Christchurch area (GNS 2023) which have become available since these Management Areas were mapped.
8. The new data indicate that VLM rates are currently higher than previously reported and although there is some uncertainty in future rates of VLM, projected future values of RSLR are also likely to be higher than previously reported. As a result, the RSLR increments used to map coastal inundation hazards should be higher in some locations than those previously used to map the Coastal Hazard Risk Management Areas.
9. An increase in RSLR values will increase the depth of inundation in the areas defined by the four coastal inundation risk categories. This will tend to increase the extent of each category of inundation risk further inland of the coastline.
10. The degree to which the extent of the QM-CH may increase will depend on the local ground surface topography and the local rate of VLM and a more detailed analysis would be needed to quantify the magnitudes of potential changes. I understand that is a matter that will be considered in the context of Plan Change 12. However, the new VLM data will not reduce the spatial extent of the Coastal Hazard High Risk Management Area or the Coastal Hazard Medium Risk Management Area for coastal inundation hazard and most likely increase the inland extents of both these areas.
11. Concluding statement: The methodology employed in the CHA (2021) to calculate extreme sea levels and map the areas susceptible to coastal inundation follows standard practices and makes use of current datasets. The sea level rise scenarios and thresholds used to define the proposed Coastal

Hazard High Risk Management Area and the Coastal Hazard Medium Risk Management Area are appropriate. The new VLM data which have become available since these areas were defined will not reduce the spatial extent of the High or Medium risk areas, and most likely increase their extent.

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Damian Debski