Memorandum

To	Proposed Wellington District Plan Hearing Panel
Copy	Bianca Tree; Amy Dresser; Janice Carter
From	Sam Morgan
Office	Gisborne
Date	7 August 2023
Subject	PWDP – Coastal Hazards Summary

Main Points

- The coastal hazard ranking table has only considered the likely hazard extent of the hazard scenario and given the scenarios a relative ranking of high, medium or low rather than providing an assessment of the risk presented by the hazard. The definition of risk in the NZCPS includes both the consequences and likelihood of an event.
- There is no context in the Proposed Plan around water depths during prescribed events across respective areas.
- This type of information would help plan users to understand what the overlays mean and could at a high-level help inform the assessment of risk to a particular site (i.e. will inundation depths be less than 100mm or greater than 500mm at a particular site).
- For example, the Medium coastal inundation extent with 1.43m sea level rise with 1% AEP storm event will only impact the overlay area at and around the high tide period due to the combination of the different variables on top of MHWS (noting the tide range in Wellington is approximately 2m). Further, for the period that inundation occurs, due to the changing topography across the Central City area inundation water depths will vary across the overlay extent with some areas experiencing water depths in excess of 1m and other areas less than 300mm. This range in water depths can present very different hazard risk profiles.
- It is also important to understand that the overlay tsunami extents are based upon the tsunami event occurring at high tide. In addition, when sea level rise is taken into account this has a material difference to the extent and potential water depth of the affected area. In the GNS maps (figures 4.1, 4.3 and 4.5 below) the extent of a 1:100yr, 1:500yr and 1:1000yr event at current MHWS affects much less of the City Centre than the maps (figures 4.2, 4.4 and 4.6) that illustrate the extent of a 1:100yr, 1:500yr and 1:1000yr event with 1m SLR. To put the modelled tsunami events in context a 1:100yr event is of the magnitude of the tsunami that impacted Tutukaka in 2022 (based on the area affected within the Central City and scale of most likely trigger event being a magnitude 8 earthquake event in the Hikurangi margin), and the modelled 1:100yr

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event with 1m SLR results in estimated water flow depths of 1m or less across the City Centre overlay area. It is difficult to interpret from the Council's reports and evidence, but from the available information it is also likely that water depths will vary more than is indicated in the GNS report with the changing topography across the City Centre

- Another key concern is that the proposed scenarios and respective hazard ranking will result in disproportionate planning constraints being applied to sites that are exposed to a coastal hazard but are not subject to the same degree of risk (as defined in the NZCPS).
- A real-world example of this in the Wellington region is along the South Coast where there are currently inundation and coastal storm impacts being experienced on a reasonably frequent basis. In my opinion areas that are currently experiencing the impacts of coastal hazards should be afforded more stringent planning constraints, and a higher respective hazard ranking, in order to discourage or avoid the increase of risk from coastal hazards in these locations (as recommended in the NZCPS).
- I have also identified a discrepancy between the Hazard Ranking table and the mapped extent for the "High Tsunami" hazard, with the mapped extent including a 1m allowance for sea-level rise.
- The mapped extent of the 1:100yr tsunami + 1m SLR (occurring at high tide) is approximately the same extent at the 1:100yr inundation event + 1.43m SLR (shown in Attachment 2). They have the same extent, return period and both take into account sea-level rise, and therefore in my opinion these respective hazards should be assigned the same hazard ranking. As they both take into account future sea-level rise it is appropriate to assign them a "Medium" hazard ranking, below the "High" scenarios which should not take into account sea-level rise.
- I also note that the hazard extents relating to coastal erosion provided in the NIWA reports have not been taken into account in the hazard ranking.

Response to Evidence in Reply- James Beban

- In paragraph 16 of Mr. Beban's evidence in reply, he discusses the reasons for inclusion of the 1:100yr return period event as a high hazard. I note this rationale is significantly different to that offered up in the S42 report where it is stated that the NZCPS defines 1:100yr events as a high hazard risk. Mr. Beban now relies upon the statistical occurrence of the 1:100yr event occurring over the next 100 years. He does not state any rationale as to why this may be more relevant than a larger consequence event with a smaller likelihood of occurring over the next 100 years.
- Overall, I think Mr Beban has misinterpreted my primary point, which is that by focusing on the return period the degree of risk to different areas from coastal hazards has not been adequately addressed by the Proposed Plan.
- In Paragraph 22 of Mr. Beban's reply, he discusses the 1m SLR inclusion to the high tsunami ranking as being required to allow for a buffer to avoid areas being developed that may be subject to future tsunami events. I note this logic is equally applicable to coastal inundation events but has not been applied to this hazard in a consistent way. Furthermore, as noted above and illustrated by the GNS maps and Attachment 2 this places an unequal level of planning restrictions to those areas currently subject to tsunami hazard and will be at greater risk in the future.

Response to Evidence in Reply- Jamie Sirl

- I agree with Mr Sirl in Paragraph 52 of his reply statement that the South Coast does have a greater proportional representation of spatial area impacted by the mapped coastal hazard extents. However, this does not entirely address the disparity and potential variance in hazards risk across the overlay (as discussed above).
- I do not understand how Mr. Sirl in Paragraph 53 states the level of hazard risk management proposed within the plan is commensurate with the hazard risk when no assessment of hazard risk has been presented or undertaken.
- It is important that the changes set out in my evidence are made to the hazard ranking table to provide for better consistency across the scenario and relative hazard ranking.
- However, I also consider that the hazard ranking table and associated mapping should only be an interim measure until an appropriately scaled risk assessment of coastal hazards across the Wellington Region is available.

Attachment 1 – GNS tsunami maps

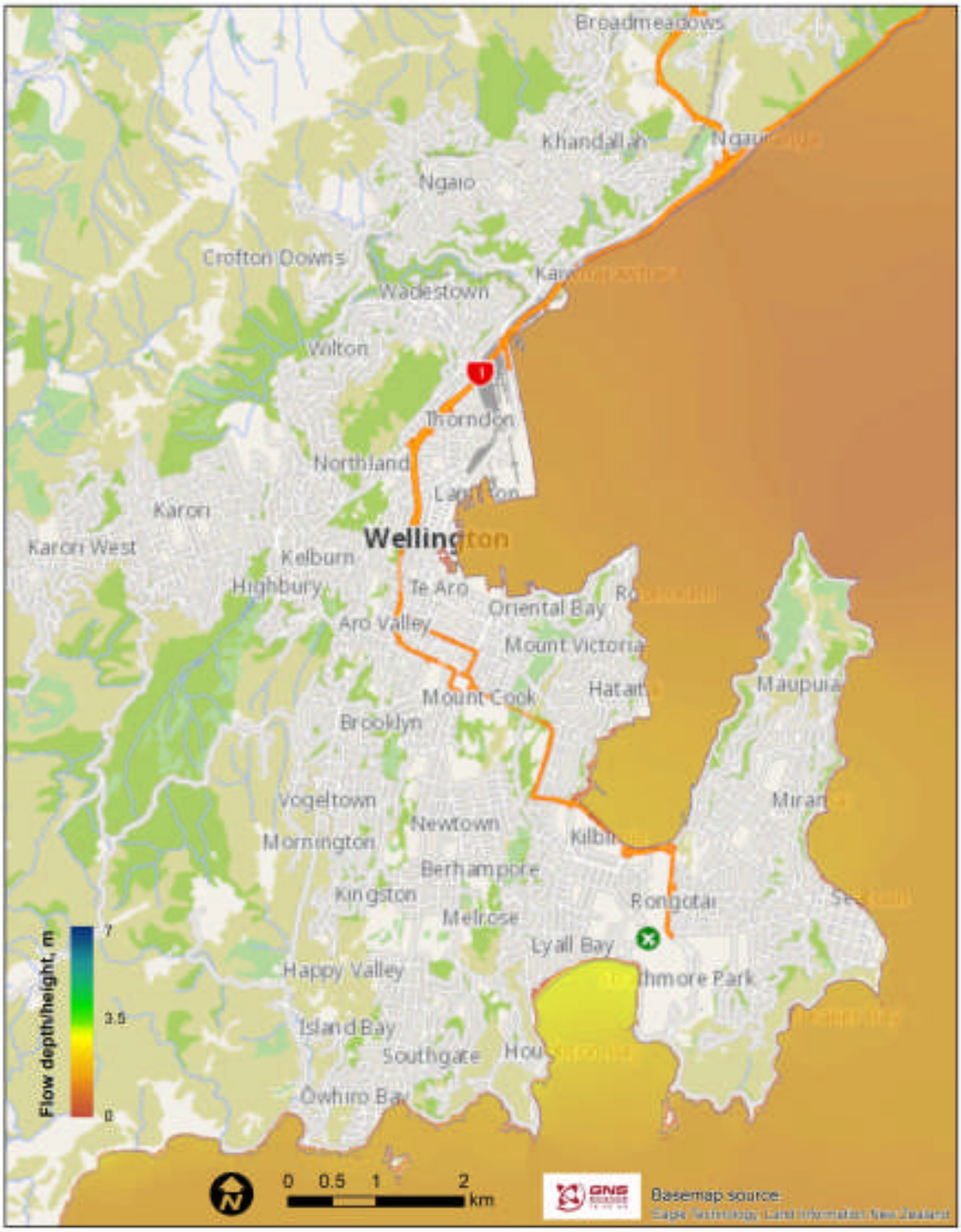


Figure 4.1 Probabilistic tsunami inundation maps for Wellington City showing the median flow depths onshore and offshore tsunami heights with a 1-in-100-years chance of being exceeded per annum at current MHWS. Onshore values refer to flow depths, while offshore values refer to maximum tsunami heights.

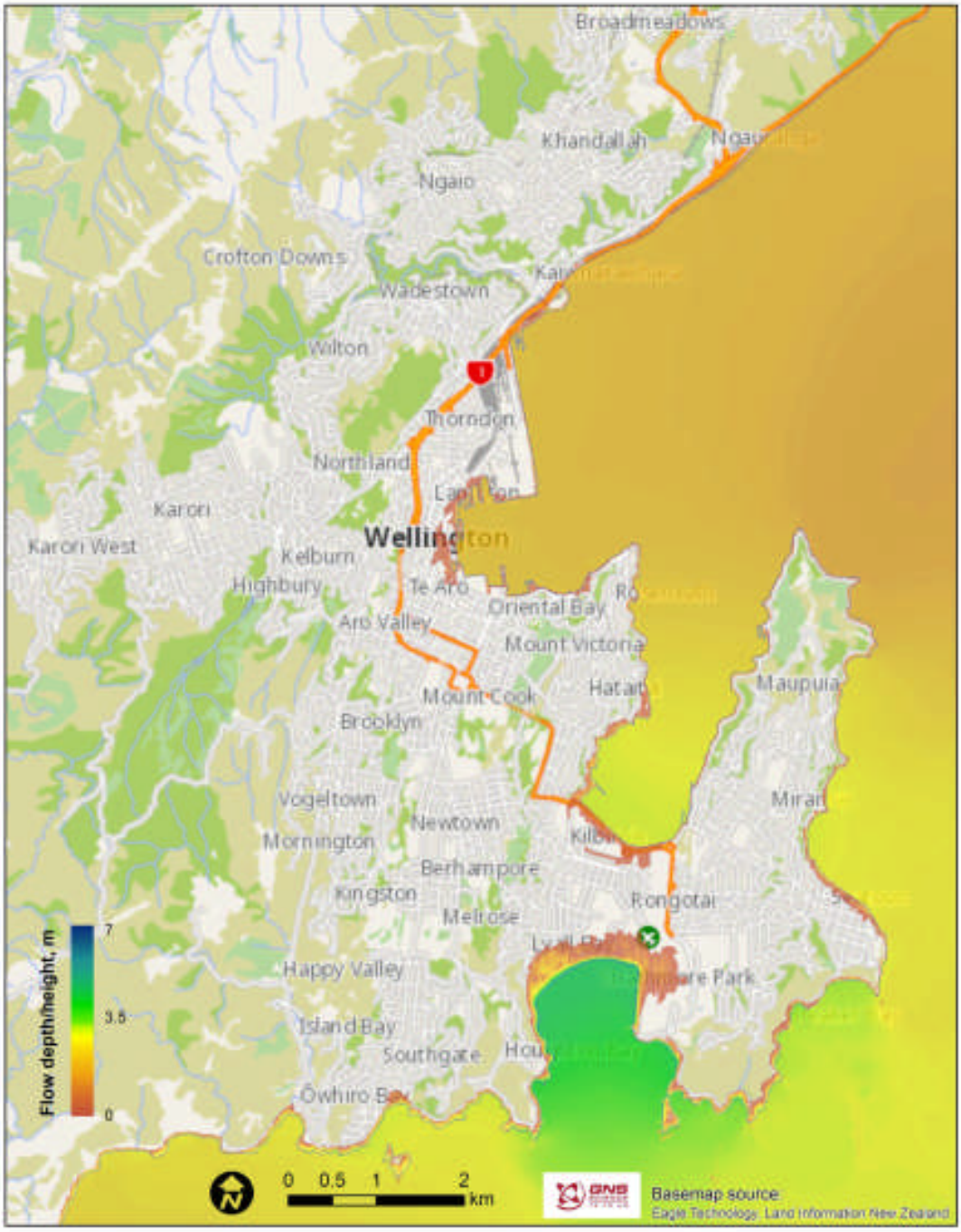
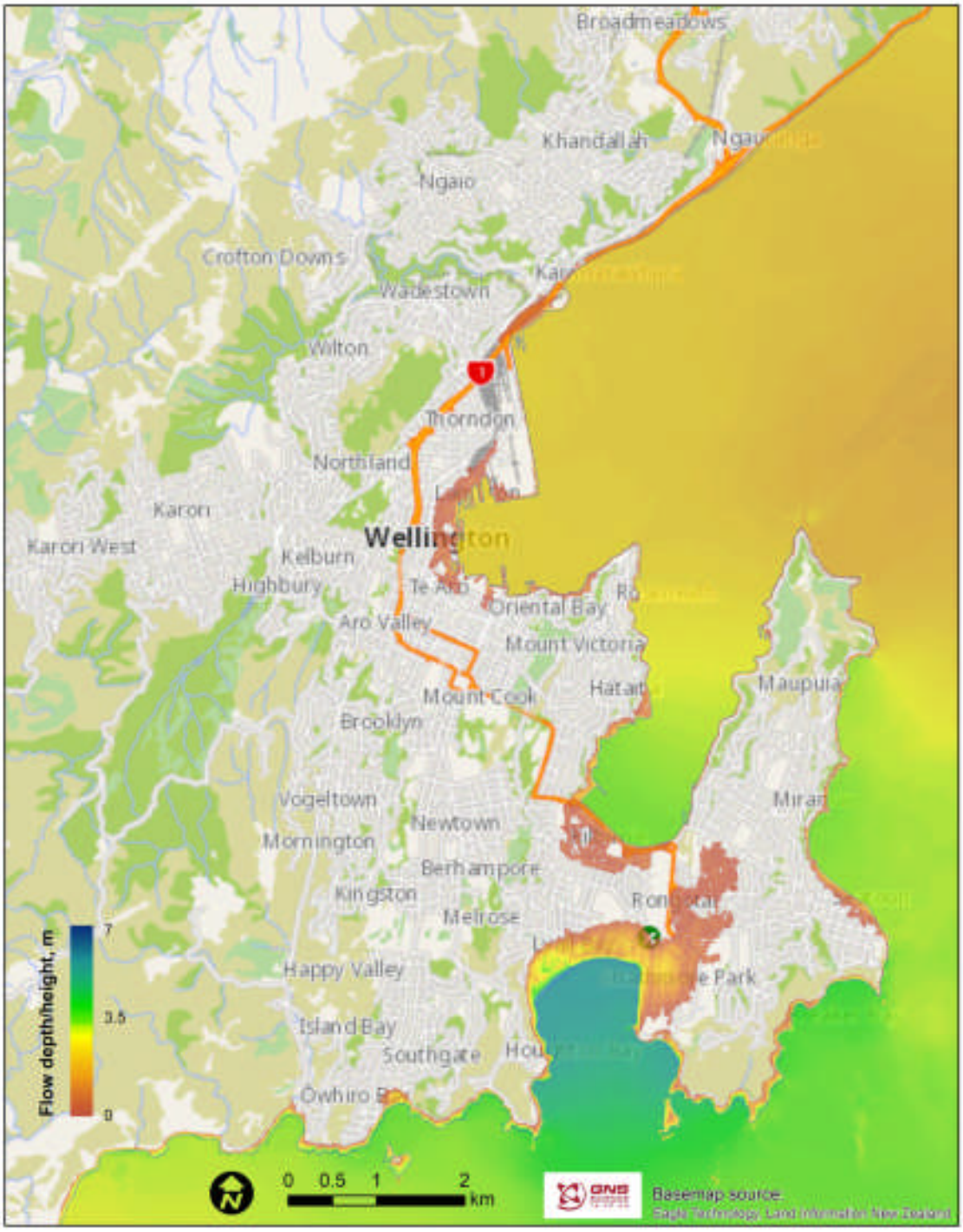


Figure 4.3 Probabilistic tsunami inundation maps for Wellington City showing the median flow depths onshore and offshore tsunami heights with a 1-in-500-years chance of being exceeded per annum at current MHWS. Onshore values refer to flow depths, while offshore values refer to maximum tsunami heights.



igure 4.5 Probabilistic tsunami inundation maps for Wellington City showing the median flow depths onshore and offshore tsunami heights with a 1-in-1000 years chance of being exceeded per annum at current MHWS. Onshore values refer to flow depths, while offshore values refer to maximum tsunami heights.

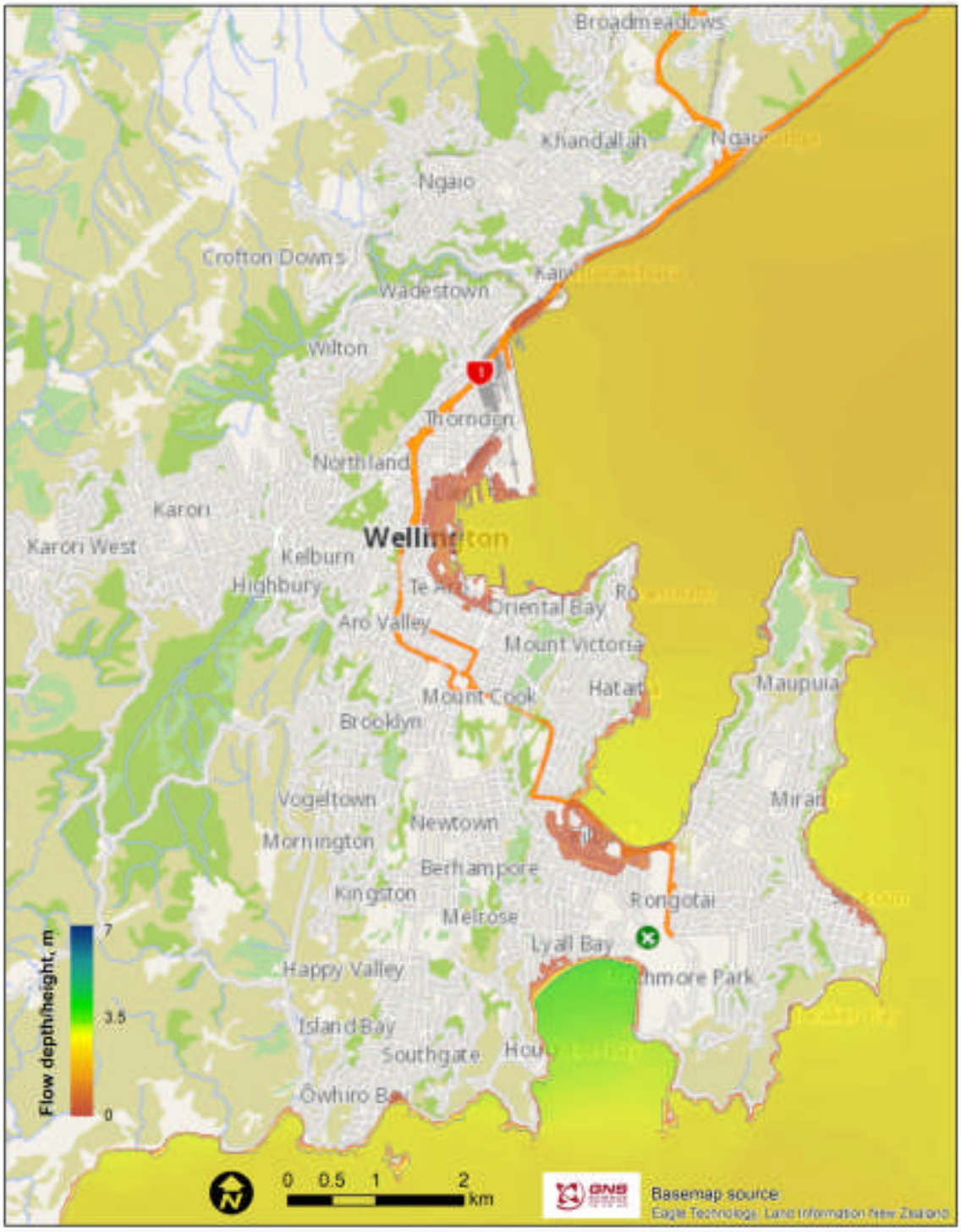
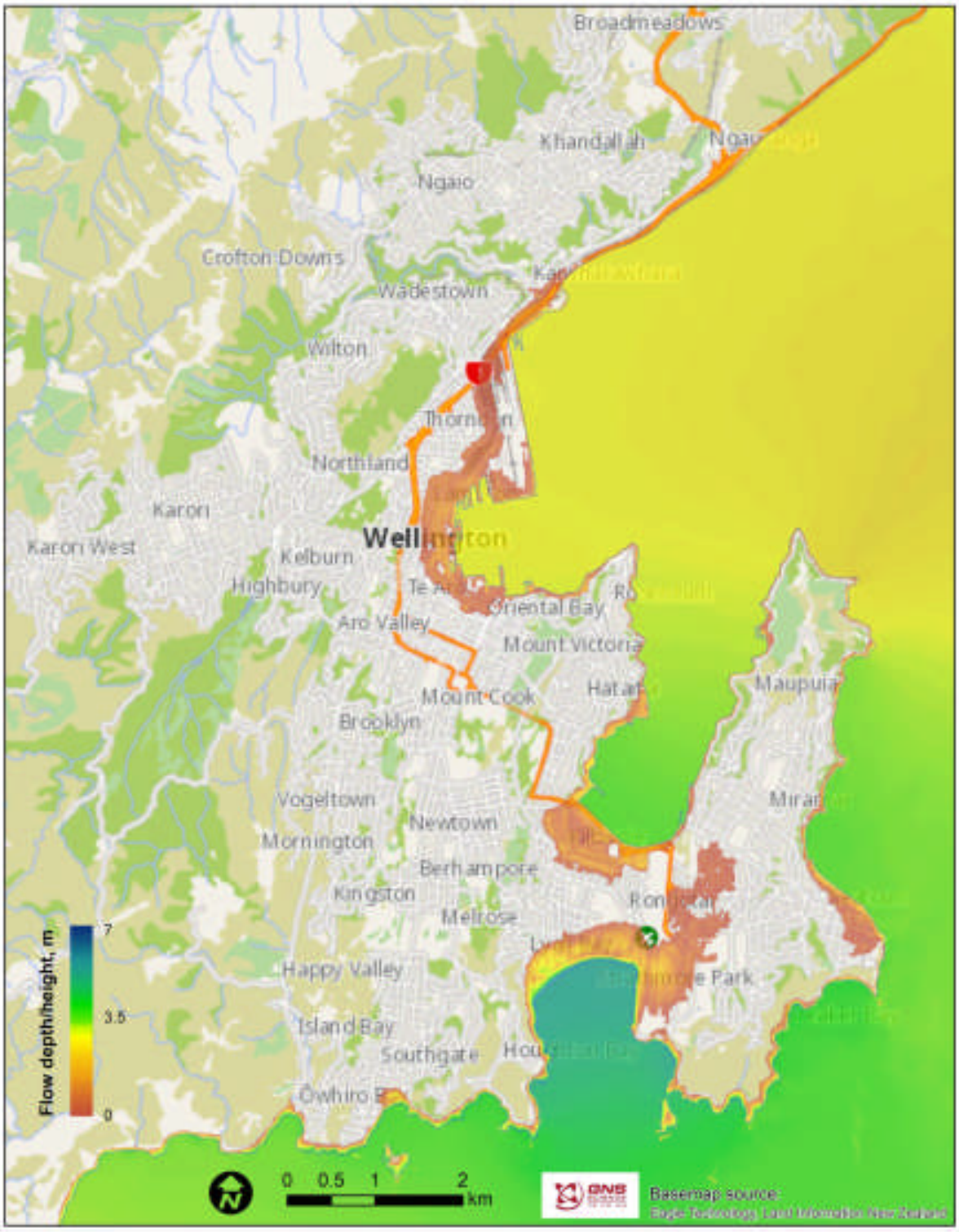


Figure 4.2 Probabilistic tsunami inundation maps for Wellington City showing the median flow depths onshore and offshore tsunami heights with a 1-in-100-years chance of being exceeded per annum at current MHWS plus 1.0 m of sea-level rise. Onshore values refer to flow depths, while offshore values refer to maximum tsunami heights.



igure 4.4 Probabilistic tsunami inundation maps for Wellington City showing the median flow depths onshore and offshore tsunami heights with a 1-in-500-years chance of being exceeded per annum at current MHWS plus 1.0 m of sea-level rise. Onshore values refer to flow depths, while offshore values refer to maximum tsunami heights.

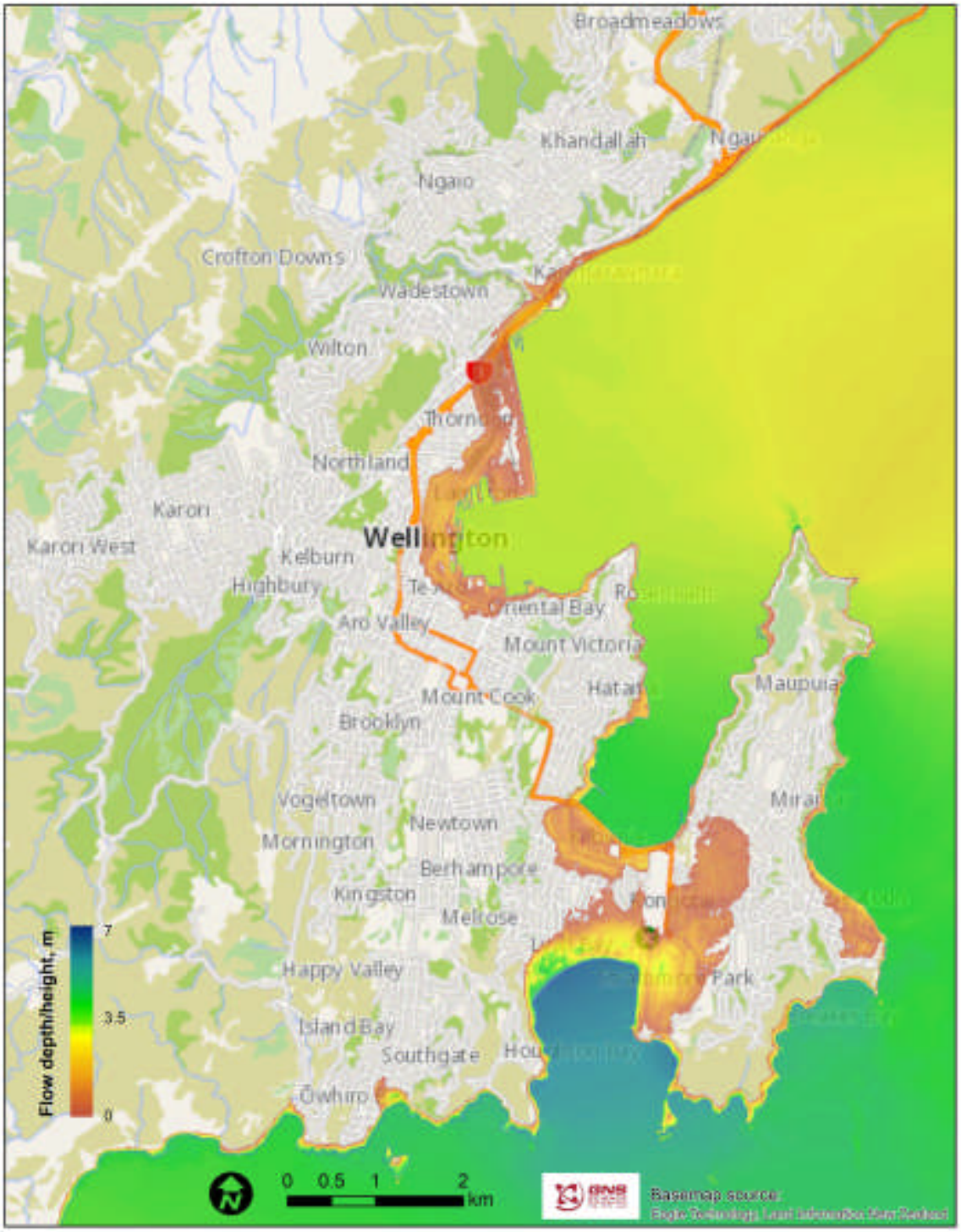


Figure 4.6 Probabilistic tsunami inundation maps for Wellington City showing the median flow depths onshore and offshore tsunami heights with a 1-in-1000 years chance of being exceeded per annum at current MHWS plus 1.0 m of sea-level rise. Onshore values refer to flow depths, while offshore values refer to maximum tsunami heights.

Attachment 2

Proposed Plan – High Coastal Hazard Tsunami (1:100yr event and 1m SLR) and Medium Coastal Inundation Overlay (1.43m SLR and 1:100 year storm event)