17 July 2024

Lois Easton
West Coast Regional Council

Dear Lois,

RE: Coastal Setback Overlay, West Coast

The Coastal Alert overlays which were updated through the recent project engagement between WCRC and NIWA for areas where LiDAR is available (from Jackson Bay to Hector) (Bosserelle, 2023), supersede the previous coastal alert layers that used a satellite derived digital elevation model (DEM) (Bosserelle and Allis 2022). However, having the coastal alert layer overlay where we have LiDAR does not (always) preclude the use of coastal setback. "Bathtub" inundation estimates are based on storm-tide and wave setup estimates, and near the shore, inundation hazard may occur at a higher elevation because of wave runup, rapid shift of sand and or overtopping. For example, in Heretaniwha Point near Bruce Bay, (Figure 1) because the LiDAR was surveyed after a relatively quiet ocean condition, some beaches were at their seasonal widest which means that even parts of the active beach (i.e., without vegetation) appear away from the coastal alert zone. In a winter storm, the sand would rapidly shift to form an offshore bar or would be flushed into Bruce Bay and there would be inundation hazard all the way and beyond the vegetation line.

To account for these effects, a 30 m buffer from the edge of the active shoreline (vegetation line in most places) should be used as a coastal setback where it extends further inland than the Coastal alert layer. This way, areas that may be affected by wave runup that are not captured in the Coastal Alert overlay will be captured in the coastal setback zone. In some places this coastal setback zone is inexistent (setback extent is within the coastal alert overlay), but in other places it accurately identifies locations potentially exposed to nearshore hazards such as wave runup and wave overtopping that would otherwise appear out of the Coastal Alert (e.g. Fox River, Figure 2).

This 30 m buffer as a coastal setback is helpful where the Coastal Alert layer exists. In my opinion, it does not require being any wider than 30 m. However, the original 200 m coastal setback should still apply south of Jackson Bay and north of Hector, outside of areas where LiDAR is currently available and where coastal inundation hazard extent could not be estimated.

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Figure 1 Example of limitation of the LiDAR inundation bathtub (purple) in places, showing little to no hazard risk implications. Essentially the LiDAR inundation does not define the coastal hazard well there and a 30m setback from the edge of the active shoreline (hachures) makes a better proxy of inundation hazard in that situation.

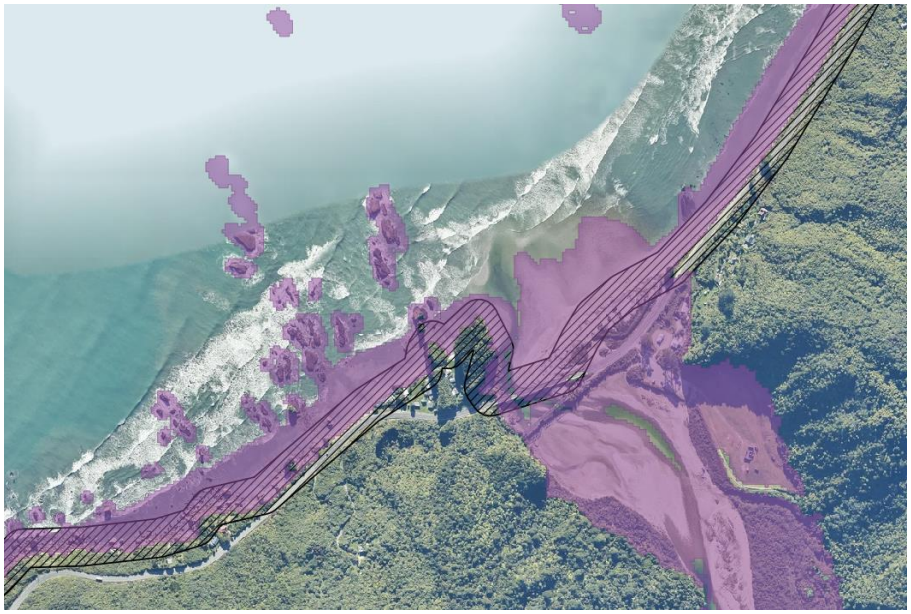

Figure 2 Example of benefit for adding a coastal setback zone (hachures) to account for areas potentially reached by runup and not captured by the coastal alert overlay (purple) in Fox River.

Yours sincerely

Cyprien Bosserelle
Hydrodynamics Scientist

References

Bosserelle C. and Allis M. (2022) Mapping for priority coastal hazard areas in the West Coast region: Supporting Te Tai o Poutini. Prepared for West Coast Regional Council. NIWA Client report number 2022036HN

Bosserelle C. (2023) Mapping for priority coastal hazard areas in the West Coast region: Coastal inundation hazard update using 2022 LiDAR. Prepared for West Coast Regional Council. NIWA Client report number 2023043CH.