

Waikato District Council
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Attention: Kelly Nicolson

Dear Kelly

Review of Waikato District Coastal Hazard Assessment

1 Scope of review

Waikato District Council (“WDC”) have engaged Tonkin & Taylor Ltd. (“T+T”) to undertake a review of the Waikato District Coastal Hazard Assessment (the “Assessment”) dated September 2019. The intent of this review is to assess the information, methodology and recommendations contained in the assessment and to make recommendations on whether they are appropriate, defensible and consistent with national and regional policy direction and national coastal hazard guidance.

This review has been undertaken in accordance with guidance provided within Engineering New Zealand: Practice Note No.2: Peer Review – dated April 2018 and has included the following approach:

- 1 Initial teleconference between WDC, T+T reviewers and assessment authors to provide context (5 December 2019)
- 2 Review of assessment with draft comments provided directly by T+T reviewers to authors for comment or clarification
- 3 Teleconference between T+T reviewers and assessment authors to discuss these draft comments (12 December 2019)
- 4 Final review comments provided to WDC (this letter).

This review has focussed on three parts including:

- Assessment methods used to derive hazard components and final values
- Assessment of the location and spatial extent of each hazard area and the recommendations for mapping these, and
- Identification of management options for each hazard area.

General commentary on each of these themes is provided below with specific comments included within a mark-up of the assessment attached within Appendix A.

2 Assessment methods

2.1 Comments on concepts

The study considers coastal erosion and coastal inundation. The region is split into developed sites (Raglan and Port Waikato urban areas) and rural areas. Hazard areas are termed *High risk coastal erosion/flood zones* and *Coastal erosion/flood sensitivity zones* in urban areas and *Coastal hazard sensitivity zone* in rural areas. Comments on these concepts and terms are as follows:

- The term 'risk' generally includes a consequence component and, while the proposed high risk zones are generally located in urban areas and therefore likely to have higher consequence (because there are public and private assets likely to be impacted by erosion and/or inundation) than non-urban areas, T+T consider that the term 'risk' may not be appropriate. This opinion is based on the current lack of a consequence assessment and the fact the assessment authors have only considered houses as being affected by the hazard and not natural/ecological features and processes. T+T consider that a more appropriate and simpler descriptor would be 'Current coastal erosion/flood area'.
- The term 'Zones' is usually associated with planning instruments rather than spatial extent of hazard susceptibility areas. However, in this case it appears that the hazards extents shown in the assessment are being developed specifically for use in developing updated District Planning maps so this term may be appropriate.

The timeframes provided within the assessment indicate that a 20-25 year horizon has been used to derive the current hazard zone and 2120 used for development of the sensitivity zones.

- The assessment has discounted the effects of sea level rise (SLR) for the 20-25 year timeframe associated with the current hazard zone. T+T consider the exclusion of the effects of SLR to be inappropriate. The MFE (2017) Guidelines suggests that under the RCP8.5 M scenario the sea level at 2045 could be 0.15m above the 2020 sea level. Consequently, T+T consider the current hazard zone should take account of SLR, or alternatively, the current hazard zone is based on a 10 year timeframe and effects of SLR can be discounted.
- T+T note that many councils are now adopting a 2130 timeframe into their hazard assessments to ensure that the NZCPS requirement of 'at least 100 years' is maintained throughout a 10 year district plan period.

The initial part of the assessment discusses the project approach, policy settings, hazard identification methods, and broad management recommendations. The final chapters of the assessment discuss specific coastal hazard extents, which settlements/assets are affected by these hazards and specific management options and recommendations.

- While Figures 1 to 3 of the assessment show the Waikato District and areas covered by rural and developed area assessments, they aren't particularly clear. T+T consider that perhaps a larger map of the Waikato District could be produced, including colouring the shoreline one colour for rural areas and one colour for developed areas with insert boxes showing the developed areas more closely (though again colouring the shoreline to reflect the level of detail being provided). We have provided an additional comment below on shoreline definition in Section 2.2.

2.2 Comments on erosion assessments

- T+T consider that the discussion included within the assessment regarding the data used for deriving erosion rates is useful. However, we note that no analysis of the data is provided and presentation of historic shorelines variable. Consequently, T+T has been unable to thoroughly

review any of the specific erosion rates given throughout the assessment with regard to their accuracy/validity.

- T+T note there is a lack of data (i.e. beach profiles) available for the assessment authors to define short-term fluctuations in beach elevations and shoreline positions. However, the values adopted by the assessment authors appear to be in keeping with similar assessments elsewhere (i.e. Auckland and Taranaki regions).
- T+T consider that there are some errors in the Bruun equation and terms applied by the assessment authors (see report comments) and values such as closure depth have not been provided. T+T consider that in general the response values for 1m SLR look appropriate but that perhaps the values should increase for the higher SLR used in the rural area assessment.
- T+T note the assessment authors provide limited discussion on cliff slope angles in Section 4 of the assessment. Given the importance of slope variables for defining hazard extents of cliffed coastline it is likely worth further discussion. The limited consideration of slope by the assessment authors is found in the site-specific section where it is stated that slopes of between 1.5(H):1(V) and 2(H):1(V) are typically used for high risk and erosion sensitivity zones. The T+T reviewers are not geologists so cannot provide expert comment on the appropriateness of these slope assumptions, but do consider it is important to continue to reinforce that flatter slopes may occur throughout the district with site-specific factors and this can influence the erosion assessment.
- T+T generally agree with the erosion widths presented by the assessment authors noting the above caveat on slope angle. T+T also consider the tables used in some site-specific assessments to present these erosion widths is useful. T+T suggest that the assessment authors include these erosion widths in all tables and that consistency between tables is provided (i.e. some tables include a slope stability horizontal distance and some give a slope)
- T+T consider that the adopted SLR value of 1 m for urban areas is in keeping with the transitional values presented within the MFE (2017) Guidelines but is lower than the RCP8.5 H+ value recommended for stress testing. Therefore, any new major infrastructure or greenfield development within the urban areas may still require a further future hazard assessment, even if outside the mapped areas.

2.3 Comments on inundation levels

- The discussion of inundation levels provided by the authors of the assessment in Chapter 4 is difficult to follow as the tables alternate between datums (MSL, MVD, NZVD) and locations. T+T suggest that the assessment authors use a consistent datum and undertake any conversions outside of the assessment. T+T further suggest that the assessment authors provide a final complete table of the adopted values for the different zones (including SLR where appropriate). In the final table the assessment authors could provide inundation levels in terms of MVD and NZVD, as future users of the assessment may be dealing with either in setting floor levels.
- T+T understand that the assessment authors developed the inundation levels based data collected from tide gauges in deepwater so the levels will not include any wave set up component. T+T acknowledge that wave set up contribution to an inundation level is likely to be small in a harbour environment (likely <0.2m) but T+T consider that an allowance for wave set up should be considered, unless the assessment authors believe the building block approach or rounding they have used has covered this allowance some other way .
- T+T consider that it is important to note that these inundation levels proposed by the assessment authors are applicable only to harbours, and that levels for wave-exposed open coast shorelines should include an allowance for additional set up. T+T note that open coast

shoreline levels are typically higher and so the allowance for set up is unlikely to have a material effect on the hazard extent in mapping.

- As to T+T's assessment of what assets are included within the hazard extents, specific comments are included in the assessment mark up (Appendix A) but of note, Wainui Road near the corner of Wainui and Riria Kereopa Memorial Drive is predicted to be affected at current flooding levels but hasn't been mentioned.

3 Hazard mapping

The assessment has provided distances and levels corresponding to predicted inundation and erosion hazards relative to current shoreline position. Inundation has been mapped within the assessment and instructions for future mapping erosion provided within an appendix, except where some indicative erosion lines are presented for north of the Waikato River. T+T's comments on the hazard mapping are as follows:

- Being able to see the inundation mapping is useful, though captions within and below figures should be aligned, i.e. some captions use 1% AEP, some use 'severe storm', some use 'extreme events'. The assessment authors confirm that the 1% AEP event wasn't specifically used to develop the inundation level (but rather a building block level), so T+T consider it is likely better to use a term like 'extreme inundation event' in the captions.
- T+T consider that the specific inundation level being mapped should also be included in the figure caption to allow users to reproduce within the Waikato Regional Council inundation tool.
- When T+T compared the inundation extents proposed by the assessment authors we observed slightly different extents to those shown on the WRC inundation tool for the same level. However, we understand from discussions with the assessment authors that the WRC inundation tool has recently been updated and that they intend to re-check their predicted inundation extents using the most recent version.
- For the erosion hazard, T+T understand that mapping is yet to be undertaken and therefore review of the maps by T+T has not been possible. Instructions from the assessment authors for future mapping appears sufficient to ensure that mapped distances are in agreement with the assessment values. T+T consider that it will be important to define the transition between different erosion areas/extents during mapping. For example, some very large values are used around major harbour entrances (S8.3.2) but these are maximum values, and it will be important for those undertaking mapping to show where the values extends from/to for adjoining shorelines with the assessment authors' input.
- T+T consider that accurate definition of a current shoreline will be important for future erosion mapping and current shoreline definition needs to be completed prior to mapping commencing, along with the extents requiring the differing mapping treatments.
- T+T disagree that stable angle mapping for cliffed shorelines should be based on the RL 3m contour as suggested by the assessment authors. T+T consider that a more appropriate basis for stable angle mapping is the current toe. Higher sea levels may increase erosion rates but unless a platform developed the current cliff toe should continue to be used.

4 Management options

This report has presented broad management options and the final chapters discusses specific management options and provides recommendations.

T+T comments around the management approaches suggested by the assessment authors include:

- The report contains quite emotive language around hard protection structures and their “huge” cost, provides limited options, and could be read to mean that the options are already pre-determined.
- We recommend that the hazard part of the report (assessment of hazard values, extents and what is affected) is separated from the discussion of management options. This would allow the hazard assessment to be dealt with as a factual report while the management options can be discussed and worked through with stakeholders.
- Similarly, the funding model for implementing an adaptive management framework is fundamental to its success and this requires discussion, the use of other council processes (LTP etc), and agreement outside of the hazard assessment.
- Further regulatory comments include the timeframe of the DP is stated as being 10-20 years and LIM are identified as supporting an adaptive management framework. These statements are confusing and require further explanation. Similarly, the assessment is to inform a District Plan review, but repeatedly refers to an adaptive management strategy with no commentary on how this is or is not related to or tied back to the review versus resource consents versus coastal management strategies etc.

5 Other comments:

- Many references used throughout the assessment are not included in reference section at the end.
- Page numbering has been reset throughout the assessment and needs updating to be continuous.

6 Conclusion

This assessment has derived hazard extents over a large and widely varying coastline and has provided a range of management options for the differing environments.

Overall T+T consider that the proposed hazard distances are generally appropriate based on our assessments in similar locations, although lack of data available and detail on assessment methods used by the authors preclude us from undertaking a detailed examination of individual components. Future mapping will be important, particularly around transition zones and care should be taken on these.

General management options have been provided together with commentary for specific locations. We suggest these are separated from the hazard report, as one should be a factual presentation of data and modelling outputs and one is a range of options to be discussed by and agreed with stakeholders.

7 Applicability

This report has been prepared for the exclusive use of our client Waikato District Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

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