

Christchurch City Council
PO Box 73012
Christchurch Mail Centre
Christchurch 8152

Attention: Peter Kingsbury

Dear Peter

Variation No. 3
Coastal Hazard Assessment - Stage II. Revision addressing Peer Review Panel Final - Recommendations

Following our discussion of 4 August 2016, and as you requested on 24 August 2016, we are pleased to re-confirm the basis on which we will update our Coastal Hazard Assessment (CHA) report addressing recommendations of the final Peer Review Panel (PRP) dated 18 August 2016 as a Variation to our existing Contract. This Variation replaces our initial Variation dated 5 August 2016 that was based on the draft recommendations. The Variation only includes activities required to refine the erosion hazards and inundation hazards for the open coast, Lyttelton and Akaroa Harbours. Our proposed Variation for the Avon/Heathcote inundation is included in a separate letter.

This proposal includes:

- Methodologies and scope to addresses the recommendations from the PRP for work that they recommend need to be done now (paragraphs 221-227).
- Prepare a further report and a programme of work that the Council should carry out at (say) 5/10 yearly intervals to update the revised June 2015 T+T report. The basis of this programme of work is given in the peer review panellists "Consideration for future assessment", paragraph 228-235.

The three most significant recommendations are:

- i Using a range of sediment budget scenarios for the open coast (para 222, c)
- ii Re-assessing the harbour coast sites for erosion (para 224)
- iii Including the results of more than one IPCC scenario (para 225).

These recommendation are considered in the task breakdown below. We note that the last item means that a significantly greater number of maps will be required. Our proposal is based on the assumption of four climate change scenarios. This is quite different from our previous report where we selected the events to map. It will require the production of a range of maps for both inundation and erosion and these will be required for present day, 2065 and 2115 (i.e. three time periods),

although we also suggest changing the last year to 2120 to be consistent with providing an assessment for at least 100 years as required by NZCPS.

Preliminary phase

Task 1: Supporting the Peer Review Panel through the review process to assist them in understanding the initial approach and to provide them with relevant background information (this stage has already completed).

Response to Para 222 and 225 – Revision of the Open Coast CEHZ maps

Task 2: Re-assess short term component (considering approaches set out in para 18 and 19)

Task 2.1: Using the same delineation of the open coast as for the long term trend, review beach profile data in BMAP (assume data provided by CCC in a suitable format) within each cell.

Task 2.2: Use SBEACH to evaluate storm cut for each cell.

Task 2.3: Evaluate the potential to use alternative distributions and determine appropriate values for storm cut for each cell.

Task 3: Evaluate potential to use alternative distribution for long term trend analysis (considering approaches set out in para 21)

Task 3.1: Re-assess LT trend for normal distribution.

Task 3.2: Re-assess dune stability distribution based on the standard error of the slope for each cell.

Task 4: Consideration of sediment budget component (considering approaches set out in paras 24 to 31)

Task 4.1: Review sediment budget papers and determine distribution of sediment transport and effects of long term transport trends using one line beach theory approximations, i.e. assume existing long term trends at each location is the mid-value of the distribution and that sediment supply variations will be an additional driver on change in addition to the distribution resulting from the historic LT trend analysis.

Task 4.2: Add this component to formula (i.e. an additional term) to carry out within the monte carlo simulation.

Task 5: Re-run simulation taking into account new component estimates and more refined cell delineations and prepare revised report and maps.

Task 5.1: Include location and condition status of seawalls and other structures. It is assumed that this will be available as a GIS layer from Council and will not require significant additional work from us to include in maps.

Task 5.2: The simulation will provide a range of probabilities for present day, 2065 and 2120. It is assumed that 7 lines per time period will be provided on the GIS overlay – i.e. min, 5%, 33%, 50%, 66%, 95% and Max. We will run this with the sediment budget distribution and with average sediment budget considerations to provide clarity on the potential effect of sediment budget on the hazard lines. This means we will present results for the three time periods with and without a sediment transport distribution.

Response to Para 223 – Harbour Coast CIHZ

Task 6.1: Provide additional support to the 0.4 m allowance at the entrance to the harbour.

Task 6.2: Run model for present day exceedance (refer separate proposal).

Task 6.3: Refer separate proposal.

Response to Para 224 – Harbour Coast CEHZ

Task 7.1: Site inspections and insitu inspection and measurement of individual beach slopes and characteristics – This will be carried out by Richard Reinen-Hamill. It is assumed that Council will provide both car and logistical support and any approvals required to access the sites.

Task 7.2: Review profile slopes and update equilibrium profile approach – this will be a building block assessment of erosion – i.e. assessing existing erosion rate (storm and long term trend and adding the effect of P50% SLR effects for 2065 and 2120) for 4 future climate change scenarios.

Task 7.3: Update report and maps with present day, 2065 and 2120 erosion extents.

Final steps to update the report

Task 8.1: Review other sections of Peer Review Panel report and update/modify report taking into account suggested changes, edits and minor errors.

Task 8.2: Issue peer review draft for their review

Task 8.3: Update and modify to prepare final document

Report on future work programme

Task 9: Identify work programme based on recommendations from the PRP over the next 5 to 10 years and prepare work scope.

We understand that you will obtain the necessary rights of entry and approvals to undertake the work we have outlined above.

Programme and Team

We will start work within one week of your instruction to proceed and expect to present our draft report by early February 2017. Finalising the report will be completed after this phase and the hydrodynamic modelling of the Avon/Heathcote is completed.

The project team will be led by Richard Reinen-Hamill our senior coastal engineer who will be the principal author of the report. He will be supported by members of his coastal engineering team, including Dr Tom Shand and Patrick Knook as well as one of our GIS specialist for the mapping work.

Health & Safety

T+T is committed to providing and maintaining a safe and healthy working environment at all of our places of work. In line with this commitment, and as required by health and safety legislation, we will develop and implement a health and safety management plan for our work in consultation and co-ordination with you and others who will be working on the project. To assist us in this, please provide a list of any known hazards and a copy of any health and safety management plan you operate which are relevant to our services.

Terms and Conditions

The work will be carried out as an extension to our existing engagement and in accordance with our previously agreed Conditions of Engagement set out in our proposal dated 5 February 2015. These terms place certain limitations on our liability and they will apply in precedence to any terms and conditions in any purchase order or other confirming document that you may issue to us.

We provide our reports and other deliverables for your benefit only and they cannot be relied upon by any third parties. However, if you want us to, we may allow a third party to rely on them after signing an appropriate reliance statement with us.

This offer is valid for 3 months from the date of this letter.

Closing remarks

We trust that this satisfactorily meets your needs. We look forward to receiving your instruction to proceed and to working with you on this project. You can confirm your acceptance by returning the attached signatory form. Alternatively, we will take your written instruction to proceed as confirmation that you accept this proposal.

Please contact Richard Reinen-Hamill at rrh@tonkin.co.nz if you'd like to discuss anything about this project.

Yours sincerely

Richard Reinen-Hamill
Business Leader Natural Hazards

Attached:

1 Variation of Existing Contract - Signatory page

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