Mark Thomson

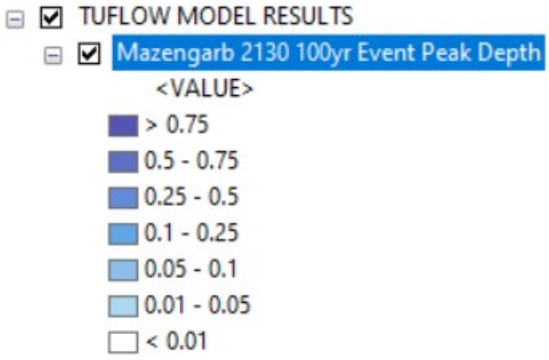
From: Tony Trueman <tony.trueman@awa.kiwi>
Sent: Tuesday, 28 May 2024 4:53 pm
To: Mark Thomson; Craig Martell
Cc: deonv@frequency.nz
Subject: RE: P22-323 - 65 & 73 Ratanui Road Flooding

Hi Mark

Please see our answers below.

I have added below the Mazengarb TUFLOW 100YR ARI 2130 peak model results are shown below.

Note these a base model results and **do not** include freeboard.



Some isolated ponding going on the site, there is quite a bit of hump and hollow, so rainfall is getting trapped in the low areas of the site. One deeper ponding area to the south approximately 500mm deep and one in the north approximately 1500mm deep. There are 5 areas to the west where flow enters the site from adjacent properties and ponds within the site.

Regards

Tony

From: Mark Thomson <mark.thomson@woods.co.nz>
Sent: Friday, May 17, 2024 9:37 AM
To: Craig Martell <Craig.martell@awa.kiwi>; Tony Trueman <tony.trueman@awa.kiwi>
Cc: deonv@frequency.nz
Subject: P22-323 - 65 & 73 Ratanui Road Flooding
Importance: High

> Some people who received this message don't often get email from mark.thomson@woods.co.nz. Learn why this is important

Dear Tony and Craig,

We understand from Kapiti Coast District Council that Awa Environmental undertakes stormwater modelling on behalf of KCDC and holds the KCDC stormwater model for the Paraparaumu area.

Woods has been engaged by a large developer to undertake due diligence civil engineering investigation and reporting for 65 and 73 Ratanui Road, Paraparaumu. We are bound by a non-disclosure agreement, so are limited on details that can be provided.

Our client has an overarching set of requirements with respect to stormwater modelling and sea-level rise, and consequently we need to understand the basis of the existing model so that we can advise our client on risks associated with adopting the existing information, or that they should undertake additional work.

Consequently, please can you respond to the following queries we have in respect of the existing KCDC stormwater model; we anticipate some of these answers may be contained within a modelling report prepared at the same time as the model?

1. What AEP event does the KCDC flooding extents represent? 1% AEP?
   The "ponding" extents shown in the above plan represent the 1% ARI rainfall event with a climate horizon of 2090 and have a freeboard of 300 to 500 mm applied from KCDC's legacy flood hazard models. KCDC have recently updated their flood hazard models to include a wider range of ARI events and a new climate horizon out to 2130. KCDC is currently in the process of determining appropriate freeboard allowances for this latest modelling, however the base model results are available.
2. Please confirm our assumption that the 'Recommended Building Line' on the KCDC GIS represents the extent of modelled flooding, and that appropriate freeboard should sit on top of this?
   Sorry I am a little unclear on this question, if you are referring to the extent of the ponding above, then it includes a freeboard of 300 to 500 mm.
3. What inherent assumptions are included in the model build?
   a. Which climate change scenario does the model represent (eg. RCP 8.5, or X degC temperature increase)? If climate change is included within the model assumptions, which time horizon has been modelled?

   Latest modelling uses climate change scenario SSP-5 (8.5 m), out to 2130.

   b. What allowances for tide have been built into the model?

   A dynamic tidal boundary has been used in the model based on joint probability analysis with rainfall. The design tide incorporates:

   - Historical Seal Level Rise (SLR) to 2005 – Collation of mean level of sea estimates from various studies
   - SLR projections from 2005 - using Takiwa Platform (searise.nz) and MfE 2022 guidance (see Table 1) to project to 2130, using SSP5-8.5M
   - Astronomical tide - to provide the underlying shape of astronomical the tide timeseries, we used a high water spring (as per GWRC 2021 Modelling Standard). We used tide levels sourced from https://tides.niwa.co.nz over the period 3 January 2022 to 5 January 2022.

- Storm surge profile – Assumed to be bell-shaped, lasting 3 days – this has been peer-reviewed. Extreme storm tide levels for a range of AEPs from Stephens et al (2012).
- Wave set-up – Stockdon (2006) formula used to scale the difference between peak storm tide and wave setup. Correlation between significant wave height and wave length has been approximated (99th percentile of prediction interval) using NIWA hindcast. Sstorm tide and significant wave height joint probability from Stephens et al (2012).
- 1% AEP storm tide and wave set up estimates sourced from Lane, E., Gorman, R., Plew, D., and Stephens, S. (2012). Assessing the storm inundation hazard for coastal margins around the Wellington region. Prepared by NIWA for Greater Wellington Regional Council, Kāpiti Coast District Council and Wellington City Council, November 2012. This was extrapolated across the District to determine values for the intended time horizons and boundary conditions.

The design tide was then used to provide base values for a joint probability analysis that established the boundary conditions between rainfall, tide, and riverine flow in the different catchments.

c. Does the model include any allowance for vertical land movement over the modelled time horizon?

Yes, vertical land movement is taken into account over the modelled time horizon.

4. What allowances for storm surge (pressure setup, wind setup, wave runup) are included?

   See 3b above.

5. Please can you confirm if the model has been updated to align with the MfE Coastal hazards and climate change guidance released early 2024, or if not, if/when this update is programmed to occur.

   The modelling uses the 2017 edition of the MfE Coastal Hazards and Climate Change Guidance. Awa has not been engaged to update to the latest guidance.

6. Please advise the process / cost for obtaining a time-series output of modelled flooding at a specific cross-section.

   We will need to add in flow lines in the area of interest and run the model to extract discharge results for the return periods of interest. A typical cost to set up the model, run and extract results and supply is approximately $1500 excluding gst.

Please feel free to call if you would like to discuss.

Kind regards

Mark Thomson
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