

Memorandum

To: Andrew Scoggins, Chris Jones, Kathryn King, Andy Finch
From: Hendrik Hilhorst
Date: 18 March 2016
Subject: Widening of the Orakei Basin Boardwalk for the Glen Innes to Tamaki Shared Path – Implications of Assessed Sea Level Rise

Summary

The finished level of the widened Orakei Basin boardwalk, in terms of current detailed design, will be 6mm above Mean High Springs Tide (MHST) measured against assessed sea level rise of 400mm by 2050. Unitary Plan provision require sea level rise effects to be addressed as part of RMA consent applications.

Water levels are controlled by the railway embankment and the sluice gates which Auckland Council operates. Currently the sluice gates operate below the level of MHST.

Based on those assumptions the boardwalk decking could be inundated during a large storm event or due to wave action at MHST by 2050.

Recommendation

That the risks of inundation of the path by 2050 in terms of the current design is an acceptable risk for Auckland Transport for the following reasons:

1. The effect is based on a predicted worst case scenario
2. The route is not a strategic transport route and there are public transport alternatives in the form of the rail network with Meadowbank station 800m south and Orakei station a similar distance north, the rail network being higher than the boardwalk
3. There is future potential to alter the sluice gate height
4. The cost implications of raising both the existing and new section would be significant and there are risks of complications arising with altering the existing structure.
5. The advantage of keeping the boardwalk open during construction would be lost.

Details

In preparing for the final structural design for the boardwalk widening and formulation of the required RMA resource consents the coastal processes expert (Terry Hume, ex Principal Scientist in Coastal Geomorphology with NIWA and NIWA's National Projects Manager, now Director of Hume Consulting) has recommended that the design accommodate a 200mm-400mm rise in sea level by the middle of this century. This is based on the fact that the application will be assessed against the objectives and policies of the Unitary Plan and these include:

Objective 5; "The process of permanent coastal inundation from sea level rise and temporary inundation from storm tide events are managed to minimise risk to people, buildings and infrastructure" and

Policy 16; " Allow for the construction of new infrastructure in the 1 per cent AEP coastal inundation plus 2m sea level rise area only where:

- a. it is functionally required or cannot practically be located elsewhere
- b. the infrastructure does not increase inundation risk, and
- c. the infrastructure is designed to withstand 1 per cent AEP coastal inundation events."

This issue applies to the middle 500m section of the approx. 650m boardwalk, both end sections are well above. See attached elevation sections.

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If we were to raise the level of the boardwalk whilst still using the manufacturer recommended 46mm depth decking we would have to reconstruct both the existing portion of the boardwalk as well as the new section of the boardwalk. This would result in increased cost, time lost to undertake redesign and would not enable a principal recommendation from key stakeholders [Parks, Local Board and Bike Auckland] that the boardwalk remain functional whilst the addition is constructed. The contractor has confirmed the construction methodology to keep the boardwalk open.

There is a risk with attempting to alter the existing superstructure of the old portion of the boardwalk to raise the level further (structural complexities and application of new standards which did not exist at the time). There would be significant cost in doing so as the work would be labour intensive, but this has not been quantified. Revised cost estimates for the new addition have not yet been completed, but are expected to fall in a \$2m-\$2.5m range.

The decking proposed is GRP (glass reinforced polymer) a synthetic fibre, cement like, but lightweight, providing an excellent riding surface and resistant to marine conditions and fire (there was an attempt to set fire to the boardwalk in recent times). The decking cross section is "nnn" shaped, with ribs to provide strength. As part of a value engineering exercise involving the decking manufacturer it was strongly recommended that a 46mm deep GRP decking is selected for strength, stability and cost reasons, as opposed to an untested 80mm depth. This will mean that the finalised RL of the deck will be about 6mm higher than mean high springs.

Beyond the boardwalk, the effects of a sea level rise of up to 400mm would be significant on the foreshore of the basin in terms of public area foreshore access as well as private property and likely to cause measures to be investigated to modify the current sluice gates which effectively controls water levels lower than mean high springs. The sluice gates are an Auckland Council Parks asset operationally. See attached pictures, next page.

The argument to proceed with the recommended design is as follows;

6. The effect is based on a predicted worst case scenario.
7. The route is not a strategic transport route and there are public transport alternatives in the form of the rail network with Meadowbank station 800m south and Orakei station a similar distance north, the rail network being higher than the boardwalk.
8. There is future potential (not investigated in detail) to alter the sluice gate height, which if feasible would control inflows.
9. The cost implications of raising both the existing and new section would be significant (MWH assessment, not assessed in detail) and complications with altering the existing structure may arise.
10. The advantage to keep the boardwalk open during construction would be lost.

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1. Current boardwalk at MHST



2. Sluice gates



3. Adjustment potential



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