

Under the Resource Management Act 1991

And

In the matter of Proposed Plan Change 2 to the Rotorua District Plan

**STATEMENT OF EVIDENCE IN REPLY OF LIAM ALEXANDER FOSTER
Dated 2 October 2020**

TOMPKINS | WAKE

Westpac House
430 Victoria Street
PO Box 258
DX GP 20031
Hamilton 3240
New Zealand
Ph: (07) 839 4771
Fax: (07) 839 4913
tompkinswake.co.nz

INTRODUCTION

1. My full name is Liam Alexander Foster. I am a Technical Principal Water for WSP. I have the qualifications and experience set out in paragraphs 2 to 5 of my Statement of Evidence dated 14 September 2020.

DISCUSSION ON PROPOSED PLANNING PROVISIONS

2. This statement provides a summary of my review of the proposed changes to Plan Change 2 requested by the Regional Council on 23 September 2020. My statement relates only to the specific stormwater provisions within the context of my role as expert adviser on stormwater management.
3. In summary, I agree with:
 - (a) Proposed A5.2.3.4.7 (a) - Stormwater Management Plan Preparation
 - (b) A5.2.3.4.7 (b) - Stormwater Management Plan Information and Assessment Requirements
4. I refer you to evidence in reply from Mr Craig Batchelar with regards to the proposed A5.2.3.4.7(c) Performance Measures.
5. I disagree with the proposed A5.2.3.4.7 (d) Methodology – Design Criteria for Mitigation Measures for the reasons given below.
6. With reference to A5.2.3.4.7 (d) (i – iii), Ms Thiel-Lardon’s evidence (paragraph 88) identifies that the assessment of effects *‘should be tested for a range of appropriate conservative design storms.’* I agree with this statement that this should be the basis of design moving forward, not solely seeking to use the event identified in the draft Design Criteria. At this stage, I want to reinforce that in my opinion the 72-hour nested storm was appropriately conservative, as agreed by the experts (referenced in the Joint Witness Statement), for this Plan Change assessment phase.
7. For preliminary and final design, in my experience, the 72-hour nested storm has not

been applied as being the basis of design for detention-based systems. New Zealand practice and application has tended to either size detention based on the critical duration of the receiving environment or through the application of a nested storm of shorter duration. This duration can either be a function of the catchment's critical duration or as is often the case across New Zealand, a 24-hour nested storm has been applied. Evidence of this approach being applied is contained in guidance documents in the Waikato¹, Wellington² and Auckland³.

8. Recent discharge consents sought from Regional Council across Rotorua⁴ have not sought to apply a 72-hour storm to manage stormwater effects from proposed developments, including those within the Utuhina catchment.
9. To support this, I note from Mr Blackwood's primary evidence that the catchment time of concentration for the Utuhina is in the order of 6 hours (paragraph 24). My rough order calculation for the catchment's critical duration has it in the order of 24- hours. As such, the use of the 72-hour storm for preliminary and detailed design of detention-based infrastructure will result in significantly larger stormwater basins being required, as shown at this stage, than typically delivered. The Regional Council's GUCM model could be utilised to confirm the catchment's critical duration through running a series of discrete events of different durations.
10. Using the longer length of rainfall time series from the Whakarewarewa rain gauge (located only 2 kms to the south of the development area, but outside the catchment), it has been shown that storm events in the catchment adjacent are not of 72 hours duration and those that are, are formed of several discrete events (of between 4 – 10 hours typically) or of a lower intensity than those identified within a nested storm design

¹ Section 4.2.4.4 in the Waikato Local Authority Shared Services – Regional Infrastructure Technical Specifications (May 2018). Downloaded August 2019 from <https://waikatolass.co.nz/wp-content/uploads/2019/01/Regional-Infrastructure-Technical-Specification-V1.0.pdf>

² Wellington Water (2019) – Reference Guide for Design Storm Hydrology, - Standardised parameters for Hydrological modelling. Prepared for Wellington Water – downloaded August 2019 from <https://www.wellingtonwater.co.nz/assets/Uploads/Reference-Guide-for-Design-Storm-Hydrology-April-2019.pdf>

³ Auckland regional Council (1999) – TP108 - Guidelines for stormwater runoff modelling in the Auckland Region, downloaded August 2019 from <http://www.aucklandcity.govt.nz/council/documents/technicalpublications/TP108%20Part%20A.pdf>

⁴ Discharge consents include Wharenui Rise development (2020), Baxendale (2017) and Sunnydowns (2016)

event. This pattern is likely to be seen in the Utuhina catchment as shown in the flow series record used within the GUCM model at Depot St.

11. Therefore in my opinion and noting the catchment's sensitivity to antecedent conditions and to flooding, there should be a flexible approach to the Methodology - Design Criteria presented, that can enable further improvement of the conceptual level mitigations presented within the Stormwater Report. Technological advances, changes to regional and national guidelines, further research and investigation could yield an approach deemed to be of similar or greater rigour to that presented to date. For instance, analysis based on Long Time Series rainfall (historic rainfall) is likely to be the most robust means to determine effects, as opposed to a discrete theoretical design event.
12. I note that the process would require the preparation of a Stormwater Management Plan and an application for a discharge consent from the Regional Council. These present a suitable process to develop and test alternatives to that tabled currently in the Design Criteria, and to engage with the Regional Council in doing this.
13. With reference to proposed A5.2.3.4.7 (d) (iv) – The reliance on RLC and BOPRC GUCM model (models) to calculate effects precludes other opportunities to deliver the work and could result in future deliverability issues. To date, there is little reason to suggest that this collaborative working won't support future delivery programmes. The requirement to use the BOPRC GUCM model places potential issues in relation to its availability and how it can be used, particularly given Regional Council's other duties, such as Natural Hazard Event management that would take precedence over the activities to run model simulations to support future Stormwater Management Planning exercises.
14. We note that, with the time constraints, we have not had the opportunity to test other criteria, given that the Regional Council advised that the GUCM model was to be the method that they would accept to validate the Plan Change level proposed mitigations. Flexibility within further stages should be allowed to test other criteria to deliver no increase in flood levels, velocities and extent downstream balancing the delivery of good outcomes across the development area.

15. If the Hearing Panel wishes to accept proposed Rules A5.2.3.4.7(c) and (d), I consider that the following changes are necessary:

- (c) That the table referenced within A5.2.3.4.7(c) (i) identified as '*Table 4.1 of the WSP report (Version 2 dated 19 August 2020)*', be specifically included to make discovery easier for subsequent designers.
- (d) Provision should be made for the approval of 'Alternative Design Criteria' that seeks to allow for appropriate testing and approval of alternative methodologies as part of the future collaborative Stormwater Management Plan delivery with both tangata whenua and the Regional Council.
- (e) With reference to proposed A5.2.3.4.7 (d) (iv) 4. I consider that the provision should maintain the 2% AEP event as 2130 not current, due to future requirements for the secondary analysis of Table 20 under Appendix L of the RPS.