

Under the Resource Management Act 1991

And

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

**SUMMARY OF EVIDENCE OF LIAM ALEXANDER FOSTER
Dated 21 September 2020**

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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.

SCOPE AND STRUCTURE OF SUMMARY

2. This statement provides a summary of my Statement of Evidence dated 14 September 2020, and the Stormwater Report attached to that evidence as Appendix 1.
3. My evidence is structured as follows
 - a) Relevant Facts and Context
 - b) Summary of Technical Report
 - c) Summary
 - d) Conclusions
4. The purpose of my evidence is to describe the potential effects of the proposed plan change on downstream stormwater flood risk and determine whether the site can be developed by implementing a stormwater approach that meets Council standards, relevant industry practice and mitigates the potential flooding effects (water levels and velocities) of this plan change downstream.
5. In this summary, I do not repeat the description of the plan change and refer to the summary of the plan change in the Council's S42A report.

RELEVANT FACTS AND CONTEXT

6. Conceptual Stormwater Management Plans (C.SMP) were developed for each of the major land holdings that form the PC2 - Pukehāngī Heights zone as part of the Council's s32 evaluation. These identify the opportunity to protect and enhance the receiving environment as it changes land use zoning from the current land-use.
7. Since the Plan Change was notified, further works have been undertaken to determine the downstream flood risks within the Lower Utuhina catchment, now that additional information has been received.
8. The Bay of Plenty Regional Council model for the Greater Utuhina Catchment (GUCM) was received in May 2020. In agreement with the Regional Council, we have used this model to determine the impacts of the proposed approaches to manage stormwater

quantity.

9. Changes were required to the proposed stormwater basin concepts at this time as the design storms identified by the Regional Council were sufficiently different to those used previously. These changes allowed for the GUCM to be used as a tool to assess the effects of the plan change.
10. Further meetings throughout July and August have sought to arrive at an agreed output from the work, culminating with a caucus held in August with the Council, Regional Council and key submitters, where the potential effects were presented. My Stormwater Report dated 14 September 2020 captures these changes and the work to support the requests identified at this meeting.
11. At the same time further effort, in the form of a Stormwater Master Plan, is being undertaken by the Council to investigate the overall stormwater management approach across the District. This includes specific investigations of the catchment in which this Plan Change is located, namely the Uthina Stream and its urban tributaries (the Mangakakahi and Otamatea streams). It is anticipated that this study will investigate the most efficient and effective manner to manage stormwater through the catchment. This work may identify that offsite mitigation in parallel with proposed onsite mitigation options will better help deliver the following key outcomes of:
 - i) Alleviating flooding in lower parts of the catchment in conjunction with the Regional Council. The current levels of service for this area are not being met, and;
 - ii) Allowing for suitable urban growth within Rotorua and balance effectively the impacts of development.

SUMMARY OF TECHNICAL REPORTS

12. Stormwater runoff from the plan change area is predominantly captured and conveyed by a combination of piped networks and overland flow paths, discharging into the Mangakakahi and Otamatea Streams. The Uthina Stream flows in a north-easterly direction to Lake Rotorua.
13. The quantity of the stormwater runoff from a fully developed site will increase from the existing greenfield situation. Therefore, control of this runoff will need to be incorporated into the stormwater management system design. This is necessary to ensure that urbanisation of the site does not result in significant flooding effects downstream.

14. As identified within the C.SMP and the plan change provisions, the stormwater approach is to deliver water sensitive design approaches onsite that:
 - a) Promote inter-disciplinary planning and design,
 - b) Address stormwater effects as close to the source as possible, and
 - c) Mimic natural systems and process for stormwater management.
15. For the purposes of the plan change assessment, the concept approach used end of system detention basins onsite to balance the increases identified in (13). Detention basins are used in similar settings across Rotorua, however these will require further investigations and appropriate design at the time of subdivision consent.
16. Water Sensitive Design principles through the plan change area have the potential to appropriately integrate stormwater quality and quantity needs further across the plan change to treat, attenuate and infiltrate the more frequent events.
17. The basins have been conceptualised to capture the plan change stormwater, store, infiltrate and discharge it to existing stormwater networks or waterways. The basins reduce peak flow rates from the site, for a range of storm events from 50% Annual Exceedance Probability in any given year (AEP) to 0.2% AEP, now and with an agreed climate change allowance. This is through a series of outlets and weirs as described in the Stormwater Report. In doing this, the focus has been on downstream flood management.
18. A like for like (relative change) assessment was undertaken to compare the existing greenfield runoff and downstream flood risk with the conceptual stormwater approach, using inputs and parameters agreed with Regional Council.
19. The 'relative change' approach taken through the modelling shows a neutral or positive effect for the directly affected streams across the range of return period events from 10% AEP to 0.2% AEP now and with appropriate climate change allowances.
20. All but two of the basins are modelled to contain the 1 % AEP plus climate change event without spilling over an emergency spillway. A review of the two shows that these basins can be further refined to reduce or remove this spill. Additionally, the spills for these do not show any impact on private property being conveyed along existing flow paths (within road reserves), or directly, into an open waterway.
21. The conceptual stormwater management approach for all the basins relies on the continuation of existing overland flow paths, some of which are through existing

properties, which include residential sections with existing development.

22. This approach represents an appropriately conservative approach for the plan change stage through its choice of parameters and inputs, as described in the Stormwater Report.

SUMMARY

23. In summary, the investigation has been targeted at determining whether a solution can be found that can avoid increasing flood risk downstream, rather than providing the design information needed for consenting and construction purposes.
24. The effects assessment, using a relative change approach for the conceptual stormwater approach, shows a neutral or positive effect on peak flood water levels and peak velocities downstream.
25. The assessments capture a range of return periods from the 10% AEP for the present day through to the less likely 0.2% AEP with a climate change allowance based on draft Regional Council guidelines (3.68 degree of warming scenario to 2130).
26. Two outlet configurations have been identified within the revised stormwater report that can have a neutral or positive effect, of the two, Scenario 16 enables greater certainty for similar outcomes for more frequent events than those currently modelled.
27. There are minor effects identified within the urban stormwater network serving the current rural land area as a result of the attenuation basins, releasing attenuated water up to 1 day longer compared to the base. The impacts diminish over time as the urban stormwater network recovers its capacity for stormwater events.

CONCLUSIONS

28. It is my opinion that the concept assessed provides a deliverable and practicable option for stormwater management onsite that can service the plan change in a way that has negligible effects on downstream water levels and velocities. This has utilised the input parameters identified in consultation with the Regional Council.
29. Other solutions / configurations of devices may also be feasible both on site and off site to mitigate the impacts identified in my report. Flexibility in the conditions for rezoning should be allowed at this stage to allow improvements to be explored during subsequent investigation and design phases and in accordance with the ongoing Stormwater Master Plan work that Council has underway.

30. The plan change stormwater approach identifies that the plan change should follow key Water Sensitive Design Principles to manage the quantity and quality impacts, as shown in (14).
31. Overall the proposed stormwater concept assessed which includes dry detention basins, are of a scale that is appropriate for not worsening the flood risk downstream. The devices are appropriate to the proposed land use change context, and consistent with the skills and resources of the maintenance personnel available to Council.
32. Further investigations to support the detailed design of stormwater approaches, as recommended in my report, will take place within Stormwater Management Plans for the site and the Council's Stormwater Master Plan.