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**In the Matter of:**

The Resource  
Management Act 1991

**and**

**In the Matter of:**

Request to change the  
Manawatū District Plan  
under Clause 21 of  
Schedule 1 of the  
Resource Management  
Act 1991 (Private Plan  
Change 1)

**Application By:**

**Te Kapiti Trust**

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**Statement of Evidence of Jonathon David Bell  
For the Manawatu District Council S42A Report  
(Stormwater)  
Dated 28<sup>th</sup> April 2023**

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# Statement of Evidence of Jonathon David Bell, MEng (Civil) CPEng CMEngNZ

## A. Executive Summary

1. The key conclusion of my technical section 42A report are that:
2. It has been demonstrated that stormwater from the development can feasibly be managed in such a way that the development can be hydraulically neutral. This means that the peak rates of run-off from the site will not be increased by the development. This being the case, it can be said that the development will not create or exacerbate a flood risk to any other properties.

## B. Introduction

3. My full name is Jonathon (Jon) David Bell. I am currently employed at Stantec as Senior Principal River Engineer.

### Qualifications and Experience

4. I have the following qualifications and experience relevant to this assessment:
  - (i) I hold a Master of Engineering (Civil Engineering) from Cardiff University, United Kingdom, 2007.
  - (ii) I am a Chartered Professional Engineer and a Chartered Member of Engineering New Zealand
  - (iii) I am a member of the River Group NZ, and between 2018 and 2022 served on the committee of the group.
  - (iv) Since obtaining my degree, I have gained 16 years of experience in river engineering, hydrology, hydraulic modelling, and flood risk management mainly in New Zealand as well as the United Kingdom. My work has covered flooding from both rivers and stormwater systems.
  - (v) Between 2011 and 2022 I was employed by Horizons Regional Council in their River Management Group. During my time at Horizons, I undertook a number of projects involving flooding within the Manawatu District.

### Involvement in Proposed Plan Change

5. I have been involved with the proposed plan change since August 2022 when I was engaged by Manawatu District Council to review the stormwater (quantity) aspects. My involvement has included expert conferencing with Ms. Reiko Baugham (GHD, for the applicant), and Ms. Julia Jung (Horizons Regional Council), on 13<sup>th</sup> April 2023.

### Code of Conduct

6. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. I confirm that I have stated the reasons for my opinions I express in this report, considered all the material facts that I am aware of that might alter or detract from those opinions, and that the report and the issues I have addressed are within my area of expertise.
7. Statements expressed in this report are made within the scope of my expertise except where I have relied on technical advice I have referred to in this report.
8. I have all the information necessary to assess the application within the scope of my expertise and am not aware of any gaps in the information.

### C. Scope of Evidence

9. My evidence is on the stormwater quantity (flood risk) aspects associated with the proposed private plan change.
10. In preparing this evidence I have read and used the following stormwater related information that has been supplied by the applicant:
  - Rongotea Private Plan Change, Three Waters Assessment, 9<sup>th</sup> November 2022, GHD
11. The proposed plan change has been described in detail in the application documents, and has been summarised in the evidence of Mr. Daniel Batley. In the interests of brevity I have not reproduced this information here.

### D. Summary of Evidence

12. In reviewing the application, I consider the key question in related to stormwater quantity is whether development, similar to what is outlined in the request, can be feasibly achieved while avoiding more than minor increases in flood risk to the site or elsewhere.

### Initial Assumptions

13. The GHD report assesses the flood risk associated with the plan change, as well as the management of stormwater from the site. In terms of the flooding assessment the report has made 5 assumptions, which I comment on below:
14. **Culverts and drainage structures upstream of the development site are adequately sized and do not restrict flows.** This is a reasonable assumption to make for the flooding assessment as what is being assessed is the relative difference between a pre and post development scenario.

15. **Upstream culverts are blockage and sediment free.** This is a reasonable assumption to make for the flooding assessment as what is being assessed is the relative difference between a pre and post development scenario.
16. **The Digital Elevation Model (DEM) is representative of existing terrain. Fences or walls that may constrict or divert flow paths are not resolved in the DEM and thus not resolved in the flood model.** This is a reasonable approach to take in a flooding assessment.
17. **The size and depth of existing drainage channels is adequately represented in the DEM. This is a reasonable assumption to make and is a common approach for this type of work.**
18. **The flood model has not been validated or calibrated.** I understand that this is the case due to a lack of sufficient data to be able to undertake this work. It is my opinion that the model that has been built is adequate to make an informed decision about the feasibility of the proposed stormwater management.
19. The GHD also makes 6 assumptions about the management of stormwater across the site. These assumptions are reproduced below, along with my comments about them:
20. **Except for filling in gullies on the site, the finished ground will generally maintain existing elevations and falls. Final grades of the road reserves will allow drainage of overland flow paths to a centralised wetland and attenuation facilities.** In my opinion, these are reasonable assumptions as this would be typical of subdivision development.
21. **The soils are suitable for drainage swales.** In my experience this is appropriate as the ground in the area typically drains well.
22. **The soils are suitable for the stormwater wetland and attenuation pond design.** In my experience this is appropriate as the ground in the area typically drains well.
23. **The extent of stormwater management required to meet the Resource Consent for the discharge of stormwater includes stormwater treatment and 'hydraulic neutrality'. Hydraulic neutrality has been applied as limiting post-development peak run-off from the site to pre-development peak run-off.** Whilst I can not comment on the extent of stormwater management required to meet the Resource Consent, I consider that the definition of hydraulic neutrality is appropriate for this assessment. By limiting the peak run-off from the site to pre-development levels, means that the downstream drainage network will not subject to any greater flows.
24. I note that this does not mean that the total volume discharged from the site will not increase. However, in discussions with the applicant's and Horizons' experts it was agreed that any potential increase in total volume from this site would be extremely minor in terms of the wider catchment and hence considered to be less than minor.

25. **The impervious area percentages provided by the Property Group are appropriate and representative for the development.** This is a reasonable approach to assess the feasibility of the request.
26. **Horizons will agree to recontouring of the floodplain and realignment of part of the Campbells Drain (if required) on the adjacent property for stormwater use.** This is not something that I can comment on.

### Flood Modelling

27. The GHD report describes the modelling work that was undertaken. Whilst undertaking a peer review of the modelling work is outside of my scope, it is important to consider the appropriateness of the modelling approach in terms of its ability to represent the pre and post development scenarios. The key aspects of the modelling approach are summarised below:
- The model has been developed in HEC-RAS, a modelling tool developed by the Hydraulic Engineering Centre of the US Army Corps of Engineers. This software is used across the globe for floodplain analysis.
  - Model includes 2-dimensional surface flows for the catchment north of and draining to the site, as well as for an area approximately 1 km south.
  - A grid size of 20m<sup>2</sup> was used for the wider modelled area and a refined 5m<sup>2</sup> grid size within the plan change site, adjacent site for stormwater used and channels draining into the site.
  - The model does not include the existing reticulated network in Rongotea
28. I consider that the modelling approach used is appropriate for the assessment of flooding across the site.

### Hydrology

29. The GHD report discusses the development of the inputs for the flood model. I note that when modelling the hydrology, a conservative assumption was made about the soil types in the catchment. I agree with the report where it states that *"this is conservative but likely represents the behaviour of wet saturated soils typically observed in the winter months."*
30. I further note that to develop an appropriate hyetograph, several synthetic rainfall events were developed, and the most conservative approach was chosen for use in the assessment. I consider that this conservative approach is appropriate to determine the feasibility of the proposed Plan Change.

### Flood Risk

31. The modelled 200-year flood extents are shown in Figure 6 of the GHD report. Whilst it has not been within my scope to undertake a peer review of the model, I believe that the modelling approach, as previously described, is appropriate, and the results produced look reasonable based upon my knowledge of the site. As such I believe that the modelled results are appropriate for the assessment of flood risk at this site.

32. I concur with the GHD findings in Section 2.2.2 of the report where it is stated that "**The area surrounding the Ruivaldts and Campbells drain should also be identified as a flood prone area to prevent residential development or loss of floodplain storage.**"

### Management of Overland Flow Paths

33. The GHD report (Section 2.3.1) discusses the management of overland flow paths. This is important so as not to create or exacerbate flooding upstream or downstream of the site. It is proposed that runoff into the site from the urban area of Rongotea will be intercepted by cut-off drains along the northern boundary. These flows can then be conveyed via a swale and bypass pipe.
34. The Ruivaldts drain will need to be culverted under the main east to west road. Additionally, it is proposed that the baseflow from the east overland flow path, to Florin and Sterling Lanes, can be maintained via another pipe.
35. Whilst I cannot comment on the exact sizing of these drains, swales, and pipes, I can confirm that the assessment demonstrates that the stormwater entering the site can feasibly be managed, so that flood risk is not increased to the upstream catchment area.

### Stormwater Model Development

36. To provide indicative sizing of the stormwater network and attenuation for the development site GHD developed a stormwater model using PCSWMM software from Computational Hydraulics International. Again, it is outside of my scope to undertake a peer review of the modelling, and as such I rely on the information provided in the GHD report.
37. I can confirm, however, that the software used is appropriate and is commonly used for stormwater models such as this.
38. I can also confirm that the rainfall hyetographs that have been developed and used in the model are appropriate.

### Stormwater Management

39. 2 potential options for the management of stormwater in the east sub-catchment have been discussed as part of the request. These are referred to as 'Option A' and 'Option B', in the interests of clarity I will continue to use this nomenclature. These options have been described in detail in the application, so in the interests of brevity I do reproduce that information here.
40. In essence both options will capture stormwater from the development and convey it via a reticulated network to an attenuation facility. In Option A this attenuation would be an existing wetland area and a constructed attenuation basin.
41. In Option B the attenuation would be in the form of a constructed attenuation basin and a constructed wetland.

42. Stormwater management in the west sub-catchment is shown to be achieved using kerb and channel run-off to rain gardens before discharging to Ruivaldts Drain.
43. Whilst all these options will require detailed design to confirm their exact dimensions, location, and construction, it is my opinion that the information provided shows that stormwater can feasibly be managed so that hydraulic neutrality from the development is achieved.
44. A number of submitters to this plan change have raised concerns about the management of stormwater. Marti Hodgins and Graham Edwards (SO3/001 & SO13/001) have discussed the stormwater run-off that currently affects properties along Severn Street.
45. The application proposes the construction of a cut-off drain along the northern boundary of the site. The purpose of this cut-off drain being to capture overland flows entering the development and conveying them through the site.
46. It has been demonstrated that all stormwater from the development will be captured and managed in such a way that the peak discharges from the site will not be increased. Whilst this may not alleviate the flooding currently seen at Severn Street, it will not be increased by the development.
47. Another submitter, Rhonda Maurice (SO1/001), is concerned that the infrastructure in Rongotea "will not cope" with a significant increase in the local population. I cannot comment on all elements of the local infrastructure as only the stormwater network is within my scope. In this regard, the application has demonstrated that all stormwater from the development will be captured and managed on the site, meaning that it will not put any extra demand on the existing local infrastructure.

## **E. Conclusions**

48. It has been demonstrated that stormwater from the development can feasibly be managed in such a way that the development can be hydraulically neutral. This means that the peak rates of run-off from the site will not be increased by the development. This being the case, it can be said that the development will not create or exacerbate a flood risk to any other properties.
49. The GHD report demonstrated how run-off entering the site from the Rongotea urban area can be captured and conveyed through the site in such a way that it will not cause any increase to flooding to Rongotea.
50. Whilst the feasibility of the stormwater management has been demonstrated it will still need to be subject to detailed design. I recommend that the models developed to support this design are subject to a peer review.

Jonathon Bell  
Stantec New Zealand

28<sup>th</sup> April 2023