

**IN THE MATTER OF**

the Resource Management Act 1991

**AND**

**IN THE MATTER OF**

Of an application for a resource consent under the  
Resource Management Act 1991

**BETWEEN**

**WELLINGTON WATER LTD. ON BEHALF OF THE  
UPPER HUTT CITY COUNCIL**

**Applicant**

**STATEMENT OF SUPPLEMENTARY EVIDENCE OF ROBERT JAMES HALL**

**THE 3 DAY OF August**

**2020**

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My full name is Robert James Hall. I am a Civil and Environmental Engineering consultant and I reside in Timaru. I am the sole director of R.J.Hall & Associates Ltd.

I have been engaged by Save Our Hills ( inc ) to assist them in their submissions in relation to the Wellington Water Ltd. – Upper Hutt City Council resource consent applications to which these proceedings relate.

### **Qualifications and Experience**

My relevant qualifications and experience are as follows Masters of Engineering ( Natural Resources ), Bachelor of Engineering ( Civil ), New Zealand Certificate in Engineering ( Civil ), Graduate Course in Surface Water Hydrology ( University of NSW, Sydney, Australia ), Member of Engineering New Zealand, Chartered Professional Engineer ( Civil ) Int PE ( NZ ) and a member of the NZ Society of Large Dams, NZ Hydrological Society and NZ Structural Engineers Society. I have 45 years experience in the area of water and soil engineering, 12 of which as a Director of R.J.Hall Civil and Environmental Engineering ( Timaru ). In October 2007 R.J.Hall Civil & Environmental Consulting Ltd. was purchased by GHD Ltd. who then employed me as a Civil and Environmental engineer and as manager of their Timaru office. My engagement with GHD Ltd terminated in early May 2011. At that point I established a new consultancy R.J.Hall & Associates Ltd.

Prior to establishing R.J.Hall Civil & Environmental Consulting Ltd I was employed by a number of catchment authorities in both the North and South Islands of New Zealand as a civil engineer. I was employed by the Canterbury Regional Council from its inception through to October 2005 when I resigned to establish R.J.Hall Civil & Environmental Consulting Ltd.. Whilst employed by the Canterbury Regional Council I held the roles variously of Principal Design Engineer and Hazards and Structures Engineer and Southern Area Office Manager.

1. A record of the engineering position I have are as follows

Design Engineer ( Hawke Bay Catchment Board and Regional Water Board ), Chief Engineer ( Waitaki Catchment Commission and Regional Water Board ), Deputy Chief Engineer ( Bay of Plenty Catchment Commission and Regional Water Board ), Rivers and Drainage Engineer ( Marlborough Catchment Board and Regional Water Board ), Deputy Chief Engineer ( South Canterbury Catchment Board and Regional Water Board ) and Regional Design Engineer ( Canterbury Regional Council ).

My responsibilities whilst employed by these various Authorities centred on the management of a wide range of river systems, the design of river protection and flood mitigation works ( erosion control structures, detention dams, stopbanks ), drainage systems ( gravity and pumped ), natural hazard assessments and flood plain mapping,( flooding, erosion, debris flow, rock slides ), flood and low flow frequency analysis, assisting Territorial Authorities to develop natural hazards policies for District Plans, managing flood warning systems.

As a consultant I peer reviewed Opus Internationals report to Horizons on the 16 February 2004 floods. Collaborated with T.R. Davies ( Natural Resources Engineering Lincoln University ) on river related natural hazards at Franz Josef and with staff and elected members of West Coast Regional Council, and representatives from the Ministry of Emergency Management, Ministry for the Environment, Department of Conservation, NZTA and Westland District Council. I was engaged by the Fletcher , Dillingham, Ilbaua Consortium to develop flood warning and associated procedures for the Manapouri Power Station tailrace project. I was engaged by the MacKenzie District Council and subsequently Environment Canterbury to provide hydrological assessments in relation to the failure of the Opuia Dam and to assist in the legal proceedings which arose from that failure. I provided the designs for the Mararoa River recovery project for the Southland District Council and provide flood mapping services and advice on flood management policies to jointly the Southland Regional Council and District Council. I provided engineering advice to the West Coast Regional Council in relation to the hydrology, and performance of the Grey River stopbank system at Greymouth and in relation to it's subsequent upgrades.

At present I have engagements with Environment Southland ( river management issues on the Upokurora River, Te Anau ), Otago Regional Council, river management issues, Clutha River at Albert Town and Environment Canterbury ( peer reviewing internal flood hazard reports prepared by ECan for both the Waitaki District Council & Timaru District Council ).

### **Code of Conduct**

2. I have read, and agree to comply with, the Code of Conduct for Expert Witnesses contained in the Environment Court's Consolidated Practice Note 2006 in giving evidence to the Environment Court in this matter. All my evidence is within my expertise and I have considered and stated (where applicable) all material facts known to me which might alter or qualify the opinions I express.
3. I have no financial interest in the outcome of this hearing.

### **Ambit of Evidence**

4. In my evidence, I will advise on
  - An assessment I have made of the flood event that occurred on the Pinehaven Stream 8 December 2019 and in particular provide an estimate of the peak flow that occurred at the Chatsworth Rd. gauge site about 6.30 am that day in response to what is estimated to have had a two hour rainfall rain fall depth of some 53mm between 3 and 5 am that morning with an estimated two hour duration recurrence interval of 30 years, and
  - A revised rating curve that I have developed for the Chatsworth Road gauge, and

- Footnote: Attached to and forming part of my evidence is a report to Save Our Hills ( inc ) in draft form, summarising the work I have undertaken at their request and the conclusions I have formed as a consequence of those investigations. It is intended that this work will form the basis of my contribution to the Expert Evidence conference set down for the week commencing Monday 27 July 2020. The final report will be available later this same week once the conferencing has taken place and any modifications which are appropriate as consequence of the conferencing can be included.
- On the basis of the above using six empirical methods provide a series of flood frequency plots for the Pinehaven Stream at the Chatsworth Road gauge site, and
- Advise on a check method to assist in determining the efficacy of these six methods for the site and in the process rejecting one on the basis that it did not entirely satisfy the test criteria being employed, and
- Provide comment on the flood frequency curve ( s ) that have been developed for the Pinehaven Stream Catchment variously by the Greater Wellington Regional Council and their agents, MWH, SKM and Jacobs from 2008 to the present and which inform the flood plain mapping exercises that have been carried out and which form the design basis for the present resource consent applications.
- Correct an error in my Evidence of 27 July 2020 relating to the rainfall in the Pinehaven catchment for the event 23 July 2009, and
- Reiterate the importance of giving consideration to the effects of antecedent rainfall conditions and forest canopy interception in estimating rainfall excess, and
- Note that when modelling the rainfall – runoff process if insufficient attention is paid to these two catchment characteristics then model outputs will tend to overestimate both runoff volume ( rainfall excess ) and peak flows, and
- Note that once these errors of this kind are embedded in the rainfall – runoff model then the outputs ( hydrographs ) will be impaired and any subsequent use of those hydrographs to generate flood maps or to form a basis for channel upgrades as is the case with the stream upgrade designs, will likewise be impaired, potentially to a greater degree particularly where inadequate calibration and verification of those models has occurred, and
- Reiterate that the safeguard customarily employed to avoid this issue is to rigorously calibrate and verify the models being used against well established rainfall and flood hydrograph records, and
- To note that in order to arrive at a flood frequency curve for the Pinehaven catchment using my flood frequency curve whilst including an allowance of 20% for climate change effects, the flood peaks can be directly scaled up by 20%. The reason for that is that the methods I have employed to reach the flood estimates provided are based on the Rational Method or derivatives of it which has a rainfall parameter employed in the calculation so the result is based

on rainfall rather than rainfall excess. The form of the flood estimates shown on my flood frequency curves in Fig 1 & 2 plot as a straight line on the log – normal plot and hence represent a GEV 1 type distribution ( Gumbel ). This form will be retained when the climate change adjustment is made along the lines noted above.

**From this I conclude** that the flood frequency curves on which the presently proposed Pinehaven Stream upgrades are based and which previously provided a basis for the Upper Hutt City Council flood maps for the Pinehaven Catchment over estimate flood peaks and runoff volumes by a significant degree and should not be used as a basis for the current designs. This suggests that there is an immediate need not to proceed further with the consent application until such time as more appropriate flood frequency estimates are available and are adopted in order to more appropriately inform the proposed works in the Pinehaven Stream covered by the present resource consent application and to which these proceedings relate.

R.J.Hall

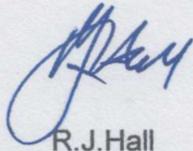
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