

BEFORE THE HEARINGS PANEL

IN THE MATTER of Plan Change 21 to the Timaru District Plan

BETWEEN **PORT BRYSON PROPERTY LIMITED AND HILTON
TRUST LIMITED**

AND **TIMARU DISTRICT COUNCIL**

STATEMENT OF EVIDENCE OF ROBERT HALL

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Introduction

- 1 My full name is Robert James Hall. I am a Civil and Environmental Engineer, in which capacity I am a Director of R J Hall & Associates Limited. I reside in Timaru.
- 2 I hold the qualifications of 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 the Institution of Professional Engineers of 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 and the NZ Geotechnical Society.
- 3 I have 40 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. I was employed by that Company as a Civil and Environmental engineer and managed their Timaru office until March 2011, when that office was closed. I then set up my current company, R J Hall and Associates Ltd, of which I am a director. 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 1995 when I resigned to establish R.J.Hall Civil & Environmental Consulting Ltd., variously as Principal Design Engineer and Hazards and Structures Engineer and Southern Area Office Manager.
- 4 My experience includes consideration of the use of detention storage for flood protection and urban stormwater runoff management and in the sizing of spillways and outlet structures for detention dams and irrigation storage dams. I am also familiar with coastal processes and particular the dynamics of the mixed sand / gravel beach systems which border the Pacific Ocean along the Canterbury coastline and the issues which arise from the episodic landward retreat of these beach systems.
- 5 A record of the engineering positions that I have held are as follows:
 - (a) Design Engineer (Hawkes Bay Catchment Board and Regional Water Board);

- (b) Chief Engineer (Waitaki Catchment Commission and Regional Water Board);
 - (c) Deputy Chief Engineer (Bay of Plenty Catchment Commission and Regional Water Board);
 - (d) Rivers and Drainage Engineer (Marlborough Catchment Board and Regional Water Board), Deputy Chief Engineer (South Canterbury Catchment Board and Regional Water Board);
 - (e) Regional Design Engineer (Canterbury Regional Council);
 - (f) Director R.J.Hall Civil & Environmental Consulting Ltd; and
 - (g) Principal Civil Engineer (Timaru), GHD Ltd.
- 6 As a Civil and Environmental Engineer, I also have experience designing and sizing infiltration in disposal fields for wastewater treatment systems.
- 7 Although this is a Council hearing, I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

Scope of Evidence

- 8 I have been asked by Port Bryson Property Limited and Hilton Trust Limited (**Submitters**) to:
- (a) Prepare evidence in relation to the provision of infrastructure and services, including stormwater reticulation facilities in Proposed Plan Change 21 (Broughs Gully Outline Development Plan) to the Timaru District Plan (**Plan Change 21**).

Section 42A Report

- 9 A number of the Officer's recommendations in the Section 42A Report sought further information and evidence from the Submitters as part of the evidence exchange process. I wish to comment on the following aspects raised in the Section 42A Report:
- (a) Stormwater – alternative locations for stormwater ponds (including efficiency and effectiveness); and

10 I address this issue below.

Stormwater

11 Mr. Elliot Duke of Davis Ogilvie and Partners Ltd in his statement of evidence describes in broad terms both the requirement and the manner in which stormwater runoff from the development of the plan change area can be effectively attenuated in the design storm (AEP 2%, 24 hour rainstorm).

12 Further to that, he makes a comparison between the Council's preferred design (referred to as the "original layout" in Mr Duke's evidence) and an alternative considered by Mr Duke for the purposes of evaluating the Submitters' concerns (referred to as the "alternative design " in Mr Duke's evidence), and summarises the advantages that the former has over the latter and the disadvantages he considers are implicit in the latter. Details of the design standard employed and the hydrological and hydraulic considerations embodied in the development of the Davis Ogilvie proposal are set out in Appendix 6 of the Timaru District Council document “ Proposed Plan Change to the Timaru District Plan – Broughs Gully Outline Development Plan (i.e. OPD)” November 2016, titled “Stormwater Assessment ”.

13 I have read both Mr. Elliot Duke statement of evidence dated 5 July 2017 and Appendix 6 of the OPD, and comment as follows.

14 The concepts being employed to attenuate stormwater runoff from the proposed subdivisions by routing runoff through constructed storages so that the discharge in litres per second at the downstream end does not exceed the pre development discharge from that same catchment area in the AEP 2%, 24 hour rainstorm (runoff generated by 135mm rainfall in 24 hours) is a widely used and proven methodology. This same principal is used by the alternative design in Mr Duke's evidence, albeit with different layouts that do not require storage facilities to be located on land that the Submitters own and wish to develop.

15 From what I can make of what has been presented is that both approaches can achieve the requisite outcome notwithstanding the detrimental effects associated with the alternative design as outlined in Mr Duke's statement of evidence. I note though in this regard that little if any attention is directed at the detrimental effect that the Davis Ogilvie

design proposal (Appendix 6 of the OPD) would have on the Submitters' land and other interests.

15. The intention is to construct a detention storage pond at the lower end of Broughs Gully (eastern bund) on what is the Submitters land. The outlet from this pond is to connect to a 900 mm diameter pipe that passes beneath State Highway 1 and discharges on land between that highway and the South Island Main Trunk Railway line (SIMTR).
16. As far as I can ascertain no consideration has been given in the original design to the long term effects of coastal erosion that is occurring along this coastline, and in particular, in the vicinity of Washdyke Lagoon, nor the effects of sea level changes which are anticipated predicted climate change influences.
17. The site chosen for the eastern bund is on land with a reduced level at or below 3m above mean sea level. The significance of that elevation is that it lies at or below the mean sea level that is inferred for the post glacial climatic optimum. This land is known to be vulnerable to inundation from coastal storms as well as surface flooding during coastal rainstorms unless appropriate protection measures are adopted.
16. Accordingly in situations where high sea levels occur during storms (strong onshore winds, low barometric pressure, heavy swells, combine with high or king tides) gravity outflows from detention storages in such locations will be problematic now and less certain into the future. The consequences of impeded gravity outfalls will be that larger detention storage area will be needed for the system to operate as intended.
18. This situation is likely to become more acute into the future as a result of changes to the Washdyke coastline occur. Washdyke Lagoon is presently bounded in the east with a mixed sand / gravel barrier beach. The size and form of this beach is progressively changing over time as a result of starvation of coarse gravel sediment supply primary from the south arising from the construction of the Timaru Harbour moles. The interruption of sediment supply to the Washdyke Lagoon barrier beach from long shore drift is resulting in both a reduction in beach volume and sediment grading. These changes materialise as lowered beach crest and flatter seaward batters meaning that as time progresses more frequent over topping of the barrier beach occurs during coastal storms and beach line retreat becomes more pronounced.

19. It is only a matter of time before the Washdyke Lagoon barrier beach is completely destroyed and the ocean invades the lagoon. When that happens the new shore line will be located at the SIMTR embankment. This situation occurred in the 1930's to a mixed sand gravel barrier beach which was located across Caroline Bay sub parallel to the beach line in front of what is now Ashbury Park.
20. When this situation develops it is anticipated that gravity outfall from the east bund detention storage area will inevitably be compromised.
21. In order to avoid this situation it would be prudent to locate the east bund further inland and for example, at an elevation of at least 4m or higher above mean sea level.
22. I note that no consideration has been given at this stage in any detail as to where and how stormwater runoff is to be renovated prior to disposal in the coastal zone. Given the circumstances just described it would seem prudent to attend to that matter now because the expectation that such activities could be attended to on the seaward side of State Highway 1 if that is the intention may in fact not be possible in the long term.
23. Given the above, it is opined that the proposal to site the eastern bund on the Submitters' land is not appropriate and that more thought is needed as to where it would be more prudent and appropriate to locate it. To this end, other options which might include multiple stepped storage, on land other than the Submitters land, with or without preliminary attenuation on a lot by lot basis or multiple lot basis in order to avoid land lying at or below the 4m AMSL contour is recommended.
24. Further to that as I understand it, is that storm runoff in the design storm sourced from the catchment upstream the eastern bund is to be intercepted and attenuated by that bund with a regulated outflow discharging by a 900 mm diameter culvert beneath SH 1. In the event of a super design rainstorm where the bunds design freeboard is exceeded, water will begin to overtop the bund and flow over what is at present the Submitters land and thence SH 1. This situation will arise regardless of whether the eastern bund is located on what is presently the Submitters land or on land upstream of that land. It is not immediately obvious to me from the plans provided where exactly such flow paths might be.

26. At some point it is possible that the eastern bund might fail catastrophically under these conditions, or for that matter, prematurely under other circumstances with water levels in the eastern bund at a level below the bund's crest. The analysis that has been presented so far does not include a dam break assessment under these types of situations and accordingly no indication of the extent of the hazards such failure might cause on land presently owned by the Submitter, to pedestrian traffic and / or vehicles on or adjacent to SH1 or to SH1 itself for that matter.
27. One way in which this risk could be modified (reduced) is to incorporate a measure of on-site attenuation on a lot by lot or multiple lot basis as suggested in paragraph 23 above in the proposed ODP and plan change provisions.

Robert Hall

Director R.J.Hall & Associates Ltd

26 July 2017