BEFORE THE CANTERBURY REGIONAL COUNCIL
AND THE ASHBURTON DISTRICT COUNCIL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of resource consent applications by Rangitata Diversion Race Management Limited to the Canterbury Regional Council and Ashburton District Council for resource consents for the construction, operation and maintenance of the Klondyke Water Storage Facility, its associated water takes from and discharges to the Rangitata River, and all associated activities.

SUPPLEMENTARY EVIDENCE OF BENEDICT RODNEY CURRY REGARDING USE OF WATER

DATED 4 MAY 2018

Introduction

1. This supplementary statement of evidence responds to the Commissioners' questions on 4 May 2018 regarding the use of water.

2. This statement presents a company perspective in relation to this issue. Of necessity the figures I present are approximations, but they are nevertheless based on my experience with the RDRML and its 70 years of water use data. I have also relied on input from the RDRML operations staff[1].

Sources of Demand

<u>Current Situation</u>

3. The current reliability of water to the current supply area of 75,000 hectares (ha) is approximately 84% across the 244 days of the irrigation season.

4. I note that this is a different method of calculating reliability to that used by Mr Veendrick of Pattle Delamore Partners Limited (or 'PDP'). My method is based on the availability of water to the shareholders of the Rangitata Diversion Race Management Limited ('RDRML'). As Mr Veendrick explained, the PDP model is based on volumetric averaging of supply and demand

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[1] Mr Neill Stevens, RDRML Operations Manager who has over 20 years' experience operating the RDR.

across 44 years. As others, such as Mr Callender and Mr Painter have noted, there are several different ways to calculate reliability. By providing this evidence, I am not suggesting that the method employed by the RDRML is superior to that advanced by PDP. I think that both models have their merits, and their 'place'. I offer this evidence to further reinforce the evidence of Mr Everest and Mr Van Polanen that the reliability faced by the shareholders of RDRML is far from optimal, and that it will benefit from the existence and operation of the proposed Klondyke Pond.

5. From RDRML records, full water allocation is available to the shareholders of the RDRML ('the shareholders') an average of 84% of the time. Importantly, the data also highlights that this reliability figure (84%) can drop in peak irrigation season, coinciding with low river levels and high evapotranspiration (ET) to approximately 60%. This occurs for approximately 3 weeks of every year. Using this information, I derive the following annual shortfall of water for existing use:

   (a) 60% of 35.4 m^3/s (RDRML's full take) is 21.24 m^3/s. This leaves an average daily shortfall 14.16m^3/s
   (b) 14.16m^3/s x 86,400 (the number of seconds in a day) = 1.22 Mm^3 per day x 21 days (3 weeks) = 25.7Mm^3

6. As a consequence, given the information before me, the annual shortfall of water available to the existing irrigation shareholders of the RDRML is, in approximate terms, **25.7Mm^3.**

<u>Scheme Expansion</u>

7. There is approximately 19,000ha of scheme expansion authorised under CRC121664.1. The RDRML irrigation schemes have the ability to expand within the nutrient limitations and are actively looking at expansion through surface water substitution of groundwater. The schemes could supply water on the shoulders of the season (being September to November and March to May) to this additional area, but storage would need to supply it during the three months of the peak irrigation season (December to February) as there is already a water deficit in those months for the existing irrigations of some 25.7Mm^3.

8. 9.5m^3/s can irrigate 19,000ha[2]. 9.5m^3/s x 86,400 = 821,000m^3 per day x 90 days across the peak irrigation season = **73.8Mm^3**

9. Given this, in order to effectively and reliably irrigate the additional 19,000ha, 73.8Mm^3 of stored water would be needed to be available to the irrigation shareholders.

<u>Climate Change</u>

10. The impact of climate is uncertain. Mr Veendrick advises me that the Ministry for Agriculture and Forestry (MAF) report in 2008[3] assumes a 6% reduction in available water for allocation annually. A 6% reduction in the take equates to 2.1m^3/s of water that will not, in broad terms, be available to the shareholders. When I expand that that out into a possible shortfall or

[2] Based on 0.5l/ha/day water supply
[3] MAF (2008). Projected Effects on Water Supply Reliability in Mid Canterbury. Report No C08120/1

demand across the irrigation season (although in reality its effect is annual , which the Klondyke Pond may be able to offset, at least in part, I get 44.8Mm^3. My calculation follows.

11. 2.1m^3/s in lost allocation x 86,400 seconds = 183,500m^3 per day x 244 days = **44.8Mm^3**

Ashburton River

12. As you have heard from Mr Veendrick, the full impact of the restrictions on the Ashburton River are not fully established. I understand that the minimum flow applying to the RDR will be raised by 900l/s during the peak irrigation season in 2023. The flow that will apply, and what that means for the RDR's take from the South Ashburton in 2033 are more uncertain. From my knowledge of this issue, it is safe to assume that at least an additional 2m^3/s will need to remain within the South Ashburton River. Consequently, a total of 2.9m^3/s could reasonably be expected to come from the allocation to the RDR. It is unclear whether further restrictions on the RDR take to meet the 2033 minimum flow will be applied annually or only the irrigation season. I have made a conservative assumption that it will only impact the peak 3 irrigation months. If I extrapolate this out into a demand figure, I arrive at 22.5Mm^3. Again, my calculation follows.

13. 2.9m^3/s x 86,400 seconds in a day = 250,000m^3. x90 days during the peak irrigation season = **22.5Mm^3**

Total Potential Demand from the RDRML Shareholders

14. Given the foregoing, I estimate a total potential *additional* demand is **166.8Mm^3** annually for RDRML shareholders. I note that aspects of this demand will only be faced in 2033, so not all of this demand will occur immediately. I have no ability to accurately project the additional demand that climate change could generate, but I have used MAF estimate of 6%.

Additional Uses

Managed Aquifer Recharge

15. Current modelling by the Canterbury Regional Council for the Hinds area suggests that managed aquifer recharge ('MAR') will require between 125Mm^3 to 250Mm^3 per annum to be effective[4]. It is possible that the 3.5m^3/s of water currently consented for (and thus allocated to) Ashburton District Council's stock water network could be reconsented to be used for MAR. If this were to occur, then I estimate that, the stock water supply annual volume would be:

16. 3.5m^3/s of allocation x 86,400 seconds per day = 302,000m^3 x 365 days per year = 110Mm^3

17. Therefore, the shortfall of supply to meet the demand for water for MAR which is most likely to be sourced via the RDR could be 15Mm^3 to 140Mm^3, with a mean of **77Mm^3**. Please note that this figure only applies to the 'Hinds area' and not the Ashburton-Rakaia area, which is of comparable size to the Hinds zone. If MAR is proposed in the latter area, it could conceivably double the demand for storage for this use.

[4] Ecan Memo dated 1/4/2015. MAR – Understanding how much is needed for Quality and Quantity Outcomes in the Hinds Area.

South Canterbury

18. The demand modelling work for the Geraldine Water Solutions area, done by the Canterbury Regional Council as part of the Regional Distribution Model[5] indicates a demand between 16 to 35Mm^3, with an annual mean **25Mm^3**.

Expected Supply

19. According to discussions with Mr Veendrick, the maximum volume available if the proposed 10m^3/s flood flow take is fully exercised is 86Mm^3 annually.

20. I have estimated from an analysis of the past 10 years of water delivery to shareholders in the RDR that the annual volume that could be supplied to storage from existing RDR flows to be 100Mm^3 (during periods of low irrigation demand). It must be noted that this volume is inversely proportional to the supply of water to scheme expansion in the non-peak irrigation months, outlined in paragraph 8 above. In other words the water can be supplied for scheme expansion or it can be supplied to storage – not both.

21. Given the preceding values, the total volume of water available for supply in the irrigation season is estimated to 186Mm^3 annually.

Summary Table

22. The following table summarises my preceding evidence.

	Demand from Storage	**Supply to Storage**
Existing RDR Irrigators	25.7	100
RDR Expansion	73.8	
Climate Change	44.8	
Ashburton River Minimum Flows	22.5	
Proposed Flood Flow Take of 10m^3/s		86
MAR	77	
Geraldine Water Solutions	25	
TOTAL (with additional 10m^3/s)	**268.8**	**186**
TOTAL (without additional 10m^3/s)	**268.8**	**100**

23. As is apparent from the foregoing, the amount of water available, should the Klondyke Pond be constructed with the proposed flood flow take in place, is closely aligned with the possible demand generated from the RDRML's existing shareholders (166.8Mm^3 of demand vs 186Mm^3 of supply). Should the flood flow take not be consented, then there is a significant shortfall of the water that could, reasonably in my opinion, be required by 2033. If additional uses, such as MAR and GWS added into the demand equation, there is a shortfall of approximately

[5] BD Scott Consulting Ltd (2018) "Orari-Temuka-Opihi-Pareora Regional Water Scheme Summary Report" Report to Ecan and Crown Irrigation Investments Ltd under contract C-108.

100Mm^3 of demand annually, even with the proposed flood flow take in place. Without the proposed flood flow take, it is unlikely that the Klondyke Pond could be considered as a viable supply option for MAR or as a Regional storage node.

Financial Considerations

24. I note that having the flood flow take or not has a significant impact on the costs associated with delivery of the Klondyke Pond, and its on-going cost to the parties allocated water from it.

25. An estimate of \$5/m^3 construction cost[6] has been used in initial planning. This excludes the predicted land, resource consent, building consent, and detailed design and operational costs. Given this, RDRML has, in the development of its business case for the Proposal assumed that the Proposal would cost at least \$265M. My calculation of this sum follows:

26. 53Mm^3 x \$5 = \$265M.

27. If an 8% interest rate[7] is applied to the loan taken out to construct the Klondyke Pond, that would add a further a capital annual charge of 40 cents (‘c’)/m^3.

28. If the Klondyke Pond can be refilled twice (as it can be without the flood flow take) in a season charge drops to 20c/m^3. If he pond can be refilled three times in a season (as it can be with the proposed flood flow take in place) that charge drops to 13.3c/m3, which is of the same order as the costs applying to other stored water in Canterbury. Consequently, there are substantial on-going financial benefits associated with the flood flow take.

29. I also note that the proposed flood flow take is also expected to significantly reduce the construction cost of the Klondyke Pond. By way of an example (and as I said in my evidence in chief) if demand for storage is 22Mm^3 to meet existing demand, 22Mm^3 volume will need to be built. With the additional 10m^3/s, this volume can be reduced to 14Mm^3, representing a \$40M reduction in capital cost, which is a significant saving.

Benedict Rodney Curry
Chief Executive - Rangitata Diversion Race Management Limited
4 May 2018

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[6] Estimate from discussions with John Haugh, Downer Construction

[7] Long term interest rate supplied by PriceWaterHouse Coopers.