IN THE MATTER of the Resource Management Act 1991

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IN THE MATTER of submissions and further submissions by Rangitata Diversion Race Management Limited (**RDRML**) on proposed Variation 2 to the proposed Canterbury Land & Water Regional Plan

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STATEMENT OF REBUTTAL EVIDENCE OF PETER FRANCIS CALLANDER

Introduction

1. My full name is Peter Francis Callander.

2. I provided a statement of evidence dated 15 May 2015 in connection with submissions by RDRML on proposed Variation 2 to the proposed Canterbury Land & Water Regional Plan. My qualifications and experience are set out in that statement. Consequently I don't repeat that detail now.

3. I provide via this statement, rebuttal evidence for some of the comments presented in the statements of the following witnesses:

    3.1 Adam Douglas Canning on behalf of New Zealand Fish and Game Council.
    3.2 Peter Wilson on behalf of New Zealand Fish and Game Council.
    3.3 Gregory Peter Burrell on behalf of Te Rūnanga O Ngai Tāhu.
    3.4 M J Thorley on behalf of Te Rūnanga O Ngai Tāhu.

4. I have structured this statement into the main topics that link my evidence in Chief to the comments from the other experts who I refer to. These topics are:

    4.1 Catchment load limits for nitrogen leaching.
    4.2 Limits for other contaminants (phosphorus, *E. coli* and ammonia).
    4.3 Replacement of surface takes with deep groundwater takes.

5. I confirm that this rebuttal evidence is also prepared in accordance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014.

Catchment load limits for nitrogen leaching

6. Fish and Games ecology witness, Mr Adam Canning, recommends (paragraph 40) that Dissolved Inorganic Nitrogen (DIN) limits in lowland streams should be kept within a range of around 0.1-0.7mg/L. Similarly, Ngai Tahu's ecology witness Dr Greg Burrell recommends a median DIN limit of 0.6mg/L (paragraph 73). Using the Canterbury Regional Councils modelling approach (as it was applied in Variation 2), I calculate that in order for those limits to be reached the leaching of nitrogen from soil with the catchment would need to be limited to values in the order of 50 – 350 tones/year. This range is consistent with Mr Canning's estimate of 303 tonnes/year in paragraph 41 of his evidence. This is around 5,300 tonnes N/year lower than existing losses and around 3,100 tonnes N/year lower than the target load that is advanced in Variation 2. I question, particularly in light of Mr Stuart Ford's Evidence in Chief, if this is realistic.

7. Alternatively, if the Canterbury Regional Council proposed soil leaching target of 3,400 tonnes N/yr was achieved there would need to be a continuous Managed Aquifer Recharge (MAR) flow of around 150 m^3/s to achieve the instream targets proposed by these ecology experts. However it would not be feasible to obtain a source of water of that size. For comparison the median flow of the Rangitata River is $75m^3/s$, so it would not be feasible to provide a source of MAR water that is twice the size of the median flow of the Rangitata River. Furthermore, the groundwater system on the Hinds Plains would not be able to accommodate an inflow of water at that rate, particularly given that the total groundwater balance in Table 1 of my Evidence in Chief is estimated to be $20m^3/s$.

8. Current estimates of nitrogen leaching are around 5,600 tonnes/yr (Stuart Ford Evidence in Chief, paragraph 12) and Variation 2 sets a very challenging target of 3,400 tonnes/yr. On that basis it would seem that the much lower targets required by Mr Canning and Dr Burrell's approach are incompatible with productive agricultural land use in the Hinds catchment.

Limits for other contaminants (phosphorus *E. coli* and ammonia)

9. Fish and Game experts Mr Canning and Mr Wilson propose setting limits for phosphorous, *E. coli* and ammonia. Various in river concentrations are proposed. I expect that the best way to achieve any such limits is by implementing good farm management practices and good riparian management. I am not aware of a reliable method to determine load leaching limits for the catchment for those parameters in the way that has been used for nitrogen load limits in Variation 2. Mr Stuart Ford reaches a similar conclusion and describes the appropriate management response in paragraphs 29 - 31 of his rebuttal evidence. Consequently there is no easily quantified link between the area of irrigated land and the achievement of any of these other targets and limits that are proposed.

Replacement of surface takes with groundwater takes

10. This topic is discussed in the evidence of M J Thorley for Te Rūnanga O Ngai Tāhu. In paragraph 27 he acknowledges that if surface water takes and shallow groundwater takes that affect the lowland streams are replaced with deep groundwater takes or water from hill fed surface irrigation schemes that change is likely to benefit the flows in the lowland streams. He then goes on to indicate that the deep groundwater takes will still affect the shallow water table and that there will be over-allocation issues for groundwater because of that change.

11. In general terms I agree with the comments he makes, but I still expect that the change that is proposed in Policy 13.4.5 of Variation 2 represents a better environmental outcome. Abstractions directly from the lowland streams cause a direct and immediate reduction in surface flow when the pump is running, thereby creating the maximum impact on the surface waterway.

12. In contrast, abstractions from deeper groundwater create a more subdued and broadly distributed effect which would be spread across:

    12.1 Several spring fed streams.
    12.2 Groundwater storage, indicated by a lowering of groundwater levels.
    12.3 Reduced offshore groundwater flow.

Therefore, the effect of the abstraction on any particular springfed stream will be less.

13. The effect of pumping from deep groundwater bores will also be more broadly distributed in time. Therefore the direct and immediate effect on a surface waterway when the pump is turned on is replaced with a smaller and more gradual reduction in flow in the waterways. These changes represent, in my opinion, a lessening of the environmental impact on the surface waterway.

14. In paragraph 30 of his evidence Mr Thorley notes that a change to deeper groundwater abstractions will worsen the over-allocation issue and in paragraph 31 he notes this could lead to:

    14.1 Reduced groundwater reliability due to drawdown interference between bores.
    14.2 Reduced spring flow.
    14.3 Sea-water intrusion.

15. My understanding is that one of the main reasons for setting the groundwater allocation limits, in the Mayfield-Hinds and Valetta groundwater allocation zones was to help maintain lowland stream flows. The replacement of surface water takes with deep groundwater takes aims to assist in achieving that objective and should not be prevented because a groundwater allocation limit that was established to achieve the same outcome is being exceeded. The other potential effects suggested by Mr Thorley (in paragraphs 14.1 and 14.3 above)are less likely, in my opinion, to be significant adverse effects relative to the low flow issue in spring-fed streams.

Name: Peter Francis Callander
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