

BEFORE THE OTAGO REGIONAL COUNCIL

IN THE MATTER of the Resource Management Act 1991 ("the Act")

AND

IN THE MATTER Criffel Water Limited, Luggate Irrigation Company and Lake MacKay Station.
Water Permit Application
RM16.093.01 RM18.345.01
and RM18.345.02

**REBUTTAL EVIDENCE OF MATTHEW AARON HICKEY
EVIDENCE ON BEHALF OF CRIFFEL WATER LTD, LUGGATE
IRRIGATION COMPANY AND LAKE MACKAY STATION.**

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REBUTTAL EVIDENCE OF MATTHEW AARON HICKEY

1. My full name is Matthew Aaron Hickey.
2. I am an Environmental Scientist and sole Director at Water Resource Management Ltd. My qualifications, experience and acceptance of the Code of Conduct for Expert Witnesses are set out in my primary evidence.
3. The evidence filed for Aukaha (Dr Clucas and Ms Bartlett) suggests that a “minimum flow” of 300 l/s should be applied to the grant of any permits in these applications. Neither of those witnesses claim qualifications or experience in hydrology and neither present evidence about what the impact of their proposal might be on water reliability and use under a higher minimum flow regime. This evidence addresses that omission.
4. By way of background, the same issue arose in the *Lindis*¹ case in which I gave expert evidence, and where a higher minimum flow was being promoted by Fish and Game. The water use efficiency consequence of a higher minimum flow is discussed at paragraphs [410]-[411] of that decision:

[410] As we understand Fish and Game's case it argues that *that the Galleries 900/1639 option would be a more efficient use of water because it allocates less water. That permits a higher minimum flow, therefore compelling the consent holders to use water more efficiently. We accept the submission from Mr Page that this reasoning is flawed because the higher minimum flow simply means that the water within the primary block is less reliable (because it is available to be taken less often). It is the reliability of the water that drives investment in highly efficient infrastructure, not the total primary allocation. This is due to two factors - the relatively high cost of pivot irrigators, and the watering regime undertaken which requires a little water but often.*

[411] *The evidence of both Mr Hickey and Mr D N Graham (a pumping expert) for ORC/LCG shows the critical importance that the minimum flow has on water surety. Counsel submitted "Water surety in turn has a critical impact on the infrastructure that can be deployed to use that water for irrigation". That in turn has an impact on the technical efficiency with which that water is used". In summary, the*

¹ [2019] NZEnvC 166.

higher the minimum flow, the less reliable the water is, and therefore the lower the portion of water that can be used for spray irrigation methods.

5. Exactly the same issue arises in this case through Aukaha's proposed raising of the minimum flow to 300l/s (irrigation season).
6. Between CWL, LIC and LM they can take 538 l/s under the current proposal. With a minimum flow of 180 l/s there is 311 l/s of water that I would consider highly reliable². This amount of water is capable of irrigating 518 Ha at a peak application rate of 5mm per day³. If the minimum flow was lifted to 300 l/s then the amount of highly reliable water would drop to 191 l/s or mean 318 Ha of land could be irrigated at a peak rate of 5mm per day³. This is visually illustrated in Figure 1 below.

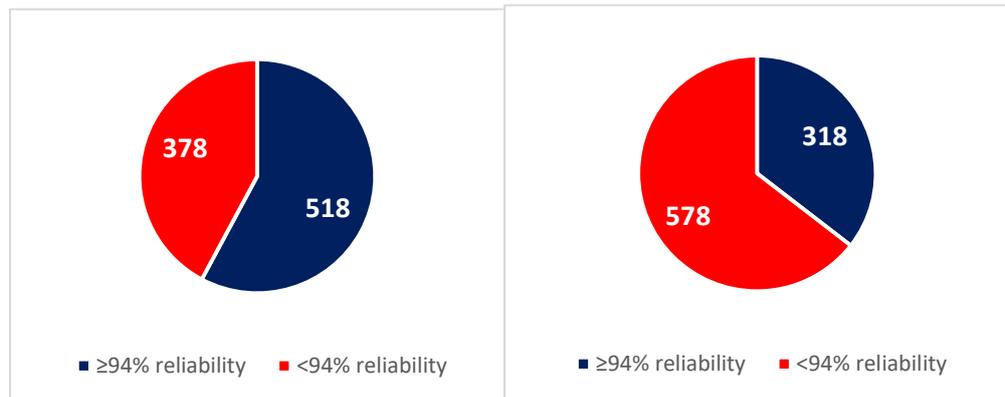


Figure 1. Relative difference area that can be irrigated with high reliability water with a 180 l/s (left) and 300 l/s (right) minimum flow and a total primary take of 538 l/s.

7. It is likely that in many seasons this 200 Ha difference would not be an issue because there is an abundance of feed and enough water available to irrigate most of the total command area of the three parties. However, in dry seasons as illustrated in Figure 4 of my evidence in chief, further reduction in reliability (by lifting the minimum flow) would effectively mean losing 200 Ha of the most valuable crop, likely the winter feed crop for the capital stock that will remain on farm

² When advising clients looking to irrigate high value crop such as winter feed or installing expensive spray irrigation, we look to target $\geq 94\%$ reliability of supply.

³ Evidence of Mr Roger Simpson

over winter. It is those driest years when water reliability and the ability to grow feed has its greatest value to farming systems.

8. Ms Bartlett raises in her Para 74 that supplementary flows should only be granted if there is existing capacity to use it. I would suggest this would undermine the whole allocation proposal we have put forward in this process. I take it to mean that Ms Bartlett does not support transitioning to storage where it can both result in less take from Luggate Creek at low flows and improve efficient use because their may be a future plan change that may or may not provide a higher minimum flow and less allocation.
9. The reality of being opposed to new storage capacity and only supporting 10-year consent terms means that Ms Bartlett is disincentivising any potential reductions in primary take for at least the next decade. I know that the work we have done with CWL, LIC and LM to reduce the actual primary take and change a component of their water use to supplementary would not had been supported by them if they knew it was contingent on existing storage and a 10-year term.

The effect of a minimum flow of 300l/s on Longfin Eel habitat

10. Ms Bartlett in her Para. 52 confuses % of MALF with % habitat retention compared to habitat at MALF in attempting to suggest the 180 l/s minimum flow on Luggate Creek is lower than the flow ranges considered precautionary by Cawthron. Based on the habitat analysis methods presented by Jowett the 180 l/s minimum flow provides 85% habitat retention for large eels (>300mm) which is in the precautionary range of 70 -90% habitat at MALF discussed by Cawthron⁴.
11. For longfin eel habitat a 300 l/s minimum flow would lift the habitat retention level of longfin eel to 94%. Another way to interpret this is

⁴ Second paragraph of page 13 in Hayes J, Hay J, Gabrielsson R, Goodwin E, Jellyman P, Booker D, Wilding T, Thompson M 2018. Review of the rationale for assessing fish flow requirements and setting ecological flow and allocation limits for them in New Zealand— with particular reference to trout. Prepared for NIWA, Envirolink, Greater Wellington Regional Council and Hawke’s Bay Regional Council. Cawthron Report No. 3040. 150 p.

that there needs to be a 66% increase in the minimum flow to realise a 9% gain in large eel habitat⁵. To contextualise this, a 90% habitat retention level relative to the natural MALF is expected to maintain fish at their natural population levels⁶.

12. My view is that firstly a 9% gain in habitat retention over and above an already high level of 85% will have minimal if any measurable improvement in the large eel fishery, even if large eels were already present in abundance.
13. Secondly, the relative infrequency⁷ of flows being held at 180 l/s due to the significant reduction in primary take by the three irrigation parties should see risks to large longfin eels reduced significantly. Duration of low flow is as significant, if not more so, than the minimum flow itself.
14. Thirdly, if longfin eel numbers reach densities in Luggate Creek where they are constrained by habitat, they have the option of moving downstream to the Clutha River where large eel habitat is abundant.
15. Fourthly, effects of habitat restriction are mitigated by the fact that the eels to be introduced to Luggate Creek are “feeder eels” which I take to mean eels put there to be harvested by whanau⁸. I would expect that this would mean that the fishery will unlikely be at a level where habitat is restricting the fishery due to the effects of harvesting for mahika kai.
16. Finally, Dr Clucas confirms that there are no records of longfin eels in Luggate Creek⁹. I take this to mean that the trap and transfer program proposed for feeder eels would need to be significant to increase the Luggate Creek eel population to a point where habitat availability came close to restricting these fish.
17. The translocation of 1 to 2 Kg eels is a new development for me in the Clutha system and I have some reservation as a 2Kg eel is likely 20

⁵ I use large eel habitat because Dr Clucas in her Para.24 talks of introducing 1 to 2 Kg eels to Luggate Creek as they are of a size trout won't eat.

⁶ Pg. 25 of Jowett, I.G.; Hayes, J.W. and Duncan, M.J. (2008). A guide to instream habitat survey methods and analysis. NIWA Science and Technology Series No. 54.

⁷ Both seasonally and time during the irrigation season.

⁸ Ms Clucas discusses feeder eels but a description of what they are is not provided.

⁹ There are observations from landholders.

years old or older and they are potentially reaching breeding potential¹⁰. Translocating them above the Clutha hydro dams means that if they are not harvested, they are still effectively removed from the breeding population as it is unlikely to successfully negotiate two sets of turbines.

18. It is difficult to assess the effects of the translocation program proposed by Dr Clucas on Luggate Creek because no details of it are provided in evidence. For instance, there is no mention of how many eels will be translocated over what time frame nor the expected harvest rate. Nor is there information provided of any wider feeder eel translocation program for the upper Clutha or where these eels will come from.
19. No population estimates are provided for the natural state eel fishery to assess whether the translocation population will get remotely close in abundance or why Luggate Creek appears to be the focal stream for this project?
20. Given the minimum flow is known to maintain a high level of habitat relative to the natural 7-day MALF and the Luggate Creek eel fishery is proposed to effectively be a “put and take¹¹” eel fishery it does allow for active management by Contact Energy and Kāi Tahu to ensure ecological balance is maintained.
21. Wanting to reinstate and protect the longfin eel species for its intrinsic, cultural and mahika kai values in the Clutha catchment is admirable and something I fully support. However, there are bigger issues at play to achieve this goal than a 9% difference in habitat retention between minimum flow options in Luggate Creek and Dr Clucas clearly articulates these in her evidence. I’m pleased to read in the evidence of Dr Clucas that Contact Energy are working closely with Kāi Tahu and looking at further eel related work¹². In recent hearing on the Lindis River I (on behalf of the Lindis Catchment Group) raised the significant concern they had on the lack of action by the ORC on

¹⁰ <https://www.doc.govt.nz/nature/native-animals/freshwater-fish/eels/>

¹¹ Put and take fisheries are common for trout where fish from hatcheries are released in ponds to be taken by anglers.

¹² Para. 20 of Ms Clucas’s evidence.

Contact Energy's consent condition to provide both eel passage up and downstream of Roxburgh, Clyde and the Hawea Dams by 2017.

The robustness of the existing schedule 2A minimum flows.

22. I was part of the ORC team that lead the technical aspects of the minimum flow project for the Luggate catchment. I have personal knowledge of the process, consultation, and the science that supported it. The Aukaha evidence, particularly that of Ms Bartlett, is critical of the Luggate Creek minimum flow and the allocation limit set in the Regional Plan: Water.
23. Ms Bartlett raises the primary allocation limits did not reflect Kāi Tahu expectations¹³. I respectfully disagree, at the time Luggate Creek was notified the Primary Allocation was 1024 l/s, it was assumed up to this amount could or was being taken as there was no metering of takes at this time. Through discussions with affected parties including Kāi Tahu it was recognised that the allocation of 1024 l/s was too high, and it should be less. The 500 l/s Schedule 2A limit was notified on this basis and no parties appealed that notification. Without the input of parties like Kāi Tahu there would have been little pressure to reduce the allocation limit in Schedule 2A.
24. Ms Bartlett is also critical of the 180 l/s minimum flow and suggests that if that exercise was redone under the current NPS FM regime then the flow number would be higher. I suspect this might be partly due to the issue raised in Para 10 above. I wouldn't want to pre-empt what number a future plan change minimum flow might land on, especially given there is no plan framework other than what is in place now to work off.
25. Along with Dr Jowett, I was also a member of the Ministry Working Group for the Proposed National Environmental Standard on Ecological Flows and Water Levels. I was then engaged by MFE to peer review the scientists' report on that proposed NES. Although

¹³ Para 74 of Ms Bartlett's evidence.

Proposed NES has not yet been adopted, it remains the most up to date and comprehensive guidance on setting ecological flows that is accepted by the scientific community.

The Luggate minimum flows set out in Schedule 2A were informed using hydrological and ecological information that is consistent with the proposed NES method for determining ecological flows and levels. As with any minimum flow it must also consider other values than ecology, such as cultural, social and economic values.

Date: 22 October

Matt Hickey