

**BEFORE THE FRESHWATER COMMISSION**

<b>UNDER</b>	the Resource Management Act 1991 (the <b>Act</b> or <b>RMA</b> )
<b>IN THE MATTER</b>	of an original submission on the Proposed Regional Policy Statement for Otago 2021 ( <b>PRPS</b> )
<b>BETWEEN</b>	<b>OTAGO WATER RESOURCE USER GROUP</b>  <b>Submitter FPI043</b>  <b>FEDERATED FARMERS NZ INC</b>  <b>Submitter FPI026 and FSFPI026</b>  <b>DAIRY NZ</b>  <b>Submitter FPI024 and FSFPI024</b>
<b>AND</b>	<b>OTAGO REGIONAL COUNCIL</b>  <b>Local Authority</b>

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**EVIDENCE IN CHIEF OF SUSAN HELEN MCKEAGUE:  
ADDITIONAL EVIDENCE FOR FRESHWATER PARTS**

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## **EVIDENCE IN CHIEF OF SUSAN HELEN MCKEAGUE: ADDITIONAL EVIDENCE FOR FRESHWATER PARTS**

1. This brief of evidence is the same as the brief filed in relation to the Otago Regional Policy Statement 2021 - non freshwater parts. New evidence not previously provided to the non-freshwater panel is added in text that is shaded grey for ease of identification.
2. I have been given a copy of the Environment Courts code of conduct for expert witnesses. I have reviewed that document and confirm that this evidence has been prepared in accordance with it and that all opinions that I offer in this evidence are within my expertise. I have not omitted to refer to any relevant document or evidence except as expressly stated. I agree to comply with the code and in particular to assist the Commissions in resolving matters that are within my expertise.

### **Introduction**

3. My full name is Susan Helen McKeague, I am an environmental farm consultant.
4. I have worked in the agriculture sector with farming families as an Adviser, Landcare co-ordinator, Facilitator, Land Resource Officer and Consultant for over 30 years. During the 1990's I worked in several farming regions of Western Australia. In 2001 I was employed by the Otago Regional Council as a Land Resource Officer and then for 13 years as the Manager Land Resources. Since October 2013 I have been self employed as a farm consultant.
5. My experience with catchment groups and farmers addressing water quality and quantity issues is extensive. While at the Otago Regional Council I assisted groups and farmers across Otago to interpret the Water Plan rules and policies, provided guidance on best management practice and strategic decisions for water quantity and quality.

6. While at the ORC, I was involved in two Plan Changes. Plan Change 1C which was introduced to enable the smooth Deemed permit transition and Plan Change 6A which set water quality limits.
7. My Environment Court and hearing experience as a consultant includes the minimum flow and permit replacement for the Lindis Catchment Plan Change 5A, the Kyeburn Catchment Group water permit application, ORC Plan Change 7 and the Glenayr water permit replacement.
8. McKeague Consultancy clients are located all over Otago and South Canterbury. We work with catchment groups of irrigators, individuals and irrigation companies. Our clients include but are not limited to:
  - (a) Taieri groups such as:
    - (i) Kyeburn Catchment Ltd (20 irrigators that successfully replaced their deemed permits in 2019),
    - (ii) Strath Taieri Water User Group (lodged group application for 21 deemed and water permits),
    - (iii) Paerau Waipiata: (Voluntary flow sharing group upholding Minimum flow),
    - (iv) Styx water users (permit replacement and flow sharing)
    - (v) Maniototo Irrigation Company providing guidance on environmental matters (MIC delivers stored water from the Loganburn dam and run-of-the-river water to shareholders in the Maniototo)
  - (b) Manuherekia
    - (i) Manuherekia Catchment Group (project management for the full catchment group that co-ordinates all water permits)

- (ii) Ida Valley Irrigation Company (managing replacement permit applications and providing guidance on environmental matters)
  - (iii) Poolburn private water users (managing replacement permit applications as a group of nine)
  - (iv) Blackstone Irrigation Company (managing replacement permit applications)
  - (v) Manuherekia Irrigation Co-operative Society (managing replacement permit applications and guidance on environmental matters)
  - (vi) Lauder sub-catchment group (All farms utilising water in the Lauder catchment (approx. 20 families) working together to apply for their permits that includes new environmental flows, flow sharing and co-operation)
  - (vii) Thomson's Creek sub-catchment group (as above for all the Thomson catchment irrigators)
- (c) Cardrona Water Users (Assisting in the replacement of permits for many water users and the minimum flow plan change process)
- (d) Bannockburn catchment (Managing the replacement permit applications for all private water users and the Carrick Irrigation Company)
- (e) Pisa and Lowburn
- (i) Replacing the water permits on many private rights in the Lowburn area for vineyards, horticultural and pastoral operations.
  - (ii) Pisa Irrigation Scheme (Managing the replacement of permits for the scheme and other environmental management matters)

- (f) Lindis Catchment
    - (i) Permit replacement and minimum flow discussions for the whole catchment.
    - (ii) Ardgour Pipeline Ltd (Farm plan auditing).
9. This client list and responsibilities provides myself and McKeague Consultancy with a detailed understanding of the water quantity issues in the region.

### **Code Of Conduct for Expert Witnesses**

10. I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. This evidence is within my area of expertise, except where I state that I am relying upon material produced by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

### **Scope of Evidence**

11. The purpose of my evidence is to explain the complexity of achieving change to farming systems and the need for long transition periods where land and water use change is anticipated through changes in policy.
12. On farm irrigation system changes take time to plan and implement.
13. Irrigation schemes and companies have complex and interconnected infrastructure that cannot be altered quickly or cheaply.
14. Over the decades the irrigators in the dry catchments of Otago have established collective water management. Irrigators, companies and catchment members all co-operate to share the scarce resource. Any alterations to the system will take time to design, introduce, and re-establish new protocols.

15. Clear goals and visions that are achievable and hold steady over time are required for any farming business to adapt.
16. It is unclear in the pRPS exactly what change is required to achieve the visions in the FMU's therefore difficult to assess if the vision is sensible for the rohe and/or achievable. That means it is impossible to predict how long change will take to implement. Although this evidence relates to the non-freshwater provisions, the need to acknowledge the difficulties in achieving change, and provide for suitable transition periods, needs to be acknowledged in the earlier chapters of the RPS.
17. As an example to explain the issue, the vision for the Manuherekia rohe to favour main stem or groundwater abstraction over tributaries is not practical or needed.

#### **On farm systems**

18. In recent times irrigators have been responding to ORC signals requiring efficient water application methods by investing in spray systems such as centre pivots, fixed grid and direct application methods. These changes also require alterations of paddock layouts, fencing, laneways, troughs and also crop or pasture establishment. Huge amounts of money, sometimes millions of dollars per farm, have been invested in the last decade or so to responding to ORC change signals. Most farms have incurred long-term debt to adapt to spray irrigation.
19. Where landscape, land availability and funds allow, irrigators have also installed water storage options. Whether that is just a smallish pond that may hold 6-12 hours water so the pivot can operate continually for a set period. Some have built bigger storage that may assist to fill a reduced water access period for a few weeks, or to bridge the gap between water rosters from race networks set up to supply flood irrigation rather than spray. Storage design and construction is expensive. In our work we assist farming businesses with the Resource Management Act paperwork that is required.

20. Even a small pond in a paddock requires a consent if the wall is above 3m or the storage is above 20,000m<sup>3</sup>.
21. Storage the size of 21,000m<sup>3</sup> is enough to only optimally water approximately three hectares in Central Otago. It is small storage. Three consents are needed: to dam, discharge and retake.
22. Irrigators are continually adopting new technologies and improving their practices. The water storage example is just one improvement that may have been made on a farm recently. The commitment to storage involves considerable paper work and funds which increases if the storage is above 4m and a Building Act consent is needed. Length of term of storage permits is generally 20+ years as it is understood storage is a long term investment.

### **Irrigation Schemes**

23. Throughout Central Otago there are many established irrigation schemes. Brendan Sheehan describes the storage and delivery infrastructure of two of those schemes in his evidence. Others have extensive races which deliver water via gravity, measuring and flow division equipment, and intake infrastructure. Hundreds of businesses are reliant on the water that flows to and through their land.
24. Irrigation water supplied even in the smallest amount in some localities makes a huge difference to people's lifestyle and business viability. Irrigation water in Central Otago is used for pasture to produce meat, milk and wool, horticulture, vineyards, hospitality venues such as gardens and mazes, golf courses, recreation and amenity areas.
25. If a scheme can no longer function because the flow available is too low or one of the major uses such as wool production is low priority, then the consequences for all shareholders could be quite major. In Central Otago in particular, reliable access to irrigation water is the difference between economic viability and failure

26. The irrigation schemes are shareholder owned and funded. The owners are the farmers that receive the water. Upgrades to irrigation schemes are funded off the balance sheets of the farmers and compete with other priorities such as improvements in stock performance, riparian planting, and investing in reducing or offsetting carbon emissions. There is a limit on the funds available to make any changes in response to visions and timeframes.
27. The implications of any RPS vision needs to be clear whether the economic failure of existing farming businesses through reduced access to freshwater is an intended or expected outcome. I would have expected such things to be identified in the preliminary chapters as significant resource management issues for the region.

#### **Catchment management of water access and low flow water sharing**

28. Central Otago irrigators are accustomed to working collectively to maintain access to some water and meet in stream limits. As the flows in creeks and rivers naturally decline it is common for the water users in a catchment or sub-catchment to ration their abstraction so that all users can have access to some water.
29. The water users are aware of their impact on each other and the waterways. Sharing access to a resource that may flow for 10's to 100's of kilometres is challenging.
30. The water users rationing regimes are sometimes relatively simple. Such as the Paerau Waipiata Irrigators on the main stem of the Taieri between Paerau Weir and Waipiata flow site. This section of the Taieri is shown on *Figure 1* below. McKeague Consultancy has been rationing these four irrigators since the summer of 2016-2017. Only two of the four permits include a minimum flow condition at Waipiata on the Taieri but all four decided they would share water and turn off when the flow at Waipiata was at the minimum flow in the Otago Regional Plan Water, of 1000L/sec.



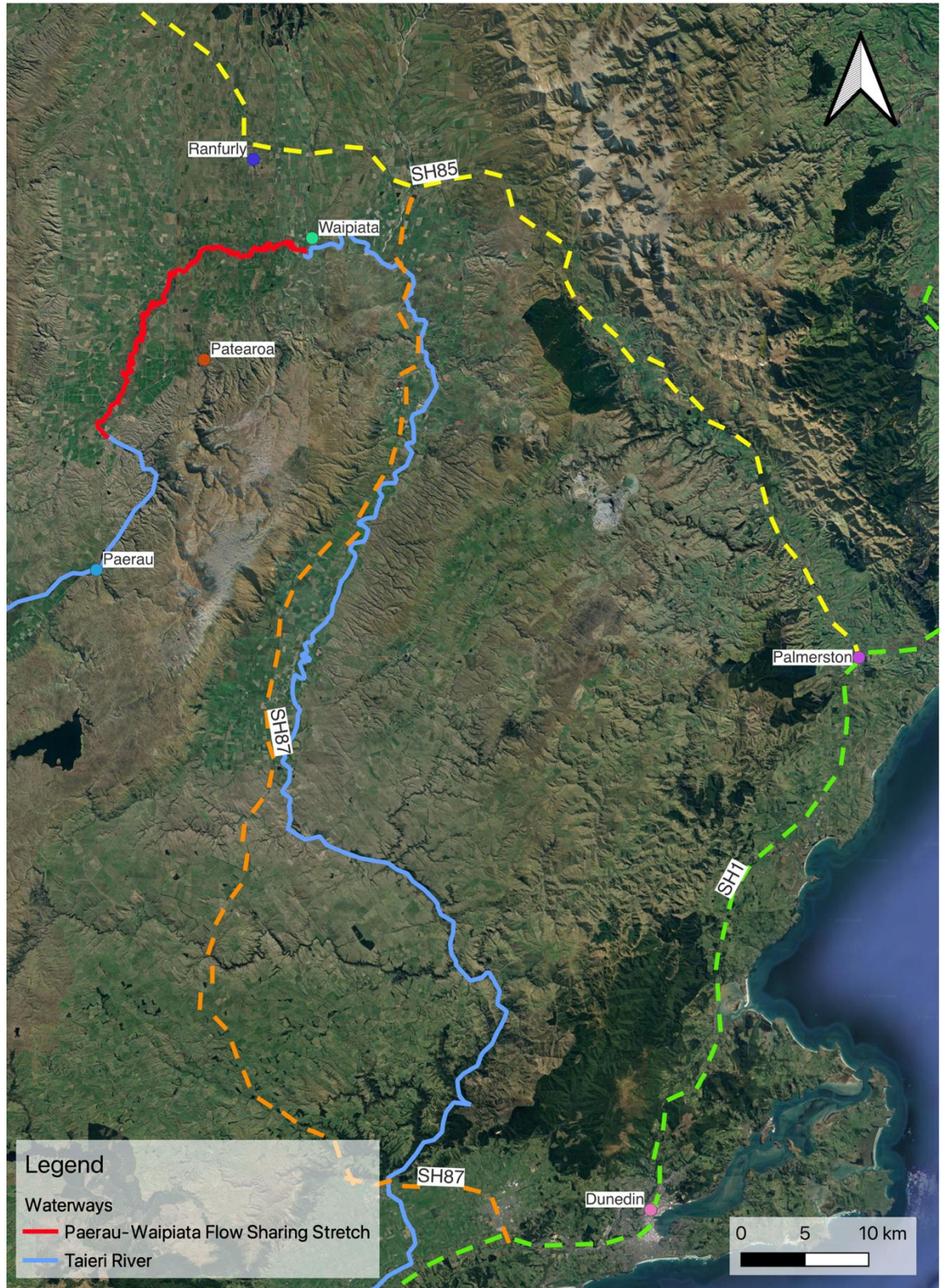


Figure 1 Location of Paerau-Waipiaata Flow Sharing Group in the Taieri Catchment

31. There is 40 hours river travel between the most upstream abstraction and the lowest. And 12 hours flow travel between the most downstream abstractor and the ORC minimum flow site. Two of the permit holder's pumps can abstract at variable rates to a minimum limit and they have the flexibility to switch the water to storage. Two permit holders cannot alter their abstraction rates as their water goes directly to application systems and that equipment does not function optimally with the reduced flow rate. That means the rationing regime cannot simply be a case of every-one reducing by a set percentage. It has to be irrigators being on and off while incorporating the travel times between takes and the minimum flow site. I say this is the simple example but in reality, even this flow sharing is complicated.
32. It has taken many years to understand how the flow down the river behaves with the variable inflow of tributaries, responses to weather and water use demands of current land uses.
33. If different limits and rules (such as minimum or residual flows, abstraction constraints and land use) were introduced then how the irrigators are able to manage the flow sharing would also need to be understood and established.
34. Flow sharing is inevitable when minimum flows are activated on rivers. Any flow that is available above a minimum or environmental flow is shared among the water user community.
35. A more complicated example is the Manuherekia River. In this catchment there are over 700 water users supplied via six irrigation companies or one of 50-60 individual permits. The farming community have been sharing water in this catchment since the 1930s.
36. There is a dam at the base of the high country in the main stem Manuherekia, Falls Dam, built in 1935. At 10 Million m<sup>3</sup> of storage it is not a big dam for the size of the catchment. During the dry times it does assist in keeping flows up in the river and some water available for irrigation abstraction.

37. Flow sharing in the catchment is based on an agreement between the four companies that own Falls Dam and abstract water from the main stem of the Manuherekia. The companies have been working to uphold a voluntary minimum flow at the bottom of the catchment of 900L/sec. When there is not enough water to achieve both the abstraction rate of each company intake and the minimum flow then flow sharing and dam water release may be initiated. The Falls Dam agreement means that a winner is not selected but rather all irrigation abstraction is reduced and all shareholders have to accept less water.
38. Flow restrictions have an impact on both the water received by the shareholders and the functioning of the scheme race systems. The greater the cut backs for rationing the more at risk the races are of not functioning. Some races in the Manuherekia Irrigation Company Society will not function at flows less than 50%.
39. Once rationing is introduced shareholders within the irrigation companies then need to respond to decreased water for their pastures, crops, vines, horticulture or livestock. The reduced water availability coincides with the hot dry time of the year. It is a tough time for all farmers and irrigation company staff. Prolonged water stress on any plant will result in plant death. That is particularly devastating in horticulture that takes seven years to reach production maturity.
40. Since at least 2018 the ORC have been advising that a plan change for the Manuherekia (and Cardrona and Arrow catchments) was imminent. At the same time the farmers were preparing for the replacement of the bulk of the water permits. These two factors meant the water users had to complete the science, understand the values, and draft a solution for the catchment themselves. The ORC are yet to announce the details of a Plan Change (now to be the new Land and Water Plan) for the Manuherekia FMU. However the pRPS sets the framework for some of those details. The pRPS framework must enable an achievable proposal for all catchments including the Manuherekia. The RPS does not tell us what that is.

41. The proposal for water management for the Manuherekia as developed by the water users needed to include both the current water sharing system that works based on Falls Dam updated with all the new requirements addressing instream ecology, catchment values and NPSFM considerations.
42. The Overview Document as attached in Appendix A is the summary that was lodged with the water permits back in early 2021. It shows the complexity at a higher catchment level of the flow sharing. It included catchment management zones (shown in *Figure 2*), minimum flow sites, residuals on the main stem and which water permits would expect these conditions.
43. The next level of detail was worked out at the sub-catchment level. Each sub-catchment of the full catchment may need a flow sharing regime so that a suitable residual flow would be maintained at the confluence with the mainstem or at locations within the stream. Or may have individual residual flows depending on the values. Each sub-catchment also contributes to the full catchment flow. *Figure 3* illustrates the major sub-catchments.



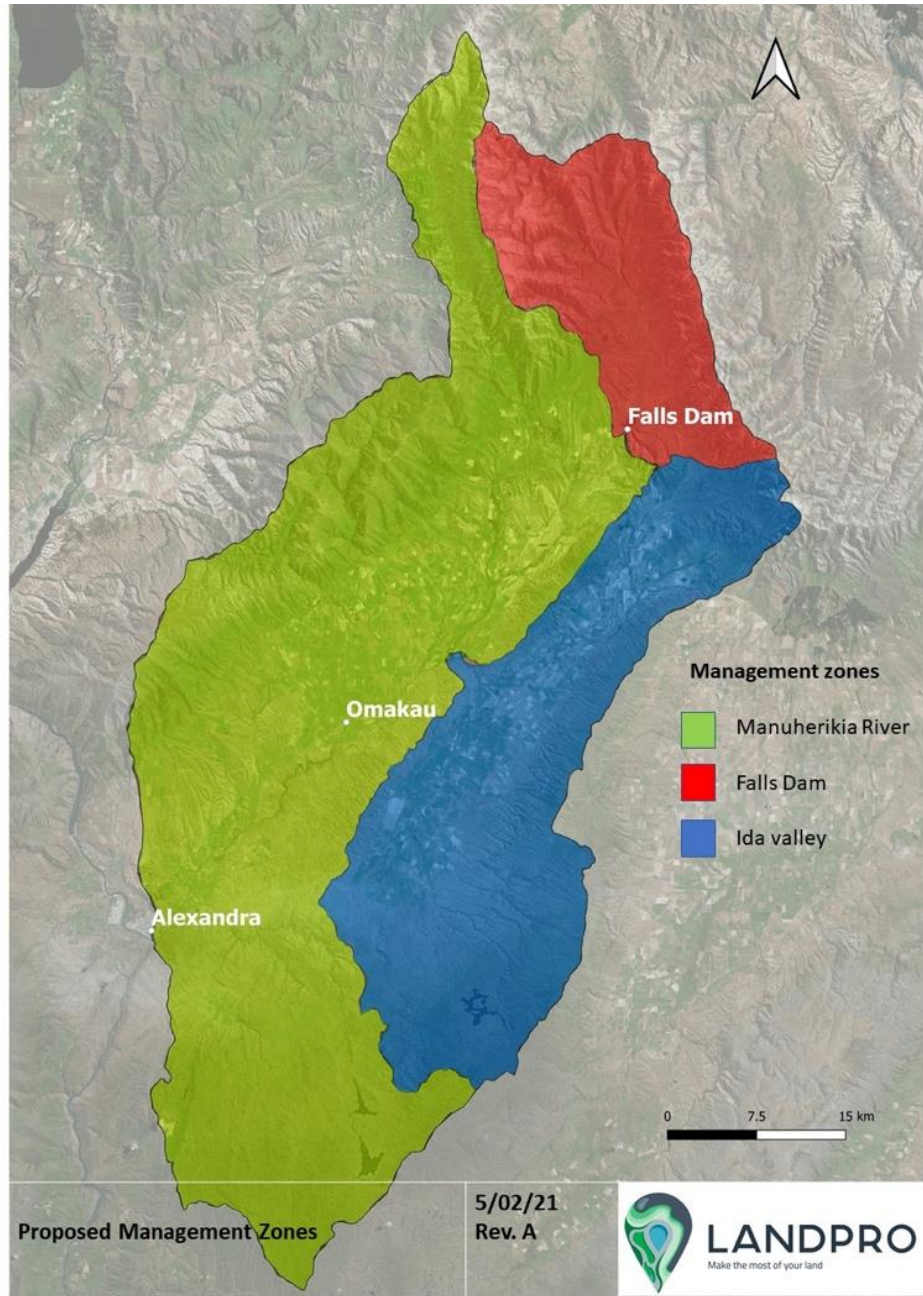


Figure 2 Proposed Manuherekia Catchment Management Zones

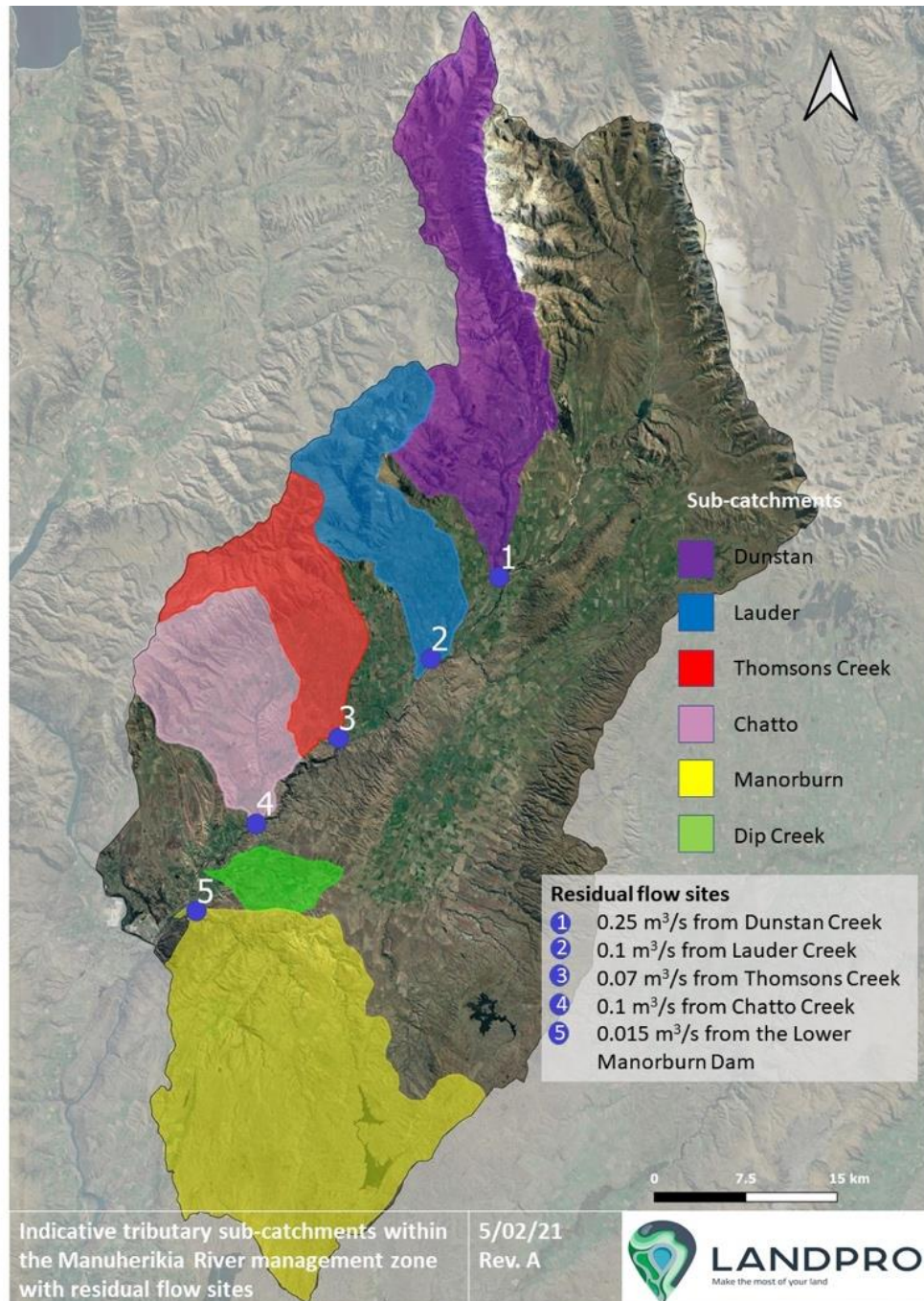


Figure 3 Major Manuherekia Sub-catchments

44. To work this out the hydrology of the streams needed to be understood and individual water users had to determine ways their own systems could work with the changes. Water users made a commitment to the proposal but still have some questions on whether

they will be able to operate their systems. Some races will struggle to operate effectively with lower flows.

45. Each sub-catchment was worked out separately and then combined into the whole catchment. The work included residual flow recommendations to protect in stream values, abstraction details, efficiency calculations on farm management and group water management decisions. My role was the co-ordinating of the group decision making. There are many businesses in a catchment that need to co-operate to get to an agreed position.
46. It is a unique situation where you have a series of competing businesses that are called on to voluntarily cut their water (ultimately their profits) for the good of the catchment and their neighbours. It calls on a lot of goodwill, trust and people putting the well-being of the community over themselves.
47. In building the solution for the Manuherekia from 2018 to 2021 I witnessed again and again individuals, businesses and business profits being sacrificed so the community or stream would be in better health.
48. Using the Lauder Catchment as an example: Figure 4 below is a map of the takes that were submitted to be replaced in early 2021. There were two residual flows proposed, Upper and Lower catchment. Those above WR432B would share flow to achieve a residual and those between WR432B and 93447 would share to achieve a residual at the confluence.
49. There are 20 farming families that needed to understand this proposal and be able to make it work on their farms just for the Lauder portion of the whole catchment proposal.
50. The proposed RPS has visions for FMU's that are not well defined so it is impossible for farmers to determine whether the vision is logical or achievable, the degree of change that may be required or whether the timeframe is fair.

**Vision versus reality at Lauder Creek**

51. The vision in the Clutha Mata-au FMU, Manuherekia, Dunstan and Roxburgh rohes includes the vision:

- (iii) sustainable abstraction occurs from main stems or *groundwater* in preference to tributaries,

52. In *Figure 4* below you can see there are many tributary takes located on the Lauder Creek, a tributary of Manuherekia. Up to 20 businesses and farming families are supported by abstraction from the Lauder Creek. All permit holders utilise gravity to at least some degree to access the water they use.

53. The location of the water take in relation to the paddocks irrigated is what makes irrigation viable. Many farms border the creek or are part of the Lauder scheme which is a shareholder owned race that delivers water to several water users.

54. Many of these farms are not close enough to the main stem for that water to be an option. Nor do they have easement rights to the main stem.



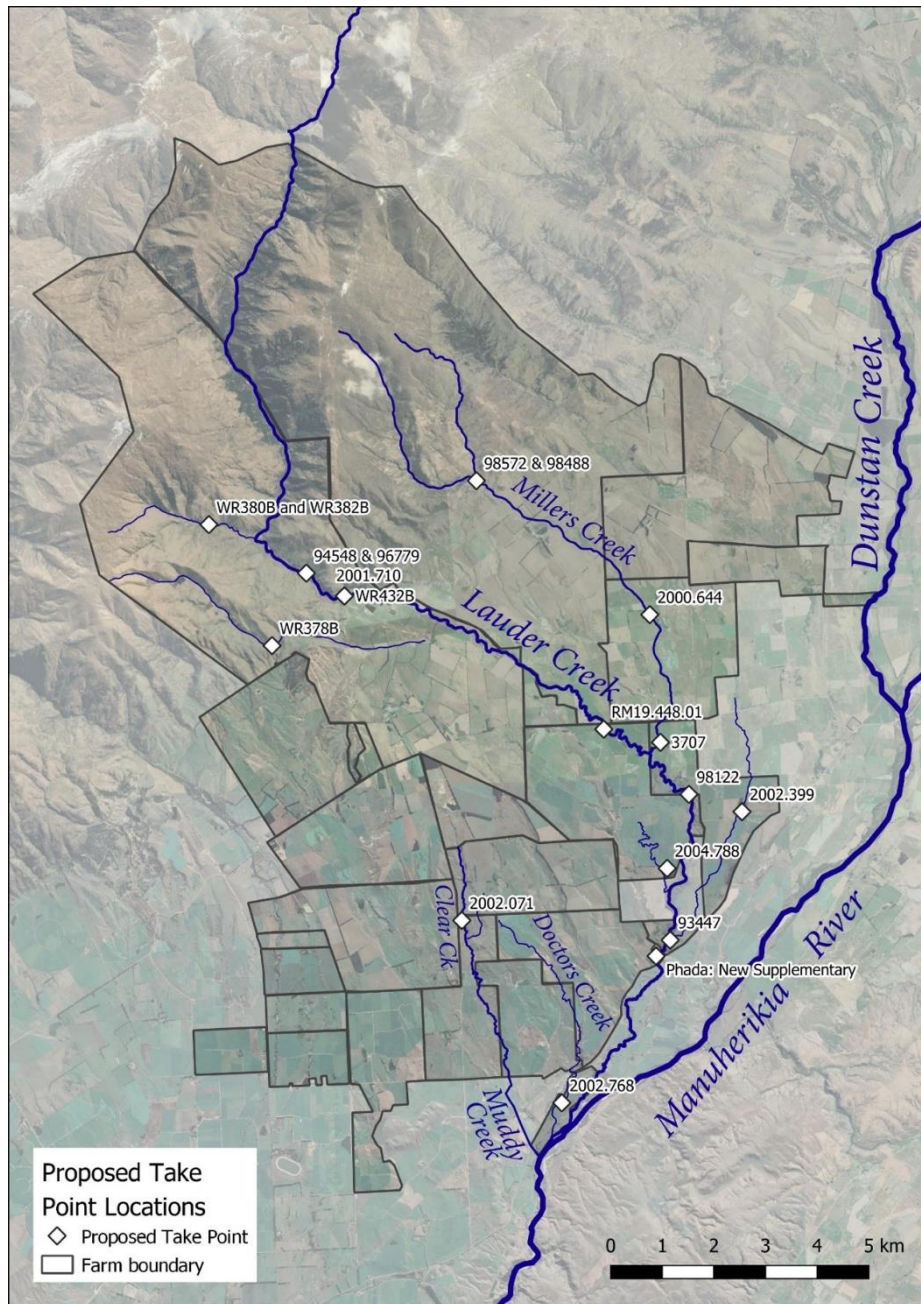


Figure 4 Lauder catchment water permit locations and numbers pre 2021(copied from permit application)

55. The wellbeing of the tributary will be protected in the future with the introduction of residual and minimum flows, efficiency improvements and further good practice adoption as required in the certified farm plans.

56. The proposed vision is neither required to protect tributaries nor feasible to implement because it fails to consider the situation on the ground.
57. The reason for explaining all this is to give the Panel an understanding of the enormous challenges and complexity involved in making changes to farming systems across whole catchments. This is truly a once-in-a-generation challenge alongside climate change and many other challenges besides. The inter-generational timescale necessary to respond to new policy settings needs to be recognised as such in the RPS, so that the intended Land and Water Regional Plan is not faced with the task of implementing a policy framework that is not achievable.

**In summary**

58. Water users in Central Otago have established protocols and infrastructure for flow sharing in dry times. Water storage, distribution, and application infrastructure is the result of a century of investment, trial, and error. Farming system change is unavoidably complex and slow.
59. The water users are prepared for some change and in many cases such as the Manuherekia have been proactively engaged in seeking further understanding and options to deliver the values of the catchments. However, if big changes are required then the complexity of water access and flow sharing mean long timeframes are needed. The RPS needs to acknowledge this to ensure that the Land and Water Regional Plan is not set up to fail through having to implement unachievable goals.

Date: 28 June 2023

Susan McKeague

# Appendix A

# Manuherikia Catchment Group Incorporated

## Overview of Proposed Catchment Management Approach



Prepared by McKeague Consultancy

February 2021