

**BEFORE THE ENVIRONMENT COURT
I MUA I TE KOOTI TAIAO O AOTEAROA**

UNDER the Resource Management Act 1991

IN THE MATTER of appeals under Clause 14 of the First Schedule of the Act

BETWEEN **TRANSPOWER NEW ZEALAND LIMITED**
(ENV-2018-CHC-26)

FONTERRA CO-OPERATIVE GROUP
(ENV-2018-CHC-27)

HORTICULTURE NEW ZEALAND
(ENV-2018-CHC-28)

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**STATEMENT OF EVIDENCE OF DR GREGORY BURRELL ON BEHALF OF
SOUTHLAND REGIONAL COUNCIL**

FRESHWATER ECOLOGY

11 February 2022

Judicial Officer: Judge Borthwick

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ARATIATIA LIVESTOCK LIMITED
(ENV-2018-CHC-29)

WILKINS FARMING CO
(ENV-2018-CHC-30)

**GORE DISTRICT COUNCIL, SOUTHLAND DISTRICT
COUNCIL & INVERCARGILL DISTRICT COUNCIL**
(ENV-2018-CHC-31)

DAIRYNZ LIMITED
(ENV-2018-CHC-32)

H W RICHARDSON GROUP
(ENV-2018-CHC-33)

BEEF + LAMB NEW ZEALAND
(ENV-2018-CHC-34 & 35)

DIRECTOR-GENERAL OF CONSERVATION
(ENV-2018-CHC-36)

SOUTHLAND FISH AND GAME COUNCIL
(ENV-2018-CHC-37)

MERIDIAN ENERGY LIMITED
(ENV-2018-CHC-38)

ALLIANCE GROUP LIMITED
(ENV-2018-CHC-39)

FEDERATED FARMERS OF NEW ZEALAND
(ENV-2018-CHC-40)

HERITAGE NEW ZEALAND POUHERE TAONGA
(ENV-2018-CHC-41)

STONEY CREEK STATION LIMITED
(ENV-2018-CHC-42)

THE TERRACES LIMITED
(ENV-2018-CHC-43)

CAMPBELL'S BLOCK LIMITED
(ENV-2018-CHC-44)

ROBERT GRANT
(ENV-2018-CHC-45)

**SOUTHWOOD EXPORT LIMITED, KODANSHA
TREEFARM NEW ZEALAND LIMITED, SOUTHLAND
PLANTATION FOREST COMPANY OF NEW ZEALAND**
(ENV-2018-CHC-46)

**TE RUNANGA O NGAI TAHU, HOKONUI RUNAKA,
WAIHOPAI RUNAKA, TE RUNANGA O AWARUA & TE
RUNANGA O ORAKA APARIMA**
(ENV-2018-CHC-47)

PETER CHARTRES
(ENV-2018-CHC-48)

RAYONIER NEW ZEALAND LIMITED
(ENV-2018-CHC-49)

**ROYAL FOREST AND BIRD PROTECTION SOCIETY
OF NEW ZEALAND**
(ENV-2018-CHC-50)

Appellants

AND

SOUTHLAND REGIONAL COUNCIL

Respondent

Summary of evidence

- 1 The Science / Water Quality expert caucusing (24–26 November 2021) resulted in a high degree of agreement amongst the experts. The only departure was that one expert (Ms McArthur) recommended wider setbacks from cultivation than are currently provided in Rule 25, whilst the other experts did not make a recommendation on setback width. I agree that there is *ecological* merit for providing a wider setback distance, but I do not make a particular recommendation because other considerations may need to be taken into account.
- 2 There were no matters of disagreement following the Forestry expert caucusing (29 November 2021) or the Ecology expert caucusing (1 December 2021).
- 3 In his evidence (dated 20 December 2021) Mr Wilson¹ suggested a change to Rule 70 to allow grazing in wetlands under certain circumstances. I do not consider there is good evidence to support grazing in wetlands, as proposed by Mr Wilson. That is based on my review of the literature and the fact that grazing in wetlands is already permitted in the proposed Southland Water and Land Plan (**pSWLP** or **Plan**), albeit restricted to wetlands that do not meet the definition of “natural wetlands”.
- 4 Mr Wilson’s evidence also includes a suggested change to Rule 20A to allow intensive winter grazing as a permitted activity under certain circumstances. I do not support the proposed wording change. That is because I consider it would be very difficult to assess effects of the activity on an individual farm basis, compared to the permitted baseline.
- 5 A concern was raised in evidence by Ms McArthur² (dated 20 December 2021) regarding the adequacy of the Plan’s provisions in protecting ephemeral and intermittent headwater streams. Following a review of the scientific literature and definitions within the pSWLP, I conclude that the proposed provisions in the Plan adequately protect ephemeral flow paths and intermittent rivers, as defined in the Plan.

¹ The planning expert for Federated Farmers of New Zealand.

² The freshwater ecology and water quality expert for the Royal Forest and Bird Protection Society of New Zealand Incorporated (**Forest and Bird**) and Southland Fish and Game Council (**Fish and Game**).

Introduction, qualifications, and experience

- 6 My name is Dr Gregory Peter Burrell. I am a freshwater ecologist with over 20 years of professional experience in freshwater management, aquatic resource surveys, restoration, and applied research. I hold the following university qualifications: Bachelor of Science, Post Graduate Diploma of Science, and Doctor of Philosophy (PhD) in science, all majoring in ecology and all obtained from Canterbury University. I am the owner and director of Instream Consulting and have been since 2014. Prior to that I worked at Golder Associates in New Zealand and Canada for 10 years, and prior to that I worked at other consultancies and NIWA.
- 7 Examples of my professional experience relevant to this appeal include: member of a technical advisory panel for sub-regional plan changes to the Canterbury Land and Water Regional Plan (**LWRP**) for the Hurunui-Waiiau and Waimakariri management zones; expert evidence for Te Rūnanga o Ngāi Tahu at council hearings for the Hinds-Ashburton sub-regional plan change to the LWRP; ecology expert witness at the Central Plains Water council hearings in Canterbury; expert witness for Otago Regional Council at the Borst Holdings hearing (the first challenge to new regional rules for nutrient discharges from farming); independent commissioner on a panel to hear applications to take additional water from the Rangitata River for irrigation; and freshwater quality sampling advice to farmers for Ravensdown.
- 8 In relation to the various appeals to the pSWLP, I previously attended expert caucusing for Topic A in relation to defining degradation and identifying degraded waterbodies.
- 9 I have been asked by the Southland Regional Council (**Council**) to prepare evidence for these proceedings.

Code of conduct

- 10 I confirm that I have read the Code of Conduct for expert witnesses as contained in the Environment Court Practice Note 2014. I have complied with the Code of Conduct when preparing my written statement of evidence, and will do so when I give oral evidence.

- 11 The data, information, facts, and assumptions I have considered in forming my opinions are set out in my evidence. The reasons for the opinions expressed are also set out in my evidence.
- 12 Other than where I state I am relying on the evidence of another person, my evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope

- 13 I participated in expert witness conferencing in relation to these proceedings, and signed the resulting Science / Water Quality Joint Witness Statement dated 24-26 November 2021, the Forestry Joint Witness Statement dated 29 November 2021, and the Ecology Joint Witness Statement dated 1 December 2021.
- 14 I have been asked by the Council to provide evidence in relation to the Joint Witness Statements (**JWS**) I am a signatory to, and the following matters which were outstanding following the expert conferences:
- (a) Setback distances from cultivation (Rule 25).
 - (b) Grazing in wetlands (Rule 70).
 - (c) Intensive winter grazing (Rule 20A).
 - (d) Ephemeral rivers/flow paths (various provisions).

Science / Water Quality expert conferencing and joint witness statement

- 15 Many of the questions addressed during expert caucusing related to whether current plan provisions related to degraded waterways also provided for ki uta ki tai and hauora. The experts agreed that the pSWLP does recognise a “mountains to sea” philosophy that is similar to ki uta ki tai. The experts also agreed that the pSWLP will not necessarily achieve hauora, which would require a move closer to a natural state than simply improving beyond a degraded state. I participated in the expert caucusing, signed the JWS, and I stand by the outcomes of the JWS.
- 16 The only area of departure amongst experts in the JWS was regarding setback distances for cultivation (Rule 25). This is discussed in the following section.

Setback distances from cultivation (Rule 25)

- 17 Rule 25 of the pSWLP (as per Planning JWS dated 10 December 2021) requires setbacks between land cultivation and rivers, lakes, and wetlands. The setback distance in the pSWLP varies according to slope. In summary, the rules are:
- (a) 5 m setback for slopes less than 10 degrees;
 - (b) 10 m setback for slopes of 10–20 degrees;
 - (c) No cultivation on slopes greater than 20 degrees.
- 18 The rationale for providing a setback, or buffer, between cultivation and water bodies is clearly laid out in the Science / Water Quality JWS and there is no disagreement on the rationale. In the JWS, the experts agreed that the buffering effect of a setback increases with setback width and that on slopes below 10 degrees riparian setbacks of 10 m would provide greater fine sediment removal than the 5 m setback proposed in the Plan. It was also agreed that a wider setback may be required on steeper slopes and that the optimal buffer width will depend on how much sediment removal is desired. Except for Ms McArthur, the experts did not recommend a setback width for the pSWLP.
- 19 In the Science / Water Quality JWS, Ms McArthur suggested a 20 m setback from water bodies on slopes greater than 10 degrees and recommended a 20 m setback from wetlands, to protect against sedimentation impacts. In her evidence dated 20 December 2021, Ms McArthur recommends a setback of 10 m on slopes below 10 degrees and a 20 m setback on slopes greater than 10 degrees. In her evidence, Ms McArthur also recommends a 20 m setback for cultivation bordering wetlands, lakes, springs, lagoons, and estuaries, due to their longer residence time and hence sensitivity to sedimentation.
- 20 In her evidence, Ms McArthur cites extensive background literature that I agree is relevant regarding setback distances. An additional report not cited by Ms McArthur is a review of riparian setback distances in New Zealand conducted by Fenemor and Samarasinghe (2020). For contaminant reduction to water bodies, Fenemor and Samarasinghe (2020) recommended a minimum setback distance of 10 m for slopes less than 10 degrees and 20 m for steeper land. They suggested a wider setback, of 15 m, for protection of freshwater ecosystem health,

terrestrial and aquatic habitat diversity, and a 20 m setback for recreational, cultural, aesthetic and landscape values.

- 21 Choosing a setback distance requires some form of a compromise to be made between protecting ecosystem health and maximising land available for farming. The maps of degraded water bodies attached to the Water Quality and Ecology JWS dated 22 November 2019 clearly show many water bodies in Southland with compromised ecosystem health or water quality. The setback distances for cultivation in the pSWLP will improve the existing level of protection for ecosystem health and water quality. The available evidence suggests increasing the setback distances further, from 5 to 10 m for slopes below 10 degrees and from 10 to 20 m for steep slopes, would add an additional layer of protection.
- 22 Regarding the implementation of wider setback distances, Fenemor and Samarasinghe (2020) suggested that the wider setbacks be considered long-term goals, taking into account opportunity costs (i.e., loss of productive farmland). In Southland, this could take the form of an initial 5 or 10 m setback (depending on slope), with all stock excluded from the setback, and then increasing the setback distance to 10 or 20 m over time.
- 23 In summary, there is good evidence that wider setbacks from cultivated land than those proposed in Rule 25 would better protect water quality and ecosystem health. However, increasing buffer widths beyond those proposed in Rule 25 would also result in a loss of productive farmland. It is beyond my area of expertise as an ecology expert to assess those other considerations. Nevertheless, I observe that phasing in wider setbacks over time could be one way of providing for environmental gains in the long term, whilst reducing the short-term cost to landowners. It would also send a clear signal that narrower setbacks will not be sufficient to achieve the required improvements in water quality and ecology.

Forestry expert conferencing and joint witness statement

- 24 The questions addressed at the Forestry expert conference mainly related to whether Rule 25 for cultivation should apply to herbicide spraying and the practice of stick raking/windrowing in plantation forests. To the extent that matters discussed were within my area of expertise, I

agreed with the position articulated in the JWS and I stand by the outcomes of the JWS.

- 25 As there are no matters of disagreement between the experts in respect of the matters discussed at the Forestry conferencing, I do not address this further in my evidence.

Ecology expert conferencing and joint witness statement

- 26 The ecology expert conference covered impacts of sheep on wetlands and impacts of weed and sediment removal from drainage schemes. In summary, we agreed that sheep can impact wetlands via grazing, ground disturbance, and faecal contamination, and that sheep tend to impact soil less than cattle. We also agreed that pSWLP provisions regarding weed and sediment removal allow for high levels of disturbance to water bodies inhabited by indigenous species. We further agreed that improved protection of indigenous freshwater species requires a change towards more sustainable drainage management.
- 27 There were no matters of disagreement at the end of the conference, and I stand by the outcomes of the JWS. I do not address this further in my evidence.

Grazing in wetlands (Rule 20)

- 28 In his evidence for Federated Farmers dated 20 December 2021, Mr Wilson proposes changes to Rule 70 that would mean stock grazing in wetlands is a permitted activity under certain circumstances. These circumstances are a maximum of 6 stock units per hectare and preparation of a Farm Environmental Management Plan that shows how stock damage to the values of the wetland will be avoided. In supporting this suggested rule change, Mr Wilson states that stock in wetlands can be beneficial.
- 29 In supporting his assertion that grazing can be beneficial to wetlands, Mr Wilson refers to a published study in the Netherlands, where there are also native mammalian grazers, including hares and deer (Lagendijk *et al.* 2017). I consider the study is irrelevant to the New Zealand setting, where we lack native land mammals. He also refers to an unpublished post graduate diploma thesis, which I have been unable to source.
- 30 I agree that there are published examples of grazing for conservation purposes overseas. However, grazing for conservation is far from a

universally accepted practice, and there are many studies that have shown negative effects of grazing wetlands, as listed in the Ecology JWS. In a comprehensive New Zealand review of grazing in wetlands, Reeves and Champion (2004) concluded that the effects of grazing are so variable that grazing decisions should be based on conservation objectives specific to each site. The authors noted that there may be benefits of grazing to suppress exotic woody weeds, but that this can also come at the cost of suppressing native wetland plant species.

- 31 I do not consider there is sufficient evidence to support a particular stocking rate in wetlands to protect water quality and ecological values. I similarly do not consider there is an evidential basis for preparing a Farm Environmental Management Plan in support of grazing stock in a wetland without causing ecological damage.
- 32 I note that the proposed wording for Rule 70 is restricted to “natural wetlands”, as defined in the pSWLP. The pSWLP definition of a natural wetland excludes wet pasture, damp gully heads, or where water temporarily ponds after rain, or pasture containing patches of rushes. This is more restrictive than national guidelines that define and delineate wetlands based on plant cover, soil type, and hydrology (Ministry for the Environment 2020). Hence, the pSWLP provides for grazing in wetlands that are relatively smaller or have a lower native plant cover, but that are still functionally wetlands.
- 33 In summary, I do not consider there is good evidence to support grazing in wetlands as a permitted activity, as proposed by Mr Wilson. This is based on my review of the literature and the fact that grazing in wetlands is already permitted in the pSWLP, albeit restricted to wetlands that do not meet the definition of “natural wetlands”.

Intensive winter grazing (Rule 20A)

- 34 In his evidence (dated 20 December 2021) Mr Wilson supports the addition of a new clause (aa) to Rule 20A, as follows:

(aa) Intensive winter grazing is a permitted activity if it occurs on more than 50 ha and on more than 10% of the landholding and a certifier certifies, in accordance with Appendix N Part C, that the adverse effects (if any) allowed by the winter grazing plan in a Farm Environment Management Plan are no greater than those allowed by 20A(i)-(v).

35 As I understand the wording of the proposed clause, it would allow winter grazing on more than 10% of the property, provided someone can certify that the effects would be no more than if 10% or less of the farm was intensively grazed. I consider this certification would be very difficult to support in practice. That is because winter grazing is often associated with diffuse pollution, and it is difficult to link diffuse pollution to individual farm actions, let alone potentially subtle changes in landuse (e.g., 10% vs 12% of the land being intensively grazed) and their effects on ecological health. I therefore do not see much value in the proposed clause, because it would be difficult to certify the effects are equivalent to that permitted.

Ephemeral rivers/flow paths

36 The terms “ephemeral river” and “intermittent river” are defined in the pSWLP as follows:

- (a) Ephemeral rivers: Rivers which only contain flowing or standing water following rainfall events or extended periods of above average rainfall.
- (b) Intermittent river: A river which does not contain permanently flowing or standing water and where the bed is predominantly devoid of terrestrial vegetation and comprises sand, gravel, boulders, or similar material or aquatic vegetation.

37 In the Planning JWS dated 10 December 2021, it is proposed to replace the term “ephemeral river” with “ephemeral flow path”. The rationale given is that “these landscape features are not waterbodies and the use of the word “river” is not how members of the community see them”. This proposed change in terminology is accompanied with a change to ephemeral flow paths being included in the definition of critical source areas. I agree with these suggested changes.

38 In her evidence dated 20 December 2021, Ms McArthur states her concern that the pSWLP does not identify important ecological values of ephemeral streams. She further suggests that stock exclusion from ephemeral and headwater streams may be required in the future to “realise the significant reductions in contaminants needed in Southland to achieve freshwater objectives, to provide for the ecosystem health of these waterbodies and to give effect to Te Mana o te Wai.”

- 39 I agree with Ms McArthur that small headwater streams, including those with intermittent flow, can harbour significant biodiversity values. I also agree that it is important to protect intermittent headwaters, to ensure protection of permanently flowing waters downstream, which is consistent with Te Mana o te Wai. However, I do not agree that the ecological values of ephemeral rivers (now “flow paths”), as defined in the pSWLP, are understated or under-protected in the pSWLP.
- 40 In essence, my disagreement with Ms McArthur comes down to pSWLP definitions of the terms “ephemeral” and “intermittent”. While intermittent and ephemeral streams are often grouped together (as Ms McArthur has done), treating them separately may be useful for the purposes of study and policy (Svec *et al.* 2005; Busch *et al.* 2020).
- 41 Research in New Zealand has shown relatively high diversity of invertebrates in headwater streams that have intermittent flow, including locations with isolated pools and locations with damp mud over summer (R. Storey *et al.* 2009; Storey *et al.* 2011; Neale *et al.* 2016). Based on the pSWLP definitions, I consider that these intermittent water bodies should all be protected by the planning provisions relating to rivers (which include intermittent rivers), and they would not be considered ephemeral flow paths. I am unaware of any studies that have attempted to quantify the intrinsic biodiversity values of New Zealand ephemeral flow paths (as defined in the pSWLP).
- 42 Given the definitions of ephemeral flow paths in the pSWLP, I do not consider they need further protection, beyond those relating to critical source areas. That is because they are unlikely to have the biodiversity values associated with intermittent or permanently flowing water bodies.

Conclusion

- 43 There is general agreement amongst water quality and ecology experts regarding water quality and ecological issues in Southland and the degree to which the pSWLP addresses these issues. There is ecological merit in increasing proposed setback distances from cultivation (Rule 25). I do not consider there is sufficient scientific evidence to support grazing in natural wetlands. I consider that Mr Wilson’s proposed changes to winter grazing rules (Rule 20A) would not work in practice, due to the difficulty in assessing effects. Lastly, I consider the proposed

provisions in the Plan adequately protect ephemeral flow paths and intermittent rivers, as defined in the Plan.



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Gregory Peter Burrell

11 February 2022

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