

**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)

(Continued next page)

**WILL SAY STATEMENT OF DR ROSS MONAGHAN ON BEHALF OF
SOUTHLAND REGIONAL COUNCIL IN ANTICIPATION OF EXPERT
CONFERENCING**

AGRICULTURAL AND SOIL SCIENCE

11 November 2021

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

Introduction, qualifications and experience

- 1 My name is Dr Ross Martin Monaghan. My qualifications will be set out in full in my evidence in chief, however, in brief: I am a research scientist working within the Environmental Science team at AgResearch, based at the Invermay campus near Mosgiel. I have a Bachelor's degree in Agricultural Science (First Class Hons, Lincoln University) and a PhD in Soil Science (The University of Reading). I have 26 years work experience with AgResearch plus the research experience gained during my PhD and post-doctoral studies (3 years for each). My research projects focus on (i) defining the impacts of intensive pastoral agriculture on soil and water quality, and (ii) identifying cost-effective options to reduce these impacts where mitigation is deemed necessary.

Code of conduct

- 2 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014 and agree to comply with it. The contents of this statement are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this statement.

Scope of will say statement

- 3 I have prepared this will say statement in anticipation of facilitated expert conferencing.
- 4 This statement addresses:
 - (a) A description of the key sources and pathways of nitrogen (**N**), phosphorus (**P**), sediment and faecal microorganism (**FMO**) transfers from farms to water;
 - (b) An overview of actions that can mitigate transfers of N, P, sediment and FMOs;
 - (c) Consideration of some barriers to the adoption of mitigation actions; and
 - (d) The key components of Farm Environment Plans (**FEPs**) that deliver improved farm environmental performance.

Key sources and pathways of nitrogen (N), phosphorus (P), sediment and faecal microorganism (FMO) transfers from farms to water

- 5 In my evidence, I intend to provide an overview of the key sources and pathways of N, P, sediment and FMO transfers from farms to water. This will include drawing on past and on-going field research undertaken in southern NZ.

Actions that can mitigate transfers of N, P, sediment and FMOs

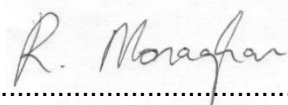
- 6 I will provide an overview of the range of mitigation actions that can be considered for mitigating N, P, sediment and FMO losses from farms to water. These will be categorised into measures that range from some now commonly accepted farming practices to those that are less widely implemented due to issues of cost, complexity and/or uncertainty regarding their effectiveness. The overview will include reference to some recent farm scale assessments, undertaken as part of the Our Land & Water National Science Challenge, of what could possibly be achieved if mitigation practices were fully implemented (Monaghan et al. 2021; McDowell et al. 2021) and to a summary provided to Council in 2016 (Monaghan, 2016).

Consideration of some barriers to the adoption of mitigation actions

- 7 I will provide a consideration of some known barriers to the adoption of the mitigation actions described above. This will cover issues of cost, complexity and/or uncertainty regarding the effectiveness of mitigation actions.

Key components of Farm Environment Plans (FEPs)

- 8 I will describe what I believe to be the key components of FEPs, linking to evidence prepared for paragraphs 5, 6 and 7 (above). These key components are consistent with the FEP provisions put forward by the Council.



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Ross Martin Monaghan

11 November 2021

References

Monaghan, R.M. 2016. Management practices and mitigation options for reducing contaminant losses from land to water. AgResearch Client Report RE500/2016/036 to Environment Southland. 16p.

Monaghan, R.M., Manderson, A., Basher, L., Spiekermann, R., Dymond, J., Smith, L.C., Muirhead, R.W., Burger, D., McDowell, R.W., 2021. Quantifying contaminant losses to water from pastoral landuses in New Zealand II. The effects of some farm mitigation actions over the past two decades. New Zealand Journal of Agricultural Research 64: 365-389.

McDowell, R.W., Monaghan, R.M., Smith, L.C., Manderson, A., Basher, L., Burger, D.F., Laurenson, S., Pletnyakov, P., Spiekermann, R., Depree, C., 2021. Quantifying contaminant losses to water from pastoral land uses in New Zealand III. What could be achieved by 2035? New Zealand Journal of Agricultural Research 64: 390-410.