

In the Environment Court
at Wellington

under: the Resource Management Act 1991

in the matter of: appeals under clause 14 of the First Schedule to the Resource Management Act 1991 concerning proposed One Plan for the Manawatu-Wanganui Region

between: **Federated Farmers of New Zealand**
(ENV-2010-WLG-000148)

and: **Minister of Conservation**
(ENV-2010-WLG-000150)

and: **Horticulture New Zealand**
(ENV-2010-WLG-000155)

and: **Wellington Fish and Game Council**
(ENV-2010-WLG-000157)

and: **Andrew Day**
(ENV-2010-WLG-000158)

Appellants

and: **Manawatu-Wanganui Regional Council**
Respondent

and: **Fonterra Co-operative Group Limited**
Section 274 party

Second supplementary statement of evidence of **Stewart Francis Ledgard** for Fonterra Co-operative Group Limited

Dated: 16 May 2012

REFERENCE: John Hassan (john.hassan@chapmantripp.com)
Luke Hinchey (luke.hinchey@chapmantripp.com)

SECOND SUPPLEMENTARY STATEMENT OF EVIDENCE OF STEWART FRANCIS LEDGARD FOR FONTERRA CO-OPERATIVE GROUP LIMITED

INTRODUCTION

- 1 My full name is Stewart Francis Ledgard and I have the qualifications and experience described in my Evidence in Chief (*EIC*). I repeat the confirmation given in that statement that I have read and agree to comply with the Code of Conduct for Expert Witnesses.

OVERVIEW

- 2 In this second supplementary statement of evidence, I produce an update to my modelling of Gerard Willis' recommended planning regime, which is set out at Appendix B of my rebuttal statement of evidence dated 18 April 2012.
- 3 The updated modelling utilises the same methods outlined in my rebuttal evidence. However, it uses the catchment and sub-catchment farm data held by Horizons Regional Council from its data base of 325 nutrient budgets¹. This information was not available to me at the time I undertook my original modelling work.
- 4 My modelling analyses predicted N-leaching from two categories of existing dairy farms:
 - 4.1 Farms with N-leaching greater than or equal to 27 kg N/ha/ year (≥ 27 kg N/ha/year *N leaching category*); and
 - 4.2 Farms with N-leaching lower than 27 kg N/ha/year (< 27 kg N/ha/year *N leaching category*).
- 5 I then analyse the reduction in N leaching per hectare from average farms in each category based on the use of the OVERSEER model, and using the Council's catchment and sub-catchment data. . The calculated reductions were based on the assumption of adoption of "Tier 1" mitigations for farms in the category leaching ≥ 27 kg N/ha/year. For the category < 27 kg N/ha/year, it was assumed that 25% adopted tier 1 mitigations, 50% had no change in N leaching and 25% of farms had a 10% increase in N leaching (i.e. option 2 in my rebuttal evidence).
- 6 Analysis of the potential reduction in N leaching based on the methods outlined is restricted to catchments or sub-catchments where there is a relatively large sample size (and therefore a reasonable representation of the actual variation in N leaching between farms). My analysis models the Manawatu catchment, Manawatu at Hopelands, Mangatainoka at SH2, Manawatu at Upper Gorge, Rangitikei catchment and Rangitikei at McKelvies.
- 7 The estimates of N leaching per hectare from this work were then provided to Dr Roygard and Ms Clark to enter into their catchment model to calculate predicated SIN loads for the specific catchments or sub-catchments.

¹ Statement of further information by Dr Jon Roygard and Ms Maree Clark providing a summary of nutrient budgets held by Manawatu-Wanganui Regional Council for the purpose of further modelling dated 9 May 2012.

SUMMARY OF RESULTS OF UPDATED MODELLING

- 8 A summary of the results of the modelling analyses for the different catchments and sub-catchments is provided in Table 1.
- 9 For the < 27 kg N/ha/year N leaching category, my updated modelling shows an absolute reduction in N leaching of 0.6 kg N/ha/year in all cases. This result is similar to the predicted results in my earlier rebuttal evidence.
- 10 For the \geq 27 kg N/ha/year N leaching category, my updated modelling shows a variation in the magnitude of reduction in N leaching associated with differences in the current average N leaching in each catchment or sub-catchment.
- 11 My original modelling analysis for the whole Region showed an average reduction in N leaching per hectare from existing dairy farms under Mr Willis' proposed approach of 9.6%. The current analysis shows variations in N leaching reductions between catchments and sub-catchments of between 8.8% and 15.1%. The variations arise due to the different proportions of existing farms in the \geq 27 kg N/ha/year N leaching category, as opposed to the regional average. For example, the Council's data records that 49% of existing dairy farms in the Manawatu at Hopelands sub-catchment are leaching at or above 27 kg N/ha/year N compared to 25% for the regional average. Therefore, the N-loss gains from applying Mr Willis planning regime are higher in that area than the regional average.
- 12 Table 2 provides a summary of the effects of adding N leaching from dairy farm conversions assumed to occur over the next 10 years (based on a 5.5% increase in area of land under dairy farming). This is based on the assumption that dairy conversions would be required to comply with the DV POP. In this case, an average N leaching of 21 kg N/ha/year was assumed from land under dairy conversions. This was accounted for by adding the predicted increase in N leaching loss from dairy conversions to the predicted N-leaching decreases from existing areas in dairy farming (for simplification in analysis of overall system changes at a catchment level).

Table 1: Summary of N leaching for existing dairy farms for the average in the N leaching categories below 27 kg N/ha/year or equal to and above 27 kg N/ha/year, and the calculated reduction in N leaching according to Mr Willis' proposed approach³

	< 27 kg N/ha/year			≥ 27 kg N/ha/year			All farms (weighted average)		
	% of farms ¹	Average ¹ (kg N/ha/yr)	Decrease (kg N/ha/yr)	% of farms ¹	Average ¹ (kg N/ha/yr)	Decrease (kg N/ha/yr)	Average (kg N/ha/yr)	Decrease (kg N/ha/yr)	Decrease (%)
Manawatu at Hopelands	51	21.2	0.6	49	31.1	7.4	26.1	3.9	15.1
Mangatainoka at SH2	67	19.8	0.6	33	34.5	7.8	24.7	3.0	12.1
Manawatu at Upper Gorge	60	20.6	0.6	40	32.4	7.5	25.3	3.4	13.3
Rangitikei catchment	82	18.9	0.6	18	35	7.9	21.8	1.9	8.8
Rangitikei at McKelvies	81	19.0	0.6	19	35	7.9	22.0	2.0	9.0
<i>Region average²</i>	75	19.3	0.6	25	33.8	7.6	22.8	2.2	9.6

¹Data from information provided by Dr Roygard and Ms Clark (received on 9 May 2012).

²Summary from Rebuttal evidence of Ledgard (18 April 2012)

³ The results in Table 1 were based on analyses for the average N leaching level in each of the categories, e.g. for 19 kg N/ha/year for the < 27 kg N/ha/year N leaching category and 32.5 kg N/ha/year for the ≥ 27 kg N/ha/year N leaching category. Additional analyses were done for farms with a range of different starting values (e.g. for 27, 30, 34 and 40 kg N/ha/year in the upper N leaching category) and this showed only a small variation in calculated % reduction in N leaching (e.g. 23-27% for starting N leaching values of 27-40 kg N/ha/year). This indicates that the approach used was adequate to examine the potential benefit of Mr Willis' proposed approach (particularly in view of the lack of more farm-specific data). Similarly, some additional analyses to consider farms in a high rainfall area (e.g. 2000 mm/year) indicated higher starting N leaching values but that the various tier 1 mitigations could all be potentially effective options, although reduced effectiveness of DCD was assumed. For example, a 26% reduction in N leaching from use of tier 1 mitigations declined to a 21% reduction with 2000 mm rainfall/year.

Table 2: Summary of the effect of including conversion of sheep and beef farms to dairying on the average N leaching and the percentage reduction from the current average

	Existing dairy farms			
	Current average (kg N/ha/yr)	With Mr Willis' changes implemented (kg N/ha/yr)	Including conversions (kg N/ha/yr)	Decrease (%)
Manawatu at Hopelands	26.1	22.1	23.3	10.7
Mangatainoka at SH2	24.7	21.7	22.8	7.4
Manawatu at Upper Gorge	25.3	22.0	23.1	8.7
Rangitikei catchment	21.8	19.9	21.0	3.5
Rangitikei at McKelvies	22.0	20.1	21.2	3.8
<i>Region average²</i>	22.8	20.6	21.3	6.5

Stewart Francis Ledgard

16 May 2012