In the Environment Court
at Wellington

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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 NZ**
(ENV-2010-WLG-000155)

and: **Wellington Fish & 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

Statement of evidence of **John Stacey Ballingall** for Fonterra Co-operative Group Limited

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Dated: 14 March 2012

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CHAPMAN TRIPP

STATEMENT OF EVIDENCE OF JOHN STACEY BALLINGALL FOR FONTERRA CO-OPERATIVE GROUP LIMITED

1 My full name is John Stacey Ballingall.

2 I am the Deputy Chief Executive of the New Zealand Institute of Economic Research Inc. (NZIER).

3 I graduated from Massey University in Palmerston North with a Bachelor of Applied Economics and a Masters of Applied Economics.

4 I have 11 years experience in the application of economics to a wide range of business and policy issues. In between my two stints at NZIER, I was the Deputy Director of the Ministry of Foreign Affairs and Trade's Economic Division.

5 In my consultancy and public sector work, I have prepared a wide range of reports relevant to this case. I specialise in modelling or analysing the economic impacts of changes to policy or regulatory settings. In particular I have:

5.1 Carried out economic modelling and written a number of reports for the Ministry for the Environment on the Emissions Trading Scheme (*ETS*). These reports quantified the impacts on New Zealand's economy and greenhouse gas emissions of a variety of ETS design elements, including transitional measures such as free allocation of emissions permits, and a capped carbon price;

5.2 Written a report that estimates the economic contribution of the dairy sector to the national and regional economies;[3]

5.3 Led projects considering the potential economic impacts of strategies to lift the performance of the red meat, aquaculture and horticulture sectors, all of which took into account changing land use patterns;

5.4 Worked on projects related to proposed changes in regional infrastructure, such as the expansion of Wellington International Airport and Queenstown Airport;

5.5 Advised on resource consent applications lodged by aquaculture companies with the Environmental Protection Authority, drawing on the Resource Management Act 1991 (*RMA*) framework to assess the suitability of the applications;

[3] NZIER. (2010). 'Dairy's role in sustaining New Zealand'. NZIER report to Fonterra and DairyNZ. http://www.fonterra.com/wps/wcm/connect/fcf7000044f43b8bb2b2fbac5c5d2692/NZIER+economic+report+to+Fonterra+and+DNZ+2010.pdf?MOD=AJPERES&CACHEID=fcf7000044f43b8bb2b2fbac5c5d2692

5.6 Chaired the 'Food Miles Group' that brought together officials and industry to discuss how best to respond to potential concerns from our key export markets about the environmental sustainability of New Zealand products. The dairy sector was often targeted by overseas producer groups or non-government organisations in this debate.

6 I am familiar with the Proposed One Plan for the Manawatu–Wanganui Regional Council (*POP*), in particular Policies 6-7, 6-7A and 13-2C, Table 13-2 and Rule 13-1 to which these proceedings relate.

7 I have been engaged by Fonterra Co-operative Group (*Fonterra*) to prepare this statement of evidence. The scope is set out below.

8 I have read the Environment Court's Code of Conduct for Expert Witnesses, and I agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence 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.

SCOPE OF EVIDENCE

9 My evidence will deal with the following:

9.1 The contribution of the dairy sector to the Manawatu-Wanganui regional economy, including its links to other parts of the economy beyond the farmgate.

9.2 The avenues available to dairy farmers to pay for the additional costs that the POP rules (*POP Rules*) will impose on them.

9.3 Whether the economic analysis underpinning the proposed rule change has been sufficiently robust to enable a proper assessment of economic impacts.

9.4 The choice of Nitrogen loss targets for regulating existing dairy farms and the adjustment period to transition to the new regime.

9.5 The lack of clarity around the components of a potential Nitrogen trading regime.

SUMMARY OF EVIDENCE

10 The dairy sector accounts for around 4% of the Manawatu-Wanganui regional economy (*the Regional Economy)* and is significant both regionally and nationally. The sector provides around 2620 jobs in the region. Only the retail sector makes more of a contribution to the regional economy.

11 Current options available to reduce Nitrogen loss – and particularly those with a moderate to high potential impact on Nitrogen loss – generally come with a net cost to farmers. Given the inability of farmers to pass on higher operating costs to consumers, the impacts of the costs imposed by changed POP Rules would be felt through lower profitability, postponed on-farm investment or slower debt repayment.

12 New entrants to the industry, or those who are performing in the lower quartile in terms of financial performance, have very limited cash surpluses available after paying for on-farm expenses, tax, drawings, rent and interest. They may find the potential costs of the POP rules more difficult to absorb than well-established farmers.

13 The profitability of the dairy sector has important implications for sectors that supply dairy farms – such as veterinary services, agricultural services and machinery repair – and for households who benefit as dairy income is spent and ripples through the regional economy.

14 Therefore any regulatory change that affects the dairy sector will have economic impacts well beyond the farmgate. This needs to be considered in any assessment of the efficiency and effectiveness of the POP Rules.

15 The version of the POP Rules submitted by the Manawatu–Wanganui Regional Council (*the Council*) in the evidence of Clare Barton (14 February 2012), has not been subject to a rigorous economic assessment. In addition, the earlier analysis prepared for Council to support the Notified Version of the POP (*NV POP)* was not robust in terms of its assumptions or methodology, and its conclusions are therefore questionable.

16 A revised cost/benefit analysis would be necessary to understand the full range of economic implications of the Council's latest version of the POP Rules (*Council Version)* as provided in Ms Barton's evidence of 14 February 2012.

17 If such an assessment is not provided, and there remains a lack of firm evidence on the relative costs and benefits of different approaches to improving water quality, my view is that there is a case for the POP Rules being applied on a more case-by-case basis. This would acknowledge the different circumstances of each farmer and would allow them to adapt their respective farming practices to improve water quality without facing unreasonable cost burdens.

18 I understand that certain appellants have raised the possibility of introducing a Nitrogen trading regime to the POP Rules. I am not aware that this has been assessed in any detail. Many of the conditions that need to be in place to promote an effective and efficient trading regime have not been provided for in the POP Rules.

INTRODUCTION

19 I have been asked to provide an economic perspective on the POP. I understand that the POP Rules and supporting policies aim to reduce non-point source Nitrogen discharges into water bodies including by:

19.1 setting Nitrogen leaching rates for dairy land use classes (*LUC*);

19.2 requiring the preparation and compliance with nutrient management plans;

19.3 potentially requiring the adoption of other management practices to help reduce Nitrogen loss;

19.4 providing for the ongoing monitoring of non-dairy land uses that affect water quality, including the potential for a future policy framework that may include Nitrogen trading; and

19.5 requiring the exclusion of livestock from rivers above a certain size and specifying management requirements for both new and existing dairy farms.

RMA context

20 Economics has an important role in assessing the POP Rules. The purpose of the RMA is to promote the sustainable management of natural and physical resources. Section 5(2) defines sustainable management as:

> managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while -
>
> (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
>
> (b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
>
> (c) Avoiding, remedying or mitigating any adverse effects on the environment.

21 There is established case law that highlights several distinct threads in the RMA which take what the Environment Court in the *Marlborough Ridge Ltd v Marlborough District Council* [1998] NZRMA 73 described as an "economic" approach to sustainable management. This approach is particularly apparent in section 5's enabling provisions for community well-being and section 7(b)'s regard to the efficient use and development of natural and physical

resources. Economic considerations are also relevant to section 104(1)(a), and economic efficiency may be a factor in sections 29 and 108 of the RMA.

22 Economic assessment can also assist with the section 32 analysis which requires consideration of alternatives, benefits and costs in deciding whether objectives, policies and rules are most appropriate for the achieving the purpose of the RMA.

23 In that context, my evidence outlines some key economic concepts and their relevance to the matters in issue in this case.

Efficiency, effectiveness and equity

24 Efficiency, defined as "*getting any given set of results from the smallest possible inputs, or getting the maximum possible output from given resources*",[4] has a central role in economics because it directly impinges on the inputs available for use and the volume of outputs that can be enjoyed.

25 Economics distinguishes "*production efficiency*" within single activities, "*allocative effi*ciency" that relates to efficient use of resources across activities, and "dynamic efficiency" that relates to maximising benefits from resources over time.

26 Efficiency is desirable in environmental management as much as in any other human activity. For instance, the economically efficient or optimal level of pollution is generally not zero, because the marginal cost of pollution abatement rises, sometimes quite steeply, the closer abatement comes to eliminating the pollution.

27 The general rule in economics is that an efficient level of any activity occurs where its marginal cost matches its marginal benefit. In other words, efficiency is at the point where the cost of an increment of abatement activity just equals the increment of benefit obtained from avoiding the pollution. Going beyond the optimal point towards zero pollution leads to diminishing marginal returns from successive increments of pollution abatement, and incurs an opportunity cost by diverting resources from other worthwhile uses.

28 Other crucial issues are the effectiveness of an action or policy – the extent to which it achieves what it sets out to do; and the equity (or fairness) of the resulting distribution of causes and consequences. While the effectiveness and efficiency of choices can be objectively measured, equity is a more subjective matter about which economics provides no clear guidance beyond identifying the distribution of impacts of particular choices.

29 With shared environmental resources, such as air, water and biodiversity, there is often no single "owner" and no-one is directly responsible for maintaining their quality, yet their degradation can

[4] Oxford Dictionary of Economics: Oxford University Press; New York.

affect everybody. In the absence of reliable private markets for environmental resources, government intervenes with public provision or regulation so the community pays collectively. This government role in environmental management has parallels in the economic theory of "externalities". Externalities occur when individuals' actions unwittingly affect third parties directly without invitation or compensation, as in the example of air and water pollution.

Economic wellbeing

30 The relevance of externalities to the RMA can be found in section 5's reference to enabling communities to provide for their "*social, economic and cultural well-being*". As an economist, I see the term "*economic well-being*" as synonymous with the technical term "*economic welfare*". Economic welfare is the notional sum of all individuals' well-being. It encompasses both the quantity of goods and services that communities consume and less tangible aspects of the quality of life they enjoy. Put another way, economic well-being is the sum of the community's consumption of tangible goods and services and its consumption of intangibles, such as quality of the environment. Externalities need to be given due consideration in assessing effects on well-being.

Understanding costs and benefits

31 In assessing the impact of achieving water quality improvements, the costs are generally more readily quantified than the benefits, but even in the absence of clear measures and values to attach to benefits, it is still possible to draw inferences as to the magnitude of effects. For instance, if benefits come from amenity and recreation opportunities, the economic value is likely to be higher in locations closer to population centres than those further away, so the economically optimal level of abatement is likely to vary with location.

Application of economic concepts to the POP Rules

32 This outline of economics and the RMA context provides the grounding for the rest of my evidence. Non-point source pollution such as Nitrogen loss, and run-off of other materials as a result of land use, creates externalities on the quality of water bodies that need to be addressed. But it is important that rules embodied in plans are designed with efficiency in mind so as not to unduly impede the generation of incomes and activity that support human well-being.

33 Dairying is an important resource management activity for New Zealand's economy. The activity harnesses natural resources of land, sunlight and water to create a tradable commodity, milk, which can be processed into numerous products for export. In so doing, it creates income for farmers and their farm workers, the suppliers of inputs into farming and the processors and marketers of its outputs. These sectors in turn spend and create income for their suppliers and product users.

34 In moving towards improving the quality of water bodies, a balance needs to be struck between restricting farm activities and achieving water quality improvements. In my opinion, that balance should be informed by consideration of the economic consequences of regulating land use activities and the benefit obtained from the quality improvement.

THE CONTRIBUTION OF THE DAIRY SECTOR TO THE REGIONAL ECONOMY

35 The POP Rules, depending on how they are designed and implemented, could impact heavily on the dairy sector in the Regional Economy. Given the importance of the dairy sector to the Regional Economy, including its links to other supplying and using industries in the economy, any negative impact on dairy production from the POP Rules is also likely to be felt well beyond the farm-gate.

36 My key point here is that it is important to take an economy-wide view of the potential impacts of the rule change. It is not sufficient to solely consider the direct impact on dairy production and profitability. This is because of the interlinkages in the Regional Economy that result in 'spillover' or 'ripple' effects that are felt in a number of other sectors and, eventually, by households.

Dairying in the Region

37 In the Manawatu-Wanganui region (*the Region)*, the dairy sector including dairy cattle farming and dairy processing employed 2,620 workers in the year to February 2011.[5] This equates to 2.7% of total regional employment, or one in every 37 jobs across the Region.

38 The value of Regional dairy production in the 2010/11 year was $802 million, based on milk solids produced and a per kilogramme price of $7.89.[6]

39 The Region accounts for 7.4% of national employment in the dairy sector, and 6.7% of the national value of dairy production, making it a substantial contributor to the overall New Zealand dairy industry.

40 As noted above, according to NZIER's regional database[7] the dairy sector accounts for around 4% of regional GDP, generating around $390 million of value added. It is second only to retail trade in terms of its contribution to the Regional Economy.

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[5] Statistics New Zealand Business Demographics Data. Accessed via 'Table Builder' at http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/business-statistics.aspx

[6] Data is from DairyNZ's 'New Zealand Dairy Statistics 2010-11' publication.

[7] NZIER's regional database is based on Statistics New Zealand's 2007 input-output tables, upscaled to 2010 and split by region using employment data.

41 The sector's wider contribution also needs to be considered. The dairy sector relies heavily on the animal feed, agricultural services, fertiliser, machinery repair and veterinary services sectors. The sector spent some $290 million on these intermediate inputs in 2010 according to NZIER's regional database.

42 While not all of these inputs will be sourced from within the Region, it is reasonable to expect that the agricultural services, veterinary services and machinery repairs sectors would be locally based and thus benefit strongly from the dairy sector's presence.

43 The presence of the dairy sector benefits households in the Region too. Previous research from NZIER indicates that, for every pay-out increase of $1 per kilogramme of milk solids, each person in the region – on average – benefits by around $140.[8]

Dairying in New Zealand

44 The dairy sector also makes a significant contribution to the national economy:

44.1 It directly contributes 2.8% of GDP – around $5.7 billion.[9]

44.2 It accounts for $12.3 billion of exports – almost 27% of New Zealand's total goods exports, and more than the combined exports of the next three largest export items (meat, wood and oil).[10]

44.3 It directly employs 35,230 workers across the country – around 1 in every 54 jobs.[11]

44.4 The average farmer spends well over half their income on goods and services to support on-farm operations, which generates flow-on effects throughout other sectors of the economy.[12]

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[8] NZIER. (2010). 'Dairy's role in sustaining New Zealand'. NZIER report to Fonterra and DairyNZ. http://www.fonterra.com/wps/wcm/connect/fcf7000044f43b8bb2b2fbac5c5d2692/NZIER+economic+report+to+Fonterra+and+DNZ+2010.pdf?MOD=AJPERES&CACHEID=fcf7000044f43b8bb2b2fbac5c5d2692

[9] Direct contribution share is taken from NZIER (2010). Nominal GDP for the year to September 2011 was $203.5 billion (Table 4.1, Statistics New Zealand GDP release for September 2011, published 22 December 2011. http://www.stats.govt.nz/browse_for_stats/economic_indicators/GDP/GrossDomesticProduct_HOTPSep11qtr.aspx)

[10] Tables 3.01 and 3.03, *Global New Zealand – International trade, investment, and travel profile: Year ended June 2011* http://www.stats.govt.nz/browse_for_stats/industry_sectors/imports_and_exports/global-nz-jun-11.aspx

[11] Statistics New Zealand Business Demographics Data. Accessed via 'Table Builder' at http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/business-statistics.aspx

[12] NZIER. (2010). 'Dairy's role in sustaining New Zealand'. NZIER report to Fonterra and DairyNZ.

45 These statistics show that a healthy dairy sector generates economic benefits for various other parts of the Regional and National economies. Conversely, if the dairy sector is struggling, this will have negative economic consequences for supplying firms and households. The dairy sector clearly has a material impact on the "economic wellbeing" of the Region.

46 Given the Region's contribution to the national dairy sector, it also plays a part in determining the economic wellbeing of New Zealand as a whole. So it is also true that any regulatory change that has significant cost implications for the dairy sector in the Region will also impact on the performance of the national dairy sector.

COST IMPLICATIONS OF REGULATING DAIRY FARMERS

47 A key point to note under this heading is that dairy farmers are price takers. The payout price for their milk is heavily influenced by global dairy prices. Individual farmers have little or no ability to pass on cost increases to buyers of their output. This implies that any cost increases will have to be absorbed on-farm, leading to reduced profitability or weaker balance sheets.

48 Based on data from DairyNZ, a representative Lower North Island dairy farm will have received $965,000 of income in 2010/11. Farm working expenses (wages, feed, fertiliser, pest and pasture management, vehicle costs, repairs, maintenance, etc) will have been $510,000, leaving a cash operating surplus of $455,000. Interest and rent payments of $175,000 then need to be deducted, as do tax ($45,000) and living expenses ($80,000).

49 The surplus of $155,000 is cash available for on-farm development, reducing principal debt and other investments.

50 According to DairyNZ's data, this representative farmer experienced negative surpluses (i.e. losses) in 2005/06, 2006/07 and 2008/09, so some of the recent surpluses will have been used to repair balance sheets.

51 While farms that are well-established may have strong enough balance sheets to absorb the potential costs of meeting the proposed rules and policies, it will likely come at the cost of debt retirement (and the reduced interest payments that will be foregone) or on-farm investment that would improve productivity. The latter may impact on the dynamic efficiency of the dairy sector.

52 Newer entrants to the dairy sector in the Region are likely to be less well placed to absorb any additional costs of meeting the proposed rules and policies. Their production levels may still be being ramped up to optimal operating efficiency and debt levels are likely to be higher than for well-established farms that have had years to build their balance sheets and pay down principal.

53 Data from DairyNZ on the lower quartile of Lower North Island farms (in terms of cash operating surplus) in 2009/10 shows that after working expenses, drawings, interest, rent and tax have been paid, just 32 cents remains from the initial $6.49 payout for capital investment or retiring debt.

54 Based on an average production level of 130,000kg of milksolids, this equates to around $42,000 available for investment or debt repayment. These lower quartile performers have little capacity to make significant investments in Nitrogen loss reduction initiatives.

Table 1: Income and expenditure of lower quartile representative dairy farm

Income/expenditure stream	$ per kg milksolids
Dairy Cash Income	6.49
-Farm Working Expenses	3.85
Cash Operating Surplus	**2.65**
- Interest and Rent	1.58
- Drawings	0.58
- Tax	0.16
Cash Available	**0.32**

ASSESSMENT OF ECONOMIC IMPACTS OF POP RULES

55 Given the importance of the dairy sector to the social and economic well-being of the Region, I am of the opinion that the POP Rules need to be carefully analysed in terms of their likely costs and benefits. I acknowledge that economic considerations are not the sole criteria for evaluating the POP Rules. But it is an important aspect. I agree with Ms Barton[13] that one of the "guiding principles" in considering the POP Rules and policies is that:

> *"There needs to be a realistic weighting of the economic impacts of a regime with the benefits there will be in relation to environmental outcomes. In addition rates of change should recognise social and cultural and economic matters relevant to the industries affected and the communities that rely upon those industries."*

56 In my opinion the economic analysis to date is not sufficiently rigorous to allow a proper evaluation of whether the POP policies and rules are the most appropriate for achieving their objectives, "having regard to their efficiency and effectiveness".[14]

[13] Para 10(c), p8, Clare Barton SOE, 14 February 2012.

[14] RMA s32(3)(b).

57 The August 2009 report by Rhodes and Neild[15] on the economic impact of early versions of the POP concluded that "*the flow-on impacts of the reduction in dairy farm output do not appear to be significant in terms of the total regional economy*" (p56).

58 This report was criticised by Matthew Newman on behalf of Fonterra.[16] Mr Newman considered that the report failed to identify whether the POP produced net benefits, as its assumptions were unclear and it did not provide a sense of the potential production losses or land price impacts for dairy farmers. Further, the analysis did not take into account administration, monitoring and enforcement costs or place an estimate on the expected value of the environmental benefits. I agree with Mr Newman's assessment.

59 The End of Hearing update by Rhodes and Neild[17] used different LUC Nitrogen leaching values for Table 13.2, examined Fonterra's proposed N-loss limits and considered different timeframes for the introduction of Rule 13.1 and the Dairying and Clean Streams Accord (*D&CSA*). It concluded that the per farm costs of meeting the D&CSA and the POP would be between $143,487 using Fonterra's proposed Nitrogen loss limits and $191,840 using the POP limits. Overall, the Council's estimate of the cost of implementing Rule 13-1 was $58 million across 428 dairy farm businesses.

60 The latest Council Version[18] has not been evaluated in economic terms. Specific costs are unknown. Putting the potential for a Nitrogen trading regime[19] to one side for the moment (I will address this later in my evidence), I would expect that a fully specified economic analysis of the Council's POP Rules to:

60.1 Estimate the costs of preventing cattle from entering some surface water bodies and their beds, and the costs of providing crossings over some rivers;

60.2 Estimate the direct costs to farmers of meeting the proposed Nitrogen loss limits in Table 13.2 (or alternative measures) and assess what impact this would have on farm profitability;

60.3 Identify the loss in dairy production across the region arising from these additional costs, including the potential 'closure' of marginal farms;

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15 Evidence of Anthony Rhodes and Jeremy Neild. 'Economic impacts of Proposed One Plan Limits on Nitrogen Leaching/Run-off and Other Rule Changes'. Section 42A Report. August 2009.

16 Newman, M. (2009). 'Statement of evidence for Fonterra Co-operative Group Limited'. 30 October 2009.

17 End of Hearing Evidence of Anthony Rhodes and Jeremy Neild. 'Economic impacts of Proposed One Plan Limits on Nitrogen Leaching/Run-off Values'. [undated].

18 Attachment 1, Clare Barton SOE, 14 February 2012.

19 Ms Barton's Proposed Policy 6.7Ad.

60.4 Consider the potential decrease in on-farm investment arising from reduced profitability;

60.5 Estimate the flow-on effects of this lower dairy production and investment for the wider Regional economy, taking into account the sector's upstream and downstream linkages to other sectors and households; and

60.6 Compare these direct and indirect (flow-on) costs with the expected benefits of the POP Rules in terms of improved water quality.[20]

61 In my view, a variety of scenarios should be evaluated, considering differing values of the Nitrogen loss limit per farm and alternative adjustment periods. For example, the scenarios listed in Roygard, Clark and McArthur[21] used to assess whether water quality can be achieved, should also be assessed from an economic perspective.

62 The methodology used by Rhodes and Neild[22] to estimate the flow-on effects of decreased dairy output was to apply output, value-added and employment multipliers. This technique is known as input-output analysis. They state that "*While input-output analysis has some significant limitations, it remains the most useful tool available*".[23]

63 I do not agree that it is the most useful tool. In fact input-output analysis has been largely discredited by many economists as a technique for policy evaluation, including by the Australian Bureau of Statistics (see quote below). Conversations that NZIER has had with central government officials in agencies such as Treasury, Ministry of Economic Development and Ministry of Agriculture and Forestry support this view. This is because this type of analysis is subject to a number of methodological problems such as:

63.1 It looks at a single point in time and so cannot capture how changes in the regional economy occur over time. This is important for thinking about the dynamic effects on investment of the proposed rule changes.

63.2 It assumes that all factors of production and intermediate inputs are infinitely available and that their prices do not change in response to a shock to the economy such as an

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[20] If quantifying the benefits of improved water quality is not feasible – and I acknowledge that there are practical difficulties in doing so – then all practical steps should be taken to achieve an assumed quality gain in the most cost-effective manner using different alternatives.

[21] Section 1C, paras 47-50, pages 5055-5057 of the Common Bundle.

[22] Evidence of Anthony Rhodes and Jeremy Neild. 'Economic impacts of Proposed One Plan Limits on Nitrogen Leaching/Run-off and Other Rule Changes'. Section 42A Report. August 2009.

[23] Page 1480, of the Common Bundle.

increase in dairy production costs. In reality, resources are scarce and their prices change in response to changes in the industry composition of the regional economy.

63.3 It assumes that extra output can be produced in one area of the economy without taking away output from other sectors.

64 As a result of these shortcomings, the Australian Bureau of Statistics[24] states (emphasis added) that:

> *While I-O multipliers may be useful as summary statistics to assist in understanding the degree to which an industry is integrated into the economy,* ***their inherent shortcomings make them inappropriate for economic impact analysis****. These shortcomings mean that I-O multipliers are likely to significantly over-state the impacts of projects or events. More complex methodologies, such as those inherent in Computable General Equilibrium (CGE) models, are required to overcome these shortcomings.*

65 There are additional complications in calculating regional multipliers. For the Region there are no official estimates of regional economic activity or the interlinkages between sectors. The discussion on the derivation of the regional multipliers in the Rhodes and Neild[25] report was almost non-existent, so it is difficult to have a great deal of confidence in their estimates.

66 A more modern and robust approach[26] to estimating the flow-on effects of a change in a regional economy is Computable General Equilibrium (*CGE*) modelling. CGE models are similar in structure to input-output models, but explicitly take into account the scarcity of resources and their prices. They can be dynamic in nature, so that

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[24] ABS. (2009). 'Australian National Accounts: Input-Output Tables - Electronic Publication, 2005-06 Final. http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/5209.0.55.001Main%20Features32005-06%20Final?opendocument&tabname=Summary&prodno=5209.0.55.001&issue=2005-06%20Final&num=&view=

Also see references in that paper, such as:

Department of Treasury and Finance Western Australia, March 2002, Economic Research Articles: "The Use and Abuse of Input-Output Multipliers", http://www.dtf.wa.gov.au/cms/uploadedFiles/ecoresearchart2002.pdf

ACT Auditor-General's Office, July 2002, Performance Audit Report: "V8 Car Races in Canberra – Costs and Benefits".

Also The Australia Institute. (2012), 'The use and abuse of economic modelling in Australia: Users' guide to tricks of the trade. Technical Brief No. 12.

[25] Evidence of Anthony Rhodes and Jeremy Neild. 'Economic impacts of Proposed One Plan Limits on Nitrogen Leaching/Run-off and Other Rule Changes'. Section 42A Report. August 2009, pp56-59.

[26] See references in footnote 18, plus, for example, Larry Dwyer, Peter Forsyth, and Ray Spurr, "Estimating the Impacts of Special Events on an Economy," Journal of Travel Research 43, no. 4 (May 1, 2005): 351-359, http://jtr.sagepub.com/cgi/content/abstract/43/4/351.

the effects of shocks to the economy can be traced over time, rather than in a single representative year.

67 CGE models have been used to assess the economic impacts of, *inter alia,* the ETS, irrigation schemes, and various industry growth strategies.

67.1 The ETS analysis[27] examined the economic impacts of various policies designed to reduce New Zealand's greenhouse gas emissions in order to meet its international obligations. It considered how industry output, GDP, wages, etc, adjusted to the imposition of a carbon price under a range of scenarios that covered a variety of transitional measures such as free allocation of emissions permits, a capped carbon price and a 2-for-1 submission arrangement, at differing carbon prices and assumptions regarding how other countries price carbon.

67.2 The irrigation scheme analysis[28] modelled the regional and national level economic impacts out to 2035 of funding and installing irrigation infrastructure in the Hawkes Bay and Canterbury.

67.3 Industry growth strategies[29] have been evaluated in terms of their direct returns to the industry in question and the wider 'spillover' benefits to the rest of the economy.

68 The regional economic activity data limitation mentioned above is also a problem for CGE models. While proxies based on employment patterns have been developed by Rhodes and Neild, some detailed calibration would be necessary to ensure that the model's database accurately represented the Regional Economy and its interlinkages.

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[27] See NZIER and Infometrics. (2009a). 'Economic modelling of New Zealand climate change policy'. Report to Ministry for the Environment. 20 May 2009. http://www.climatechange.govt.nz/emissions-trading-scheme/building/reports/economic-modelling/economic-modelling-of-new-zealand-climate-change-policy.pdf

And

NZIER and Infometrics. (2009b). 'Macroeconomic impacts of climate change policy: Impact of Assigned Amount Units and International Trading'. Report to the Ministry for the Environment, 22 July 2009. http://www.beehive.govt.nz/sites/all/files/NZIERInfometrics_Report.pdf

[28] See NZIER. (2010). 'A dynamic Computable General Equilibrium analysis of increased irrigation in New Zealand'. Report to Ministry of Agriculture and Forestry. http://www.maf.govt.nz/portals/0/documents/environment/water/irrigation/nzier-economic-impact-increased-irrigation.pdf

[29] See Deloitte. (2011). 'Red Meat Sector Strategy Report'. Report to Beef and Lamb New Zealand and Meat Industry Association. http://www.mia.co.nz/docs/Red%20Meat%20Sector%20Strategy%20Report%20-%20May%202011.pdf

69 In my opinion, it would have been more appropriate for a dynamic CGE model of the Regional Economy to have been built to test the economic impacts of the POP Rules. Such a model would have enabled a more accurate understanding of the regime's economic impacts. It should be noted that CGE models can be subject to criticism. This criticism relates primarily to cost and time. The models have higher costs to build and run and they are relatively data-intensive in nature. Having said that, bearing in mind the significance of the new regulatory regime (as noted earlier, under the NV of POP, costs to the dairy sector were predicted by Council to be $58 million), the cost and time of undertaking CGE modelling would have been proportionate in my view.

70 In short, it is important to weigh up the costs and benefits of the proposed rules and policies. Adhering to the principles of sound cost-benefit analysis will enable decision-makers to promote rules and policies that lead to the sustainable and efficient use of resources by evaluating alternative approaches to achieving desired objectives, as required by sections 5(2) and 32 of the RMA.

71 In this case, there is a lack of comprehensive or persuasive analysis along these lines in the material that I have seen to date. Much remains to be done in terms of analysing the POP Rules to determine if they meet the objectives of the POP in an efficient and effective fashion.

72 In the absence of better economic information, I consider that it would be prudent to adopt an approach to regulating for better water quality that is gradual in its implementation; allows farmers to adjust to the POP Rules in a fashion that does not cause them undue financial distress; and is monitored and reviewed regularly so as to ensure progress towards the stated environmental objectives while at the same time allowing the dairy sector to continue to contribute to the economic wellbeing of the Region.

73 The proposed requirements in the Decisions version of the rules (*DV POP)* would appear to present such an approach, with its emphasis on existing dairy farmers undertaking reasonably practicable steps to reduce Nitrogen loss on a case-by-case basis, and new entrants facing more stringent requirements.

COMMENTS ON CHOICE OF NITROGEN LOSS START POINTS

Using averages versus farm-by farm assessment

74 The Council Version rules require that existing dairy farms must not exceed Nitrogen leaching rates above those contained in Table 13.2, which are based on LUC classes, in order to be a controlled activity. I will refer to these rates as 'targets' in the following discussion. If existing dairy farms do exceed those targets, they must reduce their Nitrogen loss to the Table 13.2 values over a period of 3 years from their actual 2011 Nitrogen loss rate.

75 The choice of target plays a key role in determining the effectiveness of, and costs of adjustment to, the POP. If it is too high, then the regulations may not 'bite' and the desired environmental improvements may not occur. If it is too low, then farmers will bear the additional costs of compliance and there may be significant risks of non-compliance.

76 Regulators face a trade-off between administrative simplicity and regulatory efficiency when deciding on the appropriate Nitrogen loss target.

77 Efficiency in this context means ensuring that the right farms are captured by the rule, and by the right amount. This would ideally require consideration of the Nitrogen loss conditions faced at the individual farm level, rather than using the 'average' LUC figures. As Mr Newland's evidence[30] points out, all farming systems are different, with farmers making decisions to maximise the returns from their land through a range of technology and management practices. These decisions will be impacted on by the education and skill levels of the farmers, as well as their specific financial situation. Taking a one-size fits all approach fails to recognise these individual characteristics of farmers.

78 Taking a farm-by-farm approach would provide greater certainty to farmers that they are being treated equitably and that all relevant Nitrogen loss considerations for their particular property have been taken into account. This should improve buy-in and hence compliance from farmers. Assessing farms on a case-by-case basis appears to align closely to the provisions of the DV POP.

79 I acknowledge, however, that farm-level assessments come at a cost.

80 Using LUC-based maxima that average across farm types is administratively simple, but it lacks the flexibility that a more detailed approach would bring about. It fails to recognise that there will be heterogeneity amongst farms in any single LUC class, due to – for example – different ground cover or management practices.

The appropriate starting point

81 Another issue to consider is whether the 2011 year is an appropriate benchmark to determine a farm's Nitrogen loss starting point.

82 There are 3 broad options for determining the starting point:

82.1 A single year (Council proposes it be calendar year 2011 in this case);

82.2 An average over (say) the past 4 years (as initially proposed for the Lake Taupo *Variation 5* regime);

[30] Sean Newland SOE 14 March 2012 paragraphs 39 to 47.

82.3 The highest single year Nitrogen loss over a given period (as eventually agreed for the Lake Taupo *Variation 5* regime,[31] and which is what Fonterra proposes in this case).

83 Choosing the latest year as a benchmark may be inequitable if it was not a "typical" year for farmers in terms of rainfall, temperatures, feed use and overall production. For example, according to MetService,[32] rainfall in the Region was 35% higher in 2011 than the historical average, so it would be difficult to conclude that 2011 was a typical year.

84 Calendar year 2011 spans two production years. I have been advised by Fonterra that the 2010/11 production year (August 2010 to July 2011) was not a particularly good production year for dairying in the Region. In particular this resulted from a particularly wet period from August to October followed by dry months in October and November during which time there was little heat which resulted in poor grass growth. As a result of these climatic conditions usual farming practices were not used and 2010/2011 was not a typical Nitrogen loss year.

85 Taking an average over a given period (for example four years) addresses in part fluctuations in climate and weather variations that affect on-farm output and Nitrogen loss levels.

86 However, this approach has downsides. Consider a situation where a farmer may have made a decision to cut output significantly in the last two years during this period. The averaging option would push up the starting point Nitrogen loss estimate, which would not reflect that farm's current potential. This would seem to penalise the farmer for having made – at the time – what seemed to be economically sensible decisions to reduce herd size.

87 The converse situation, where a farmer has invested to expand herd size over the past (say) two years and seek economies of scale, will result in a 4-year average that is lower than what the starting point would be if it was based on just the last year of production. As a consequence, the farmer will be required to cut Nitrogen loss from an artificially low starting point, which may compromise the environmental objectives of the POP Rules.

88 The provisions in the Nitrogen trading regime in the Waikato Region allowed farmers to establish a 'Nitrogen Discharge Allowance' benchmark based on any single year period between July 2001 and June 2005.[33] This meant that they were given an allowance that

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[31] The grandparented number was to be fixed by calculating the amount of Nitrogen leached in the single best year (year with the highest leaching value) from farming activities on land between July 2001 and June 2005, see paragraph 13, pg 11, *Carter Holt Harvey and Ors v Waikato Regional Coun*cil, Environment Court Decision No. A12/008.

[32] http://www.metservice.com/towns-cities/palmerston-north

[33] Known as Variation 5 to the Waikato Regional Plan.

most appropriately reflected the level of production for which their farm had been established and for which previous investments had been made.[34]

89 The key point from this discussion is that the choice of target and starting point will have important implications for the effectiveness, efficiency and equity of the POP Rules. Consequently I would have expected to have seen more analysis about why 2011 is proposed by the Council as the most appropriate choice to determine existing farms' Nitrogen loss limit.

COMMENTS ON ADJUSTMENT PERIOD

90 The POP Rules in the Council's latest version of the POP are more stringent for new dairy farms (i.e. conversions) than for existing dairy farms. This weighting is appropriate in my view, as it reflects that there will be adjustment costs for existing farmers who have previously been operating lawfully, but who now face tighter regulatory settings – the rules of the game have changed for them.

91 This context raises the question of how long existing farmers should be given to reduce their Nitrogen loss levels from existing levels to the desired level. The Council's POP Rules require that the adjustment be made within 3 years in order to qualify as a controlled activity. No substantive justification has been made for the selection of this period.

92 Mr Taylor's supplementary evidence[35] provides some insights into the technical feasibility of meeting the POP Rules for a sample of dairy farms within a three year period. Mr Taylor states that for two farms it would be possible but with some difficulty and for three farms very difficult to comply with the Council's LUC regime within a three year period. Mr Taylor notes that the primary barrier is cost, which is unknown.[36]

93 If the Council's LUC approach were to work, it would be necessary to extend the analysis to look at the unknown financial feasibility of meeting the POP Rules. From that analysis, a range of step-down periods could be examined that would provide a better sense of the trade-offs between improving water quality and imposing costs on farmers.

[34] Duhon, M., J. Young and S. Kerr. (2011). 'Nitrogen trading in Lake Taupo: An analysis and evaluation of an innovative water management strategy'. Paper presented to NZARES Conference, 25-26 August 2011, Nelson.

[35] Peter Taylor SOE, 2 February 2012.

[36] Paragraph 32, p 4801.

94 The rate chosen for transitioning to a new regime involves a trade-off between:

94.1 making a short, sharp reduction in pollution, with short term costs, but potentially earlier gains for the environment; and

94.2 making a slower reduction path that allows easier adjustment but delays gains for the environment.

95 The latter 'softer' imposition is often preferred in a political economy sense as it allows more time to build a constituency of support, and is more feasible if reductions are not required immediately.

96 A softer transition path may also be sensible where there is some doubt about the likely rate of technological change in a sector. For example, if Nitrogen loss reduction technology is not yet available at an attractive cost to farmers, but it is expected to be so in the future, Nitrogen loss may be more likely to occur without the need for hard regulation in the future. That is, there may be technological developments coming on-stream in coming years, such as those outlined in paragraph 75 of Mr Ledgard's evidence, that are both economically attractive to implement and environmentally effective in terms of reducing Nitrogen loss. Table 1 of Mr Ledgard's evidence outlines a number of options to reduce Nitrogen loss and Table 2 sets out estimates of the annualised net costs and effectiveness of a range of mitigation measures available for reducing Nitrogen losses to water.

97 International experience suggests that practical approaches to sustainable development have tended to be incremental and tentative, reflecting political economy challenges and uncertainty about technological change.[37]

98 For example, domestic experience with the ETS also suggests that a gradual approach to the full pricing of an externality might be desirable. The ETS contained various design features that aimed to ease the initial burden on emitters of greenhouse gases. The transition measures – which included free allocation of emissions permits, a capped price and a 2-for-1 obligation for a limited period – reflect the desire of regulators to avoid imposing prohibitively high costs on businesses, especially those exposed to international competition. The free allocation can also be justified as recognising that firms will have made lawful investments in the past (in the context of the regulation applying at the time), that may now provide lower returns as a result of the ETS, and that they should be compensated for this.

[37] OECD (2006) "Good practices in the national sustainable development strategies of OECD countries", Organisation for Economic Co-operation and Development, Paris.

99 I note that the Lake Taupo Variation 5 case also adopted a 'softer' imposition. As noted earlier, the regime adopted a grandparenting regime for existing farmers. In addition, a substantial public fund was set up to facilitate the reduction of Nitrogen entering the lake, recognising the 'shared' nature of the environmental resource involved and its competing values. I understand that Central Government, Environment Waikato and the Taupo District Council committed $81.5m over a 15 year period towards the clean-up.[38] No such public input is proposed in this case – the clean-up burden in placed solely on the farmers.

100 With the above comments in mind, further analysis to assess the costs and benefits of differing adjustment periods for existing dairy farms, and the nature of the reductions required in each period, would be useful in determining the overall efficiency and effectiveness of the proposed rule. In my view, the evidential basis for the Council's proposed three year transition is insufficient to conclude that the transition is a certain or robust solution. This insufficiency is illustrated by Mr Taylor's acknowledgment of the difficulties for some farmers in meeting the transition and the associated financial uncertainties.

101 In the absence of further analysis, my view is that a more flexible approach is necessary. The approach should allow at least some consideration of the feasibility of each farm meeting the given target and the cost relative to the environmental benefit. As Mr Ledgard's evidence[39] outlines, most current options available to farmers to reduce Nitrogen loss in a significant fashion come with a net cost. A more in-depth analysis of these costs and benefits would assist in avoiding situations where the POP Rules make it "very difficult" for some farmers to comply, potentially compromising their profitability, ability to retire debt or to invest on-farm, along with the wider negative economic impacts of these outcomes.

COMMENTS ON NITROGEN TRADING REGIME

102 The Council Version contains a section (6.7A(d)) which states:

> "*As additional land use activities are regulated then the policy framework may include mechanisms to provide for Nitrogen trading*".[40]

I also understand that certain appellants favour including a Nitrogen loss trading regime in the Plan.[41] It is not clear whether any future Nitrogen loss trading regime would replace the existing regulations specified elsewhere in Chapter 13 or would be additional to them.

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38 See paragraph 7, pg 9, *Carter Holt Harvey and Ors v Waikato Regional Council*.

39 Stewart Ledgard, SOE, 14 March 2012, paragraphs 59 – 77.

40 Clare Barton SOE, Attachment 1, p. 4959, of the Common Bundle.

41 Paragraph 14(d), Memorandum of the Parties dated 28 October 2011.

103 A Nitrogen loss trading regime would be a significant inclusion at this relatively late stage of the process. There has been no analysis of the proposal from an economic perspective.

104 While there is some experience with Nitrogen loss trading in New Zealand from the Lake Taupo Variation 5 scheme, the process by which it was introduced was very different from what we have seen to date in the POP.

105 Stakeholders in Taupo were first notified that a trading regime might be required to manage Nitrogen loss in 2000. The final decision on the scheme was not released until mid-2011. In between those dates there were "*several iterations and years of review in the Environment Court*".[42]

106 While a decade-long process may not be necessary for the POP, it is reasonable to expect that the introduction of a trading regime would be subject to considerable scrutiny and economic and scientific analysis to determine its likely effectiveness and efficiency in achieving a set environmental objective.

107 The reference to a Nitrogen trading scheme in the POP Rules as it currently stands is so vague that it is not possible to comment on its likely efficiency or effectiveness in any detail. My below comments therefore touch briefly on the broad requirements for a trading system to operate effectively and efficiently.

108 In general, economists agree in theory that using prices to address the presence of production externalities will result in a more efficient allocation of resources. The idea is that farmers who wish to discharge more than their allocated amount of Nitrogen can buy the allowances of other farmers who can reduce their Nitrogen loss at lower cost. The additional cost of buying the Nitrogen allowances for the purchasing farmer pushes the marginal cost of production closer to its marginal social cost (that includes the cost of Nitrogen loss), thus improving efficiency.

109 But "*the potential efficiencies from trading programs can only be realized if programs are appropriately structured and implemented*".[43]

110 It is possible to draw on the experience of the 30 or so Nitrogen loss trading regimes in place worldwide, and the recently-implemented Lake Taupo scheme, to identify the conditions under which such a scheme might be efficient and effective. I emphasise the word "might" here, because there is little empirical evidence to suggest

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[42] Duhon, M., J. Young and S. Kerr. (2011). 'Nitrogen trading in Lake Taupo: An analysis and evaluation of an innovative water management strategy'. Paper presented to NZARES Conference, 25-26 August 2011, Nelson.

[43] World Resources Institute. (2009). 'Water Quality Trading Programs: An International Overview'. WRI Issue Brief, March 2009.

that these schemes have worked effectively or efficiently to date as most schemes are relatively new.

111 An efficient and effective Nitrogen loss trading regime would likely feature:

111.1 A clearly stated and scientifically well-justified cap on Nitrogen loss;

111.2 A definable unit of Nitrogen loss entering the relevant water body (with due adjustment for equivalency between that entering at upstream and downstream locations) that can be monitored and made subject to trade;

111.3 A mechanism for distributing entitlements under the cap to those who need it, which may involve auctioning or sale of units or grand-parenting allocations in proportion to existing records of Nitrogen loss;

111.4 A sufficiently wide market of potential participants to enable trade and exchange to emerge at least cost;

111.5 Institutional arrangements in place to register entitlements, monitor transactions and reconcile market activity and physical inventory changes; and

111.6 Buy-in from stakeholders, including local government, those being regulated, other water users, and other stakeholders.

112 There is minimal discussion of these features in the POP as:

112.1 There is no stated cap on Nitrogen loss which is scientifically well-justified;

112.2 A common unit for trading has not been defined;

112.3 There is some discussion of what appropriate Nitrogen loss levels might be for different types of LUC, but no discussion of whether discharge allowances would be auctioned or grandparented;

112.4 The market has not been defined beyond the vague suggestion that a trading regime may be used "*Where additional land use activities are regulated*"[44];

112.5 There is no sense of what institutional framework might be put in place to monitor trading activity and measure progress towards the Nitrogen loss objective;

[44] Clare Barton SOE, para (d), p. 4939 of the Common Bundle.

112.6 There has been no targeted public consultation on the costs and benefits of a trading regime.

113 As long as there is uncertainty about the likely design and implementation of any Nitrogen loss trading regime, farmers will be uncertain of the future regulatory environment under which they will be operating. This is likely to lead to deferred on-farm investment, which has potential negative efficiency and flow-on implications for the wider economy.

114 This point is summarised well by Kira Fabrizio of Duke University in the United States in relation to the uncertain prospect of a carbon price being introduced:[45]

> [F]irms from multiple industries have expressed frustration with uncertainty about future federal regulation of carbon emissions. Companies claim they are paralyzed because, with ongoing uncertainty about what a carbon policy might entail, they cannot determine which strategies and (policy-specific) investments are optimal. Until policy makers are able to enact legislation and credibly commit to maintaining the policy they adopt, firms will be less willing to invest in developing and adopting new technologies.

115 This is precisely what was experienced as the Lake Taupo scheme was designed and reviewed: "*many farmers [were] stalled in uncertainty, unsure of whether to invest in farm improvements and unsure of their future viability in the catchment*".[46]

CONCLUSIONS

116 I am of the opinion that more economic analysis is required to assess the costs and benefits of the latest version of the Council's POP Rules around Nitrogen loss.

117 This analysis needs to:

117.1 consider various scenarios around the key parameters of the POP Rules;

117.2 use up-to-date and robust modelling techniques; and

117.3 take into account the wider economic impacts of rules that impose costs on dairy farmers.

[45] Fabrizio, K. (2011). 'The Effect of Regulatory Uncertainty on Investment: Evidence from Renewable Energy Generation'. http://www-management.wharton.upenn.edu/henisz/msbe/2011/4_2_Fabrizio.pdf

[46] Duhon, M., J. Young and S. Kerr. (2011). 'Nitrogen trading in Lake Taupo: An analysis and evaluation of an innovative water management strategy'. Paper presented to NZARES Conference, 25-26 August 2011, Nelson.

118 Until this analysis is carried out, I do not believe that there is sufficient cost-benefit information to make firm conclusions regarding the economic impact of the POP Rules.

119 Having said that, what is known from a relatively high level is that:

119.1 The costs of the new regime to dairy farmers and to the industry as a whole appear likely to be non-trivial;

119.2 The impact of the costs may cause a negative shock to the regional economy, although the extent of that shock is unknown due to a lack of robust economic modelling;

119.3 Applying Mr Taylor's conclusions regarding the relative difficulty of meeting the Council's POP Rules (where difficulty is dependent on unknown financial costs), the costs of compliance may – for at least some farms - result in lower profitability, impaired ability to retire debt and delayed on-farm investments that retard productivity. The potential costs could be particularly problematic for new entrants or those in the lower quartile in terms of financial position.

120 In my opinion, in the absence of better economic information, regulating for better water quality should be gradual in its implementation allowing farmers to adjust to the POP Rules without undue financial distress. The regime can be monitored and reviewed regularly so as to ensure progress towards the stated environmental objectives while at the same time allowing the dairy sector to continue to contribute to the economic wellbeing of the Region.

121 On balance, the DV POP appears to provide a degree of flexibility that may be warranted given the lack of comprehensive evidence of the costs and benefits of the proposed changes.

122 The late inclusion in the POP of a possible Nitrogen loss trading regime is a significant change that warrants its own economic analysis. As it currently stands, the proposed reference to a trading regime may create some confusion and uncertainty amongst stakeholders in the region. This in turn may lead to reduced investment as they wait to see how discussions progress.

John Stacey Ballingall
14 MARCH 2012