BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of proposed Plan Change 2 for the One Plan

JOINT WITNESS STATEMENT OF EXPERTS

FARM-SCALE ECONOMICS

27 July 2020

INTRODUCTION

1. This joint witness statement (**JWS**) relates to Farm-Scale Economics.

2. This joint witness statement relates to proposed Plan Change 2 (**PC2**) of the One Plan by examining the on-farm economic impacts of a range of 'GMP', 'BMP' and 'additional innovations', where these are adopted or required (to varying degrees) to secure consent for IFLU activities under PC2.

3. The expert conferencing was held on 27 July 2020 at Palmerston North. It follows expert conferencing on 21 and 22 July 2020 on farming and growing management practices and farm systems modelling (Topics 1 and 2). At the time farm-scale economics (Topic 3) was not canvassed due to time constraints. This JWS now addresses farm-scale economics.

4. Attendees at the conference were:

   (a) **Dr Graeme Doole (via Zoom)**;

   (b) **Stephen McNally;**

   (c) **Dr Anne-Maree Jolly (not in capacity of expert); and**

   (d) **Stuart Ford (via Zoom).**

CODE OF CONDUCT

5. We confirm that we have read the Environment Court Practice Note 2014, and in particular Appendix 3 – Protocol for Expert Witness Conferences, and agree to abide by it.

PURPOSE AND SCOPE OF CONFERENCING

6. The purpose of conferencing was to identify, discuss and highlight points of agreement and disagreement on and farm system economic issues arising from PC2, and the submissions received on the proposed plan change.

7. In addition, questions arising from pre-hearing meetings between submitters and Horizons have been circulated for our consideration as part of conferencing. We have addressed those relevant to our areas of expertise.

8. Due to the relevance of farming and growing management practices and farm system modelling in the assessment of on-farm economics, we have had regard to the JWS dated 21 and 22 July 2020. We all participated in that conference and signed the JWS.

9. The scope of the issues covered at this conference included:

   (a) methodology;

   (b) on-farm costs and benefits of adopting the range of GMP, BMP, additional innovations;

   (c) variation of costs across IFLU;

   (d) importance of capital gain for financial returns; and

   (e) importance of debt and asset ratios.

KEY FACTS AND ASSUMPTIONS

10. G Doole and S Ford agree that an enterprise approach to methodology should be used and disagree with the use of a Gross Margin approach used by S McNally. There are common points in methodologies, but there are also points of contention.

METHODOLOGIES AND STANDARDS

11. WSP / Horizons provided, prior to caucusing, the methodology and modelling used to inform the discussions for caucusing. G Doole and S Ford discussed their approaches during caucusing but did not circulate any documents detailing their approaches

12. Following an explanation of the methodology adopted by WSP, and discussing of G Doole and S Ford's approach, the experts do not agree with the approach taken by WSP and make the following comments as detailed in Part 1 of Annexure A:

AGREED ISSUES

13. Refer to Annexure A.

DISAGREEMENT AND REASONS

14. Refer to Annexure A.

PRIMARY DATA

15. None to note

RESERVATIONS

16. None to note

Date: 27 July 2020

Dr Graeme Doole

Stephen McNally

Stuart Ford

ANNEXURE A

In the matter of Proposed Plan Change 2

Expert conferencing – Farm-Scale Economics

Issue	Statements	Agreed Position	Disagreements, with reasons
Part 1: Methodology	**WSP methodology tabled** SF & GD: Full enterprise approach rather than Gross Margins analysis approach should be used. The debt position (and many other expenses) are relevant and should be included. GD: The view of the farm asset and how it is affected by the policy affects farm viability. In my experience, land values and viability will be adversely affected by nitrogen limits. SF to SMc: Stephen's methodology may be valid for change, but not for representing whole farm viability.	There are common points in methodologies, but there are also points of contention: SMc has chosen to set aside a set of variables that he considers are not directly influenced by the change process. SMc agrees. Stepped aside from asset value because it was difficult to determine the overall enterprise value and the impact on land value has already occurred as N limits already apply.	

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	SMc: Nitrogen limits already apply, whether they have been consented or not. Growers are seeking certainty under agreed approach. GD: As long as we are changing the table, I believe that new uncertainty is created and will affect the asset price. GD, SF: Stephen's methodology is not suitable for informing regional modelling. Gross margin approach is unsuitable for true picture of solvency. Not considering insolvency will lower the estimated regional cost, which provides a biased view. GD & SF, say that using an enterprise approach is most relevant. GD: Capital structure has not been dealt with. Farm solvency relies on capital structure and has not been considered. SMc: acknowledges that using gross margins doesn't model farm solvency, but it has not been ignored. It has been set aside. GD: A change in cash flow is one thing but a change in farm business and land returns (asset and debt) both need to be considered.	SMc agrees that gross margin does not look at solvency. NZIER are going to be doing regional modelling, not WSP.	

Issue	Statements	Agreed Position	Disagreements, with reasons
	Graeme Doole Methodology Our focus is on individual enterprise effects across affected farms. Generated synthetic population. We have database of approx. 1,000 farms, going back a decade. How they change their production decisions across time, based on milk prices and climate. We represent both profit and its constituent parts as well as the capital structure of the farm, e.g. debts and asset. We study a 30 year period and study how the financial position changes over time under different policy scenarios. (Ten years' data and projecting 20 years) SMc: Can this be boiled down to the level of specific farms affected? Individual confidentiality prevents going down to individual farms. Synthetic farms represent that as much as possible. Focus at lower north island level. Statistical tests generating distributions. Introducing N limits introduces a measurable effect. Theory and empirical evidence – this relationship between N limits and asset value does exist		

Issue	Statements	Agreed Position	Disagreements, with reasons
	Change in operating profits - that is not what we are showing in methodology used by WSP / Horizons SMc opinion, based on brief received, is about the plan Change that adjusts the table to create a regulatory pathway for unconsented farms that didn't meet the previous limits as a discretionary consent They are already regulated – this is providing an attractive pathway for those farms. Prior to this plan change, that wasn't available to them and this must provide an upswing for them. GD: based on SMc modelling, gives the impression that there is a decline in land value when NPV is negative. The value of land is often driven by its long term profitability and negative NPV values in WSP modelling suggests that an erosion of asset price will occur. What is driving the loss of profitability for unconsented farms is mitigation costs.	SMc: That is why the WSP NPV numbers presented as the cost of change are negative or positive. When they are positive, they infer an increase in land value. GD agrees with this statement. GD then clarified that if we consider all of the costs facing the enterprise, the NPV generated may be negative and may affect land values which could decline, even with a positive NPV generated using gross margins.	SMc does not currently have enough data to either agree or disagree with this statement.

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	Costs are also being incurred on consented farms, but these have not been modelled.		
	Stuart Ford methodology SF: My approach will be to try to gauge the effect of trying to achieve the 14.2 table across a range of different enterprises. My methodology is that I will have access to NZ GAP data which will show the size of the property and output (of crop mix) of farms in catchment area (of unconsented farms). With knowledge of that data, I will create a range of representative enterprise models which takes it to EBIT. I will model those representative enterprise models across the range of options in terms of meeting table 14.2. I will be using OVERSEER / APSIM models to determine the unders and overs of achieving the targets in table 14.2. I will then be imposing the mitigations that are required or are possible on each of those models. Then I will be able to represent the impacts on an enterprise of achieving the required N reductions. I will then be able to rate that up to represent the total horticulture impact.		

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	SMc to SF: This is already a regulated market – assuming that this is Table 14.2 – can you differentiate between Table 14.2 and Table 14.2 revised. SF: I will be working from the position that they have ignored the provisions and be modelling the change of where they are now and getting to 14.2 as proposed SMc: EBIT - will include depreciation? SF: Yes. SMc to SF: Are you taking a single year approach? SF: I haven't considered a multiple year approach, as I am not convinced that it's valuable. My approach is a with or without approach which doesn't model the transition time. Some of my mitigations will be system changes, i.e. to drop high N leaching crops out. SMc: Horowhenua vegetable production – very little info available on how the farms are set up – structurally / ownership, etc. SMc to SF: Are you using the current step or future steps? SF: Depends on view of the plan – it's a ten year plan. I will look at that.	SMc & GD also use a with or without approach but explicitly consider a transition time.	

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Topic 3 – Farm-Scale Economics **Part 2: Questions circulated for caucusing**			
What are the typical on-farm costs and benefits of adopting the range of GMP, BMP or additional innovations identified in the JWS for farming and growing management practices and farm systems modelling (21 and 22 July 2020) within Horizons region for the four types of intensive farming land use – under the following scenarios: (a) Under the operative (pre-PC2) One Plan, assuming compliance is required with Table 14.2 and N leaching loss from no IFLUs exceed the operative Table 14.2 limits; (b) Under PC2, assuming compliance is required with recalibrated Table 14.2 and N leaching loss from no IFLUs exceed the recalibrated Table 14.2 limits; (c) Under PC2, assuming N leaching from some IFLUs (those who cannaot achieve the Table 14.2 limits using GMP) exceeds the recalibrated Table 14.2 limits in the following scenarios: i. All those above Table 14.2 limits reduce N leaching by 10% from the baseline agreed in the Farming and Growing Management Practices joint	a) A significant cost will be the viability of the asset SMc: Yield vs sale price Cost of inputs Cost of labour Machinery Cost of maintenance Cost of monitoring Change in fertiliser Cost of interventions, e.g. stand-off pads, etc. Cost of borrowings Asset value / depreciation / taxation Overhead costs, e.g. administration, property ownership costs – rates, insurance. Direct cost of reduced land area to meet the revised limits will result in reduced production. More land required to target no less than the same yield.	All are agreed that every farmer will make his own decision.	SMc: The assumption that for a 10ha farm, a decision to reduce cropping area and not decrease the yield and not buy more land to target no less than the same yield can be modelled. This is modelling the opportunity cost of reduced land area. Accounted for in the list of items that we are considering GD: Dairy - Revenue per ha will typically decline

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witness statement (question (k) above). ii. All those above Table 14.2 limits reduce N leaching to 75th percentile number for each target water management subzone as identified in the Farming and Growing Management Practices joint witness statement (question (n) above) iii. All those above Table 14.2 limits reduce N leaching by 10% or reduce to the 75th percentile (whichever results in the lowest N leaching rate) iv. All those above Table 14.2 limits adopt GMP (but are not required to do any additional or further N reduction) (Please specify the assumptions made for each scenario)	SF: All revenue and costs which fully represent the whole farm enterprise should be included in the analysis Impact on four scenarios. SMc: Null hypothesis – no more impact than any other event facing farmers. Even at gross margin level it is shown that in general, for CVG, less money will be made per ha. There will be some cost savings and there will be some cost increases in dairy. Extremely difficult position to model down to individual farm model where there is no representative farm to model. Modelled Cost per hectare per year. Difference between now and 20 years' time. SMc: Data is from Terry's model for dairying. WSP has used a Standard deviation approach (costs varying by 10% for hort and dairy, yield by 12.5% and 25% on sale price applied to vegetables). GD: Variances across time with price. Has SMc modelled reliability on the relationship between milk price and cost?		GD & SF: It is important to consider the additive effects of the different events facing farmers. In this way, we can be aware of the straw that breaks the camel's back. GD: Variation in the WSP model is unstructured and not data driven – gives an illusion over point estimate.

Issue	Statements	Agreed Position	Disagreements, with reasons
	SMc: Co-variances take this into account. Doesn't say why, but does model the changes. It's not precluded but not detailed as a conscious decision. Benefits: Revenue: Sale of goods from farm.		Unless we capture rich relationships we are missing a core part of the policy assessment.
How do these costs vary across the diverse farms found within each intensive land use?	SMc: Greatly. Farmers make daily decisions based on their current information.	All experts agree that costs vary greatly on an individual farm and across farms	
An important part of agriculture is financial returns from capital gain. How are asset values affected under different regulatory approaches?	GD: established above. Divergent views, dependent on data used. SMc: Capital gain is only realised upon sale of property. Ability to service debt is an important part of feasibility, profit and loss. GD: Capital gain is (on average) 2/3 of the profit of the farm. Debt also needs to be considered. Modification of a policy instrument is making us less resilient, due to the economic cost associated with the change. Equity will be affected and this reduces the size of one of our important financial buffers on farm. SMc: This is not introducing a policy instrument. It already existed.		The question of whether it is a modification of policy or more than that is not agreed between experts.
Agricultural production typically requires high debt loads for a business	See previous discussion.	Experts agree that there is an impact.	

Issue	Statements	Agreed Position	Disagreements, with reasons
due to the high price of land. How are the debt to asset ratios of diverse farms affected by different regulatory approaches within each intensive land use?		In our methodologies, we have different approaches to the way of representing it.	