BEFORE THE INDEPENDENT HEARING PANEL APPOINTED BY WAIKATO REGIONAL COUNCIL

IN THE MATTER	of the Resource Management Act 1991 (the Act)
AND	
IN THE MATTER	Submissions made on Proposed Waikato Regional Plan Change 1 – Waikato and Waipa River Catchments

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STATEMENT OF EVIDENCE OF STUART JOHN FORD FOR HORTICULTURE NEW ZEALAND

15 February 2019

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SUMMARY AND CONCLUSIONS

Summary

1. The type of soils which are preferable to grow commercial vegetable production crops in are deep, free draining soils. These soils are relatively limited across the Auckland and Waikato Regions.

2. There is no doubt that the New Zealand commercial vegetable production sector provides an essential service to the country by supplying vegetables to our predominantly urban population throughout the year at an affordable cost.

3. The alternative source of these vegetables would involve significant transport costs either locally or internationally which would result in the price required to be lifted far above the current cost and in some cases make them too expensive for the majority of consumers.

4. It is, therefore, my opinion that the economic advantage of continuing to allow access for these growers is compelling and that this fact should be recognised within the values of PC1.

5. The accuracy of the modelling of the commercial vegetable production sector is a very inaccurate depiction of reality. This is particularly if the results of OVERSEER modelling of the commercial vegetable production sector is to be combined into a model which is aimed at optimising the water quality.

6. The Healthy Rivers Wai Ora (**HRWO**) model effectively ignores the array of mitigation techniques which are available to the commercial vegetable production sector because these are not able to be modelled in Overseer.

7. What we have in the HRWO is modelling data from three different sectors which each have major problems with the accuracy of the modelling data. This in turn leads us to have considerable uncertainty as to the accuracy of the HRWO modelling and therefore the conclusions that can be drawn from that.

8. It is difficult to determine exactly how the results of the HRWO modelling influenced the CSG in their decision making because there is no clear relationship between the HRWO results as presented and the final form of PC1.

9. It is therefore my opinion that the package of measures set out in the HortNZ submission which includes: a separate consenting pathway for commercial vegetable production; a multi contaminant approach; and a catchment collective approach

are appropriate to ensure the special value of commercial vegetable production is appropriately recognised.

10. It is very important that the economic advantages of adopting a catchment collective approach are fully considered and understood. It is my opinion that it is essential that this is a matter that is considered as one of the available options and then tested through a section 32 analysis to test whether it is the most appropriate option through an efficiency and effectiveness test as detailed by the RMA.

Conclusions

11. It is my opinion that the commercial vegetable production sector is a nationally important food production service and this status should be recognised in the values of PC1.

12. The inaccuracies in the data used in the HRWO modelling cause considerable uncertainties as to the accuracy of the results that it reported.

13. It is my opinion that adopting a catchment collective approach as detailed in the HortNZ submission deserve to be considered appropriately through a section 32 analysis.

14. It is my opinion that the submission of HortNZ which required that retention of the controlled activity status for existing production plus the additions of an objective framework and a discretionary activity status for new commercial vegetable production are appropriate to ensure the special nature of commercial vegetable production are appropriately recognised.

INTRODUCTION

Qualifications and experience

15. My full name is Stuart John Ford. I am a Director of The AgriBusiness Group and work as an agricultural and resource economist based in Christchurch. I have a Diploma in Agriculture and Bachelor of Agricultural Commerce from Lincoln University and have undertaken post graduate studies in Agricultural and Resource Economics at Massey University.

16. I am a member of the New Zealand Agriculture and Resource Economics Society and the Australian Agriculture and Resource Economics Society. I am also a member of the New Zealand Institute of Primary Industry Management.

17. I have spent 37 years as a consultant in the agricultural industry, with the last twenty years specialising in agricultural and resource economics and business analysis.

18. I have undertaken a wide range of economic impact and cost benefit assessments of proposed statutory planning proposals.

19. I have prepared evidence and presented it to District and Regional Council Hearings Panels as well as the Environment Court and Special Hearing Panels on Conservation Orders.

Code of Conduct

20. While this is not a hearing before the Environment Court, I can confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses produced by the Environment Court and have prepared my evidence in accordance with those rules. My qualifications as an expert are set out above.

21. I confirm that the issues addressed in this brief of evidence are within my area of expertise.

22. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Role in PC1

23. I have been asked to prepare evidence for HortNZ in support of their key submission points on PC1.

24. I have worked as a consultant economist to HortNZ for approximately the last seventeen years in my specialist field which is economics and resource use, which in this case resolves around the modelling of nutrients and their discharges.

25. I undertook production of the report “Nutrient performance and Financial Analysis of Lower Waikato Horticulture Growers” for

HortNZ and the Waikato Regional Council (**WRC**) which was used by the WRC in the production of the Healthy Rivers Wai Ora (**HRWO**) model.

26. I then assisted Chris Keenan in making a presentation to WRC in relation to HortNZ's concerns about the inadequacies of Overseer in terms of its modelling capabilities to accurately model a commercial vegetable producers operation and about HortNZ's preference for the use of APSIM to enable a more accurate prediction of the discharge of the various nutrients.

27. I have assisted HortNZ in the modelling undertaken by Jacobs by supplying them with the results of my earlier report which had been updated to the results that were produced by the latest version of Overseer.

28. I have taken part in meetings with WRC staff in relation to the opportunity to create a range of proxy nutrient discharge predictions for commercial vegetable producers using APSIM and the ability for the commercial vegetable producers to have their involvement in the GAP scheme accepted as a Certified Industry Scheme under PC1.

29. I attended the PC1 workshop and expert conferencing that was looking at the Economic and Scientific modelling.

Purpose and Scope of Evidence

30. The purpose of my evidence is to comment on the issues raised in the s42A report by the Officers relevant to my area of expertise.

31. I would like to say that it is very difficult to comment specifically on the Officers' comments because the Officers do not address the majority of HortNZ's submissions directly but rather include them within a general group of submitters that have raised similar but not identical concerns. In addition, the hearings have been structured to separate out the policies and methods from the values and objectives. Unfortunately, this approach appears to have missed the key points made in the submissions by HortNZ, particularly its concerns about the potential impact that PC 1 will have in relation to commercial vegetable producers and its suggested alternative package of mechanisms. This is a matter dealt with in more detail the evidence of Miss Deverall, Mr Keenan and Mr Hodgson.

32. I should also point out that this evidence has been provided to you in advance of the opportunity to partake in the Forum 2 Commercial Vegetable Production expert conferencing.

33. In my evidence I refer to:

    (a) The importance of recognising the special nature of commercial vegetable production in the Auckland and Waikato regions.

    (b) The treatment of commercial vegetable production in the HRWO modelling and the resultant decisions made by the **CSG**.

    (c) The use of Overseer in relation to commercial vegetable production.

    (d) The economic advantages of adopting a sub catchment approach.

34. In preparing my evidence I have reviewed the materials listed in **Appendix 1**.

RECOGNITION OF THE SPECIAL NATURE OF COMMERCIAL VEGETABLE PRODUCTION

35. At p 230 in the Section 42A Report the Officers' state that:

> *"A number of submitters support the primary production value but seek amendments to PC1 to provide for this value, specifically to recognise the importance of the Pukekohe and Pukekawa commercial vegetable production systems in the national domestic food chain. Officers consider that the submitters' concerns are better addressed via the objectives, policies and rules and that no amendments are necessary to the value provisions. The primary production value already states that the rivers are regionally and nationally significant for horticultural purposes."*

36. I note that a number of changes to formatting of the objectives are suggested by the Officers which Mr Hodgson comments on in more detail. I agree with Mr Hodgson that the proposed changes do not add to the clarity of the objectives nor do they address the submission point made by HortNZ.

37. In addition, in the absence (at this stage) of any amendments to policies, rules and methods that would address the submission point it is my opinion that it should be appropriately addressed in the Values section of PC 1. I again refer to Mr Hodgson who addresses this point in more detail.

38. I have given evidence on the importance or special nature of the commercial vegetable production sector previously to the hearings on the Proposed Auckland Unitary Plan where the

Commissioners decided that the commercial vegetable production sector was so regionally and nationally significant that the use of the Elite soils (Class 1) should be protected from any other form of development and, in addition, that wherever possible, development for any other use on Prime soils (Class 2) should be avoided. In addition, there was also protection provided for some Class 3 and lower soils where production values were considered important.

39. This decision was made in a region where the demand for additional land for urban subdivision is currently insatiable and the value of that land as a subdivision proposition is incredibly high. The decision made by the Auckland Commissioners to preclude the development of the Elite soils and to retain them for commercial vegetable production was not taken lightly and, in my opinion, reinforces the special nature of the commercial vegetable production sector as a provider of essential food. Given the Auckland Region abuts the Waikato Region and the area we are considering is, for all intents and purposes the same (Pukekohe/Pukekawa) it is my view that the same recognition is essential here.

40. Since the Auckland Unitary Plan process, I have subsequently been involved in an Environment Court case[1] where an appellant to the Unitary Plan decision sought to have the Rural Urban Boundary shifted to include its land to allow them to subdivide for urban use in the future. In that case the Court ruled that the appeal be disallowed partly on the grounds that the property had a high proportion of Elite soils on it and the Court recognised the importance of retaining those soils for horticultural use.

41. Commercial vegetable production businesses are characterised by being individually very large incorporating the full range of activities from growing the crops through to marketing of their produce. They are fully integrated. This has involved very significant investment in land, infrastructure, growing and harvesting plant and machinery, processing sites and equipment, storage sites and equipment, and such ancillary services as freighting capability etc.

42. As part of this development these businesses have developed considerable intellectual property across the full range of production, processing and marketing of their produce.

43. Because of local and international market requirements for very consistent quality and year-round supply, these businesses

[1] *Self Family Trust v Auckland Council* Env 2017- AKL-000199

have had to expand the area that they can grow their crops in across New Zealand and internationally. Much of this activity is based around the major processing centres in either the Auckland or Waikato Regions because that is the closest to the major local market and export centres. This location also offers these businesses easy access to a readily available source of both skilled and unskilled labour.

44. Particularly for outdoor commercial vegetable production, the types of soil which are preferable to grow in are deep, free draining soils. These soils are relatively limited across the Auckland and Waikato Regions.

45. There is a huge range of crops grown (see evidence of Miss Deverall for the details), some of which are very frost sensitive and some which require considerable winter chilling. Some crops can be grown continuously on the same land whereas some require considerable periods before they can be grown in the same ground again to avoid disease pressure. This means that the land which is used for growing in any one year is less than the total footprint of land used for vegetable production.

46. In addition, the sector tends to operate on the basis of about half the land used is owned by the business and half is leased both long and short term. Lack of access to the right amount of suitable soils on a lease basis is a real issue for this sector and this is elaborated on by Miss Deverall in her evidence.

47. To be able to produce sufficient vegetables to meet internal demand during the winter, spring and early summer period requires that access to the suitable soils in the frost free areas around the Pukekohe and Pukekawa hills are absolutely essential to maintain supply. This access is being significantly threatened by urban creep from Auckland, which has impacted in the Waikato region, and by the lack of expansion opportunities available in the area subject to PC1.

48. There is no doubt that the New Zealand commercial vegetable production sector provides an essential service to the country by supplying vegetables to our predominantly urban population throughout the year at an affordable cost. The sector's ability to provide this service is predominantly driven by the availability of the correct soil types in the required climate zones which are situated in the Auckland and lower Waikato regions.

49. The alternative source of these vegetables would involve significant transport costs either locally or internationally which would result in the price required to be lifted far above the

current cost and in some cases make them too expensive for the majority of consumers.

50. It is, therefore, my opinion that the economic advantage of continuing to allow access for these growers is compelling and that this fact should be recognised within the Values section of PC1.

THE ECONOMIC MODELLING – HEALTHY RIVERS WAI ORA

51. In terms of assessing the level of uncertainty to be attributed to the economic modelling carried out in the report "General principles underlying the development of the HRWO economic model" the authors' comment that "*it is critical to recognise that while best efforts have been made to collect the most meaningful information for a model of this kind, there remain critical uncertainties given our limited capacity to address the complexity of the problem in its complete entirety*". The only conclusion that can be made in relation to this comment is that there are critical uncertainties in being able to interpret the results of such a model if the information used in populating is itself critically uncertain.

52. Later in my evidence I discuss my concerns about the appropriateness of the use of Overseer in modelling the commercial vegetable production sector's results for both Nitrogen (N) and Phosphorus (P). I am very familiar with this as I carried out the modelling of the vegetable production sector which was used by Dr Doole in his HRWO model.

53. I have the following concerns about the accuracy of the use of my modelling work in the HRWO modelling:

    (a) My modelling does not seek to represent the makeup of the vegetable production sector as a whole. The three models which I constructed were each representative of one part of the sector being an extensive, an intensive and a market garden rotation. Although I made an estimate of the proportion of the total sector each rotation made up it is in no way accurate as a representative sample of the industry.

    (b) The array of crops that were modelled cannot be considered as accurately reflecting the actual array of crops which are grown but rather what it was possible to model using Overseer.

    (c) The range of mitigation options that it was possible to model was very limited because the full range are not able to be modelled in Overseer. This is because in

some cases there is no facility to model them and because of the monthly time steps which Overseer works on.

54. These factors all mean that the accuracy of the modelling of the commercial vegetable production sector is a very inaccurate depiction of reality. This is particularly if the results of Overseer modelling of the commercial vegetable production sector is to be combined into a model which is aimed at optimising the water quality by utilising a restricted range of mitigations and then resort to land use change to forestry as the ultimate mitigation technique.

55. The HRWO model effectively ignores the array of mitigation techniques which are available to the commercial vegetable production sector because these are not able to be modelled in Overseer and, therefore, were not modelled in the HRWO modelling.

56. There is no doubt that the results that I was able to model for the N discharges for the commercial vegetable production sector are high on a per hectare basis when compared to what the average is for the whole Region.

57. However, when we look at the results for the other sectors, we find that the data which populates the model for dairy farms, for example, was provided by DairyNZ. The physical and financial data that was provided was from approximately 500 dairy farms so it would be considered to be an accurate representation of the dairy industry in the Waikato. However, it was only representative of a single season, that being the year 2012-13. Therefore, it only represents the performance of the dairy industry in that season rather than as a long-term average result. In comparison the pay-out for milk solids was adjusted to reflect a long-term average price.

58. The Overseer files that were created to represent those farms were created using the “Dairy Industry Protocol”. The Protocol was issued by the dairy industry and it gave detailed instructions about what options were to be used in entering the data into Overseer. The entering of data into Overseer is governed by the document “Best practice data input standards” which details the various ways or forms that data can be inputted into Overseer and it ranks them in terms of the most accurate results.

59. The Dairy Industry Protocol suggests options for the input of data which were designed to ease the data entry process, rather than achieving the most accurate possible results. Previous work that I have been involved in for both Central Plains Water

and the Rangitata Diversion Race Management Limited suggested that using the Dairy Industry Protocol underestimates the actual nitrogen (N) leaching by up to 45%, compared to the results that can be achieved if the data is inputted as defined in the Best Practice data input standards.

60. The data which represents the Sheep and Beef industry was supplied by Beef and Lamb NZ (**B+LNZ**) which was supplied from their economic service survey which indicates that it is a fair representation of their members' farms. However, the data was from two actual years, so the financial impacts reported are for those two years not a long-term average in terms of physical and financial performance. This factor, which influences the results, was picked up very late in the HRWO modelling process, after decisions on direction had been made by the CSG. The modelling was re-run using long term average data which showed that the impact on sheep and beef farms was much greater than originally reported. However, this refinement was modelled when it was too late to influence the decision.

61. The purpose of illustrating this is to show that what we have is modelling data from three different sectors which each have major problems with the accuracy of the modelling data. This in turn leads us to have considerable uncertainty as to the accuracy of the HRWO modelling and therefore the conclusions that can be drawn from that.

62. As noted in paragraphs 57 to 60, it is difficult to determine exactly how the results of the HRWO modelling influenced the CSG in their decision making because there is no clear relationship between the HRWO results as presented and the final form of PC1.

63. However, PC1 as proposed provides for existing commercial vegetable production as a permitted activity until 2020. Following that, existing commercial vegetable production becomes a controlled activity requiring a land use and discharge consent. New commercial vegetable production requiring a greater area than currently in production is not provided for under the plan without an application for a non-complying activity.

64. It is therefore my opinion that the package of measures set out in the HortNZ submission which includes: a separate consenting pathway for commercial vegetable production; a multi contaminant approach; and a catchment collective approach are appropriate to ensure the special nature of commercial vegetable production are appropriately recognised.

THE USE OF OVERSEER IN COMMERCIAL VEGETABLE PRODUCTION

65. At p 298 in the Section 42A Report the Officers' state that they acknowledge the limitations of Overseer while both the Technical Leaders Group and the CSG determined that it was appropriate for use in the modelling undertaken and for establishing the NRP.

66. Although I will be giving a full evaluation of the appropriateness of Overseer in the Block 2 Hearings in relation to Topic C1, I would like to make the following points as to why I would question its appropriate use for commercial vegetable producers:

    (a) Overseer is a "black box" piece of software which means that its operation is not open sourced and therefore the accuracy of what it is modelling is not able to be reviewed. At the same time Overseer has never been externally reviewed.

    (b) The modelling of P is crude in the way that Overseer analyses and reports the transfer of P across the surface of the ground.

    (c) The gross nature of the inputs used in entering data into Overseer (monthly data is the finest input timeframe) which are unable to accurately reflect the complexities of relatively fine scale vegetable production systems.

    (d) The fact that Overseer is not currently capable of modelling all possible crop types therefore forcing the modeller to choose proxy crops to represent the crop which may not accurately reflect what is being grown.

    (e) The fact the Overseer is a long term averaging tool which has a fixed, and somewhat limited, array of long term climatic data which it uses to spread the climatic data entered over, which represents an average of thirty years data.

67. I note that in the report entitled "Arable and horticultural crop modelling for the Matrix of Good Management - a technical summary", commissioned by Canterbury Regional Council[2], 21

[2] Hume E, Brown H, Sinton S, Meenken E. December 2015. Arable and horticultural crop modelling for the Matrix of Good Management - a technical summary. A Plant & Food Research report prepared for: Environment Canterbury. Milestone No. 65642. Contract No. 30084 var 2. Job code: P/421032/03. SPTS No. 12430.

examples of complexities that were encountered during modelling in Overseer for the arable and commercial vegetable production sector and detailed the work arounds that had to be adopted to make the modelling work.

68. I also note that the Parliamentary Commissioner for the Environment recently released his report "Overseer and regulatory oversight: Models, uncertainty and cleaning up our waterways December 2018"[3] where he concludes that *"a significant amount of information needed to confirm Overseer's use in a regulatory setting is lacking*". He then goes on to make a number of recommendations as to what needs to be done to make Overseer suitable for use in a regulatory setting.

69. As I have noted I will be returning to this topic in future hearings.

ADOPTING A CATCHMENT COLLECTIVE APPROACH.

70. As mentioned in the s42A Report p 381:

> *"HortNZ and others seek that PC1 provides flexibility to landowners to collaboratively achieve reductions at catchment or sub-catchment scales. To enable this approach, HortNZ seeks a number of amendments to the provisions, including the addition of catchment load limits. They seek that Objective 3 is amended to refer to the proposed load limits."*

71. Then at p 393 the Officers say:

> *"Submissions on the "sub-catchment" approach will be addressed in subsequent sections of this report. Given the conclusions on that approach are yet to be reached by the Officers no recommendation is made such that Objective 3 be amended to enable flexibility for landowners to collaboratively achieve catchment reductions. In any event, as the objective is about achieving short term improvements, and not the methods to achieve the outcomes set out in the objectives, it may be that a change to the objective is not necessary in any event."*

72. I appreciate that this is an issue we need to return to in other hearings. Suffice to say here, from an economic perspective it is very important that the economic advantages of adopting a catchment collective approach are fully considered and

[3] https://www.pce.parliament.nz/media/196493/overseer-and-regulatory-oversight-final-report-web.pdf

understood. I will say more about this in further hearings but make a couple of preliminary points now as follows:

(a) One economic advantage is to the landowners who as a collective are able to achieve their water quality targets much more efficiently than if they were required to achieve them individually by instigating a collective marginal cost curve of abatement approach across the whole catchment as opposed to achieving it individually.

(b) The other major economic advantage would go to the Waikato Regional Council who would have one group to interact with instead of the multiple number of transactions that they would be faced with if they had to deal with them individually. In my experience in Canterbury, ECan are very proactive in promoting collectives and enterprises to cut their transaction costs of administrating the reductions required.

73. It is my opinion that it is essential that this is a matter that is considered as one of the available options and then tested through a section 32 analysis to test whether it is the most appropriate option through an efficiency and effectiveness test as detailed by the RMA.

74. I note from Ms Holmes evidence that she has demonstrated how this approach would also allow the expansion of the total area in commercial vegetable production at the same time as achieving the required reductions in water quality. This is a very economically efficient method of achieving all of the parties' objectives.

Stuart Ford
for Horticulture New Zealand

15th February 2019

APPENDIX 1

NIWA (2015) : Review of historical land use and nitrogen leaching: Waikato and Waipa River catchments.

NIWA (2015) : Modelling E. coli in the Waikato and Waipa River Catchments - Development of a catchment-scale microbial model.

Doole G, Eliot S, McDonald G (2015): Economic evaluation of scenarios for water-quality improvement in the Waikato and Waipa River catchments. Assessment of first set of scenarios.

Doole G, Eliot S, McDonald G (2015): Economic evaluation of scenarios for water-quality improvement in the Waikato and Waipa River catchments. Assessment of second set of scenarios.

Doole G, (2015): Description of mitigation options defined within the economic model for Healthy Rivers Wai Ora Project. - Description of options and sensitivity analysis.

Doole G, Eliot S, McDonald G (2015): General principles underlying the development of the Healthy Rivers Wai Ora (HRWO) economic model.

Market Economics (2016) : Economic Impacts of the Healthy Rivers Initiative - Freshwater Management Unit, Regional and National Assessment.

Doole G (2016) : Model structure for the economic model utilised within the Healthy Rivers Wai Ora process.

SCION (2015) : Identifying Complementarities for the Dairy and Forestry Industries in the Central North Island.

Perrin Ag (2015) : Land use conversion costs for Healthy Rivers Wai Ora Project.

Olubode F (2015) : Sheep and beef data adjusted for average schedule price and expenditure.

Doole G, Quinn J, Wilcock B, Hudson N (2016) : Simulation of the proposed policy mix for the Healthy Rivers Wai Ora process.

McDonald G, Doole G (2016) : Regional- and national-level economic impacts of the proposed Waikato Regional Plan Change No. 1—Waikato and Waipa River Catchments.

Technical Leaders Group for the Healthy Rivers/Wai Ora project : Integrated Assessment Baseline and Scenarios.

Wedderburn L, Coffin A (2016) : Integrated Assessment for Healthy Rivers Wai Ora: The Baseline Information.

Wedderburn L, Coffin A (2016) : Integrated Assessment One: Assessment of Scenarios from modelling round one.

Wedderburn L, Coffin A (2016) : Integrated Assessment Two: Achieving water quality for swimming, taking food and healthy biodiversity. Assessment of Scenario 1 steps 10%, 25% and 50% from case 1 of modelling round two.

Cochrane W, Roskruge M (2016) : Healthy Rivers Project - Comment on Employment and Vibrant Resilient Communities Indicators.

Overseer (2018) : Best Practice Data Input Standards.

DairyNZ : New Zealand Dairy Industry Audited Nitrogen Management Scheme. Section B: A protocol for the use of the Overseer model to measure, model and audit nitrogen information from New Zealand dairy farms.

Waikato Regional Council : Proposed Waikato Regional Plan Change 1 - Waikato and Waipa River Catchments.

Waikato Regional Council : Proposed Waikato Regional Plan Change 1 - Waikato and Waipa River Catchments. Section 32 Evaluation Report.

Waikato Regional Council : Proposed Waikato Regional Plan Change 1 - Waikato and Waipa River Catchments. Section 42A Report.