IN THE ENVIRONMENT COURT AT WELLINGTON

IN THE MATTER	of the Resource Management Act 1991 ("**the Act**")
AND	
IN THE MATTER	of clause 14 of the First Schedule of the Act
BETWEEN	**FEDERATED FARMERS OF NEW ZEALAND** ENV-2010-WLG-000148
AND	**MINISTER OF CONSERVATION** ENV-2010-WLG-000150
AND	**HORTICULTURE NEW ZEALAND** ENV-2010-WLG-000155
AND	**WELLINGTON FISH & GAME COUNCIL** ENV-2010-WLG-000157
	Appellants
AND	**MANAWATU-WANGANUI REGIONAL COUNCIL**
	Respondent

STATEMENT OF EVIDENCE OF ANDREW JOHN BARBER FOR HORTICULTURE NEW ZEALAND IN RELATION TO THE APPEALS ON THE PROPOSED ONE PLAN FOR MANAWATU WANGANUI REGIONAL COUNCIL ON SURFACE WATER QUALITY

14 MARCH 2012

Helen Atkins
PO Box 1585
Shortland Street
AUCKLAND 1140

ATKINS | HOLM | MAJUREY

Solicitor on the record	Helen Atkins	Helen.Atkins@ahjmlaw.com	(09) 304 0421
Contact solicitor	Helen Atkins	Helen.Atkins@ahjmlaw.com	(09) 304 0421

QUALIFICATIONS AND EXPERIENCE

1. My name is Andrew John Barber. I am a Director of AgriLINK NZ and work as an Agricultural Engineering Consultant based in Auckland. I have a Bachelor of Horticulture (Tech) with first class honours from Massey University.

2. I have spent over 16 years as a consultant in the agricultural industry, specialising in resource use optimisation. This includes energy efficiency, resource use benchmarking and most recently carbon footprinting everything from onions to ships.

3. In my years as a consultant I have helped develop vegetable industry soil and erosion management guidelines, and individual cultivated property erosion and sediment control plans.

4. I was Project Manager on the Franklin Sustainability Project (**FSP**) and provided technical advice on managing soil erosion on cultivated land. This was a multi-stakeholder project that ran between 1996 and 2004, which while having a broad goal of improving the overall sustainability of outdoor vegetable production in the Franklin region, had a clear focus on keeping soil on the paddock and mitigating any effects of off-site discharges. The project directly involved the growers, Vegfed (now Horticulture New Zealand), MfE, MAF, Auckland Regional Council, Environment Waikato, and the Franklin District Council

5. I have been involved in the preparation of a number of individual cultivated property erosion and sediment control plans, which have involved mapping the properties and designing suitable control measures including the sizing and placement of silt traps.

6. I have also worked on stormwater projects for the Franklin District Council where I designed the stormwater system for Pukekohe Hill and the Bombay Hills that ensured an integrated system between the council and grower drains that were sized to cope with high intensity storm events.

7. In 2009/10 I was engaged by Horticulture New Zealand to help develop a Code of Practice for cultivated soil in the Horizons Region. These guidelines are based on local

grower experience, my experience in the Franklin District, and trials that were conducted both with and alongside the Holding it Together (**HIT**) Project. The HIT Project is a Horticulture New Zealand led research project that focuses on preventing soil loss, soil degradation and adverse effects on surface water ways.

8. I provided evidence to the Hearings Panel on the issues in this statement of evidence in February 2010. My earlier evidence is not included in the Technical Evidence Bundle as it was not considered technical evidence by the Hearings Panel because, as I understand it, due to time constraints imposed on the exchange of technical evidence at that time.

9. This evidence contains similar matters to the evidence I provided on the topic of sustainable land use and accelerated erosion. For Horticulture New Zealand there are overlaps between the land use topic and the topic of surface water quality. In that regard, I attended expert witness conferencing on 7 February 2012 in person and by phone on the 9 March. I have signed the Record of Witness Caucusing on Sustainable Land Use and Accelerated Erosion dated 15 February 2012 and March 2012 (**Joint Statement**).

10. I have been provided with The Code of Conduct for Expert Witnesses contained in the Environment Court's Consolidated Practice Note dated 1 November 2011. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

CONTEXT AND SCOPE OF MY EVIDENCE

11. The particular issue that my evidence addresses is the proposed regulatory framework for cultivation. The use of regulations versus education and the cooperative development and implementation of Good Management Practices.

SUMMARY OF MY KEY CONCLUSIONS

12. It is my opinion that to minimise soil loss from cultivated land, an inclusive process involving growers, industry representatives, Council and soil management practitioners is essential for the development and implementation of robust long term erosion minimisation measures.

13. I have divided my evidence into six parts as follows:

- Good management practices;
- Code of practice for commercial vegetable growing;
- Horowhenua sediment loss trial;
- Riparian 5m buffer;
- Adherence to Schedule D water quality standards;
- Recommended approach.

GOOD MANAGEMENT PRACTICES

14. As stated in my original evidence to the Council in February 2010 the best approach for affecting change is to get recognition of the problem, cooperatively develop a solution, and then disseminate that information and allow sufficient time for the practices to be implemented before finally following up with enforcement where changes are not occurring. Enforcement without education is confrontational, the problem is not recognised and the solutions are disjointed and often inadequate. Likewise voluntary measures without enforcement, after an appropriate time, do not achieve widespread adoption and ultimately penalises the early adopters.

15. This position is consistent with the most recent caucusing statement between Dr Botha and Dr Parminter in relation to land use. While referring to the dairy industry it is equally applicable to other primary sectors. Specifically they state:

> In summary, it is our view that a mix of rules and voluntary approaches are required. The rules are for a minority of recalcitrant farmers whilst it is expected that other people will

> respond to a well-designed voluntary strategy involving the regional council and the dairy industry working together.

16. Botha and Parminter also agreed that, there is a risk with using deterrence theory, namely:

> Rules constructed from deterrence theory make identifying non-compliant behaviour as easy as possible for the enforcer, the rules make no allowance for context or discretion, and identified non-compliance is made costly and punitive.
>
> … we agree that there are advantages in using social learning theory over deterrence theory, because for example:
>
> Enforcement is kept to the worst examples in a population (e.g. less than 20%), to back up and support non-regulatory methods.

17. I believe that the approach adopted by FSP of bringing councils, growers and soil experts together, holding workshops, preparing detailed guidelines, and disseminating that information through a range of channels is the most successful way of effecting change. With this cooperative multi-stakeholder approach there was general agreement on the solution.

18. This cooperative approach was used to integrate council and landowner stormwater systems on Pukekohe Hill from late 1999. Prior to this the consequences of not working together were made clear when 70% of severe erosion from the 21st January 1999 storm resulted from drains overtopping[1].

19. Prescriptive performance standards as proposed by Mr Phillip Hindrup[2], while arguably measurable, make no allowance for context or discretion. Those growers directly affected by reference to Schedule D river water performance standards will be in the minority. Very few growers directly discharge stormwater into a river, and those that do have no way of determining the correlation

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[1] Basher, L.R., and Thompson, T., 1999. Erosion at Pukekohe during the Storm of 21 January 1999. Landcare Research Contract Report: LC9899/096. Prepared for Agriculture NZ and FSP.
[2] Paragraph 108, page 31

between their activity and water clarity. What's more, the test is significantly influenced by measures outside of a growers' control, namely the intensity and distribution of rainfall events.

20. All growers have control over the practices that they put in place to minimise soil erosion and sediment loss. Consequently the focus should be on engagement, problem recognition, and cooperatively developing solutions. Sending an abatement notice for breaching Schedule D, even if it could be attributed to a single source, is not going to achieve the goal of minimising sediment loss from cultivated land. As Botha and Parminter agreed[3]:

> … not enough is currently known about the interactions between best management practices, between best management practices and farming systems, and between land uses within a catchment, to guarantee that a prescriptive approach to individual farm strategies will achieve the objectives desired by Manawatu-Wanganui Regional Council". This applies whether the prescriptions are associated with a regulatory approach (as applies here) or in cases where a voluntary approach is used.

21. Unless Council and growers work together we will not determine what the best solutions are. Punitively penalising a few growers for non-compliance to a water standard will not ensure others adopt good management practices.

22. The process of determining good management practices takes time and resources and is achieved with all stakeholders contributing. In the first version of the FSP 'Doing it Right' guidelines, the pictured silt trap was little more than a shallow depression in the corner of a paddock. There was no sizing or context around catchment area and slope. Several years later the updated version was considerably more detailed; having learnt from the research conducted through FSP and incorporated the contributions from growers, researchers, council, private erosion specialists, and road engineers. These guidelines are about to be reviewed again to improve their language by making the terms consistent

[3] Point 8 of their joint expert witness statement, In the evidence from Terry Parminter para 42:

with other erosion and sediment control guidelines, and to improve referencing for use in Auckland Council plans. No one group has the solution and only cooperatively can the goal of minimising sediment loss be achieved.

CODE OF PRACTICE FOR COMMERCIAL VEGETABLE GROWING

23. In my evidence to the Council Hearing in February 2010 I described the Code of Practice for Commercial Vegetable Growing in the Horizons Region. This still stands as the best approach for minimising soil erosion and sediment loss.

24. A copy of the Code of Practice is attached to my evidence on Sustainable Land Use/Accelerated Erosion.

25. In summary the Code of Practice is based on years of experience from many practitioners, through research conducted by FSP and the Horticulture New Zealand HIT projects, their associated guidelines, as well as other erosion and sediment control guidelines such as Auckland Council's TP90 and TP233.

26. Minimising soil erosion on cultivated paddocks has four stages:

    1. Paddock assessment – risk management.
    2. Identifying and then stopping or controlling water entering the paddock.
    3. Implementing in-paddock control measures to minimise soil movement within the paddock.
    4. Managing the water that flows off the paddock.

27. Minimising erosion and sediment loss is about getting each of these four stages right. Within paddock measures without the planning and risk assessment could lead to unforeseen washouts, likewise within paddock measures without managing the paddock discharge water still leaves the paddock vulnerable at certain.

HOROWHENUA SEDIMENT LOSS TRIAL

28. In 2009/10 eight sediment monitoring sites were established as part of a Horticulture New Zealand investigation to provide a visual demonstration of whether or not, and if so

in what situations, soil erodes from cultivated paddocks in Horowhenua.

29. Very little evidence of soil erosion was found; which is consistent with what most believe, that there is very few erosion problems associated with cultivated horticulture in the Horizons Region. We observed one instance of soil being captured by a silt fence after an overland flow path through cultivated ground. This type of overland flow path will most likely only carry water in significant rain events, and includes instances where stormwater is discharged onto cultivated land from adjacent properties or overtopping roadside drains. The situation can be mitigated through various measures set out in the Code of Practice for Commercial Vegetable Growing.

RIPARIAN 5m BUFFER

30. Mr Hindrup[4] states that the use of a 5m riparian margin around rivers as necessary to reduce sediment. While I agree that cultivation should not occur within 5m other ancillary structures and activities like bunds and benched headlands could occur within this 5m zone and result in a better outcome than simply requiring a 5m riparian margin.

31. My suggestion would be to have a 5m riparian margin unless other more effective sediment control measures are used. There needs to be the flexibility to adopt the most appropriate control measures and not have it stipulated in regulation. The paddock assessment, which is the first stage in the Code of Practice (paragraph 26), will lead to different tools depending on the circumstances. Vegetated riparian margins are described amongst a suite of control measures.

32. On cultivated land, water runoff is channelised which will flow through riparian margins. Mr Hindrup[5] points to the evidence of Dr Quinn to justify the 5m riparian zone where research shows sediment trapping efficiency of at least 80% for all riparian margins of greater than approximately 5m. This is based on the conclusion in a review by Yuan et al.,

[4] Paragraph 129, page 36 in his evidence
[5] Paragraphs 148, 149 and 150, page 42.

(2009) on the effectiveness of vegetated buffers on sediment trapping in agricultural areas. However most of the cited research in this review does not relate to cultivated agriculture. Where it does the Fasching and Bauder (2001) trial used sheet erosion and stated that the results were most likely better than in actual field conditions. Mankin et al., (2007) showed 98% reduction in sediment, however greater than 75% of the sediment removal was due to infiltration alone. This will not be the case in practice where flows are channelised. Blanco-Canqui et al., (2004) found a 90% reduction in sediment after an 8m vegetated filter strip. In the treatments that used a 0.7m wide switchgrass barrier 91% of the sediment was trapped in front of the treatment. The barrier was the most significant measure, not the vegetated land that followed.

33. I contend that rather than supporting a blanket 5m riparian margin these results show that riparian margins are unlikely to be effective at minimising sediment entering water in actual field conditions. Other measures such as bunding (barriers) may be more effective and will result in less productive land being lost.

34. This position is consistent with the Record of Further Technical Conferencing (in relation to land use) (March 2012) that in the case of channelised flow, as occurs on cultivated land, that riparian buffers can be ineffective and that other methods would need to be used (Question 18). These other methods include, but are not limited to, bunds and benched headlands (Question 19).

ADHERENCE TO SCHEDULE D WATER QUALITY STANDARDS

35. The implementation of the Code of Practice for Commercial Vegetable Growing will not provide certainty that water quality outcomes intended by Schedule D will be consistently achieved. However I see that this is no different to what can be claimed for Whole Farm Plans or other erosion and sediment control Guidelines, and Code of Practices.

36. I have not seen any evidence linking Whole Farm Plans and water quality or sediment discharge levels. From a comment at Technical Caucusing I understand that they are designed to reduce erosion by 70%. By that standard

the COP for Commercial Vegetable Growing can demonstrate comparable results (see paragraph 37); still that is not the same as directly linking good management practices and specific water quality standards. Therefore like the two guidelines that I have reviewed (Erosion and Sediment Control Guidelines for the Wellington Region and Auckland's TP90) it cannot be stated that they provide certainty that water quality outcomes intended by Schedule D will be consistently achieved.

37. Wheel track ripping has been shown in the Franklin Sustainability Project to reduce erosion in certain circumstances by 1800% (21 to 1 t/ha). Likewise the majority of erosion in Pukekohe on the 21st January 1999 (paragraph 18) could have been prevent by correctly sized culverts and drains. Which has been the case since this stormwater network was upgraded. Both these strategies are advocated in the COP where problems are identified.

38. The Vegetable COP has been developed based on current scientific knowledge and will be updated as more research and experience becomes available. The FSP Soil and Drainage Management Guide that is referenced and linked in the COP was developed with the assistance of Les Basher and Craig Ross (Landcare Research), Brian Handyside (Erosion Management), Mike McConnell (McConnell Consultancy) and Steve Bryant (Bryant Environmental Solutions). These are people with many decades of combined erosion and sediment control experience.

39. The sediment trap measures advocated in the Vegetable COP, which includes paddock bunding, have been sized to detain the runoff long enough to allow most sediment to drop out of suspension. The capacity dimensions are based on current scientific knowledge and take into account infiltration rates and soil type. It also needs to be recognised that in the predominantly flat-gentle (slope class A 0 - 3 degrees) topography that most vegetable operations in the Horizons Region operate on, infiltration rates are very high (low run-off) and bunding along headlands creates large sediment trap capacities. Combined with other in-paddock erosion control measures

these result in very low stormwater and sediment discharge rates.

RECOMMENDED APPROACH

40. It is the development of codes of practice which is critical to achieving the desired outcome of minimising soil erosion and sediment loss from cultivated horticulture. This approach is supported by Policy 5-5:

> Supporting codes of practice, standards, guidelines, environmental management plans and providing information on best management practices.

41. As demonstrated through FSP, and advocated by Policy 5-5, codes of practice jointly engage land owners, researchers and council in problem recognition and solution development. It is this process of all stakeholders learning together that not only results in solution development but also ensures ownership of the solution and subsequent implementation.

42. I have read the evidence of Mr Norm Ngapo (on land use) (17th February 2012) in relation to the use of Whole Farm Plans and Codes of Practice and I agree with his comments that (paragraph 37)

> One of the most successful ways to achieve sustainable land management in a farm situation is to adopt appropriate soil conservation measures as set out in a Whole Farm Plan or similar type of plan developed specifically for that property.

43. Specifically addressing cultivation Mr Ngapo states that (paragraph 83):

> If cultivation is undertaken on classes 1 to 4 following normal best practice on slopes up to 20 degrees, and adhering to appropriate setback distances [this issue is addressed in the section above - Riparian 5m Buffer], then I believe it could be permitted subject to robust conditions.

44. As Mr Ngapo points out in his evidence Whole Farm Plans are effectively a Code of Practice (paragraph 40) and "*as such it provides a suite of best practice options in one package, tailored to the property, and developed in close liaison with the landowner*." Therefore, I contend that the

Vegetable COP and WFBPs should be treated the same way by council as permitted activities.

45. I believe that better environmental outcomes will be achieved through the Code of Practice for Commercial Vegetable Growing than through regulations and enforcement to a set of water quality standards. The COP applies across all growers, whereas the adherence to water quality standard, if it could be attributed to an individual operation, will only directly affect a small subset of growers who could be directly linked to the named rivers in Schedule D.

A J Barber

14 March 2012