BEFORE THE ENVIRONMENT COURT

In the matter of	appeals under clause 14 of 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	**MERIDIAN ENERGY LTD (ENV-2010-WLG-000149)**
and	**MINISTER OF CONSERVATION (ENV-2010-WLG-000150)**
and	**PROPERTY RIGHTS IN NEW ZEALAND (ENV-2010-WLG-000152)**
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 REBUTTAL EVIDENCE FOR ASSOCIATE PROFESSOR RUSSELL GEORGE DEATH

1. INTRODUCTION

1.1 My full name is Russell George Death. A full description of my qualifications and experience was provided in my evidence dated 17 February 2012, which was filed with the Court.

1.2 I attended expert conferencing on 9 March 2012. A record of that conferencing has been provided to the Court in the form of a conferencing statement. This statement of evidence includes further discussion around areas of agreement and disagreement as recorded in the conferencing statement where I think it is required.

2. PURPOSE AND SCOPE OF EVIDENCE

2.1 The purpose of this evidence is to provide further clarification in regards to specific matters recorded in the conferencing statement, and to respond to some matters raised in the evidence of Dr John Allen McConchie, Mr Shane Alexander Hartley, Ms Lynette Pearl Wharfe, and Mr Andrew John Barber.

3. EXPERT WITNESS CODE OF CONDUCT

3.1. I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Consolidated Practice Note 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.

4. RIPARIAN SETBACKS

4.1. I discussed riparian setback distances in my evidence-in-chief.

4.2. In conferencing all expert witnesses agreed riparian buffers were one effective mechanism for sediment control of land use activities. However, as discussed above there is not a universally agreed 'single' buffer width that will prevent any significant adverse

effects in all situations. As presented in my evidence-in-chief and agreed in conferencing, slope and soil type in particular, will affect the ability of a buffer of given width to avoid significant adverse effects.

4.3. I proposed several alternative mechanisms for establishing the appropriate buffer widths within the context of soil type and slope in my evidence-in chief, differing in their degree of complexity. The approach agreed in conferencing was that of Collier *et al* (1995) (which is more complex than any of the approaches I proposed) which provides setback widths related to land slope, drainage and proportion of soil as clay. It must also be noted that the proposed Collier *et al* (1995) approach only addresses sediment discharges and does not account for the requirement to provide greater protection for more sensitive instream values eg SoSA, Trout spawning etc. The collier *et al* (1995) approach also, does not account for nutrient discharges, or any of the other parameters for which riparian margins should be established and protected to ensure that aquatic ecosystem health (life supporting capacity) is safeguarded.

4.4. If the Collier et al (1995) approach is unsuitable due to the concerns I have outlined above (complexity from a planning approach, does not account for the protection of more sensitive values, does not account for other parameters which ensure that riparian margins are established and protected to safe guard aquatic ecosystem health) then I fall back to my less complicated alternatives presented in my evidence-in-chief. The weight of evidence from many reviews including (Yuan, Bingner & Locke, 2009) establish minimum setbacks of 10 m for rivers, lakes and wetlands and a minimum setback of 20 m for regionally significant waterbodies (i.e., Sites of Significance Aquatic). Furthermore, given the sensitivity of trout to sediment and nutrient inputs, trout spawning rivers should also have a minimum setback of 20 m to avoid potential adverse effects. On steep slopes (> 20 °) I would recommend buffer widths equal to the base buffer width (10 m) plus 0.62 times the LUC average slope (from (Barling & Moore, 1994; Wenger, 1999) i.e., buffer width = 10 + 0.62 x slope (m).

4.5. I would also note that technical conferencing and much of the evidence presented in my evidence- in- chief focused on the role of riparian buffers in preventing sediment from adversely affecting waterbodies. My recommendations above incorporate the efficacy of buffer strips in reducing adverse effects from sediment, but also nutrients, temperature, light and food supply for in stream biological communities.

4.6. Mr Barber in his evidence in chief (sections 32-35) also made comment around the width of buffer strips for protection of waterways from sediment in cultivation land. He highlighted that riparian buffers can be used along with other techniques (see Technical Conferencing statement for examples) for sediment trapping. I agree with Mr Barber, that riparian setbacks alone will not prevent rill or gulley erosion or landslips. However, it is not clear how Mr Barber plans to combine these alternate sediment control practices with riparian setbacks into effective management strategies. My conclusion is that riparian setbacks will work to prevent some forms of erosion and that as horticultural practitioners have no desire to lose their valuable top soil in many cases they would also seek to use bunding and silt traps to prevent any possibility of soil loss.

5. VISUAL CLARITY

5.1. Some witnesses have raised concerns over the measurement of visual clarity effects referenced in Schedule D in regards to discharges of sediment to waterbodies.

5.2. Dr McConchie raises this in his paragraph 15(b) stating that "*The condition regarding the discharge of sediment should recognise the 'field application' of such a standard. I would propose that the condition refer to a 'noticeable change in colour and clarity' rather than referring to a precise 'technical standard' derived from either laboratory or field analysis*".

5.3. The 20% change visual clarity standard in Schedule D is scientifically accepted, clear, measurable, and enforceable, is field assessment appropriate (routinely used), and is commonly used even by school children. A simple clarity tube measurement avoids any potential biases that may result from individual differences in the perception of what is noticeable. All that is required for a clarity measure is a clear plastic tube, a small dark object (e.g., stone) to fit in the tube and a tape measure. Alternatively many farmers and schools have been using the SHMAK clarity tube for a number of years. You simply fill the tube with water and move the dark object until it cannot be seen and then measure the distance from eye to object, and repeat upstream. There is no laboratory assessment required.

5.4. Mr Barber raised similar concerns in paragraph 20 that "*very few growers directly discharge stormwater into a river, and those that do have no way of determining the correlation between their activity and water clarity. What's more, the test is significantly influenced by measures outside of a grower's control, namely the intensity and distribution*

of rainfall events". Growers can easily compare water clarity using a simple clarity tube or similar method outlined above. Even if the stream is sediment laden with flood water. The test of effect is that water clarity is reduced by 20% or more directly downstream of the grower's property, or from a noticeable discharge. If the water is equally murky upstream to downstream there is no effect.

5.5. Furthermore, I consider it unlikely that cultivated land lying near a waterbody will not yield any discharge of sediment laden stormwater to that waterbody, and as discussed by Mr Ngapo and Mr Eyles (rebuttal evidence) growers need to be putting sediment control measures in place at the appropriate design capacity (discharge event standard) to ensure that sediment and erosion control methods are appropriate to control discharges of sediment to receiving waterbodies during rain events (5 – 10year return periods design capacities). The large area of bare soil in horticultural land lends itself to erosion during rain events and sediment deposited into streams has significant adverse effects on biological life. The inclusion of an instream waterbody receiving standard is necessary to ensure that discharges from cultivation do not result in a significant adverse effect on aquatic ecosystem health. The assessment of a visual change in clarity allows farmers and compliance officers the ability to gauge the success of erosion and sediment controls, and to ensure that the activity is not significantly adversely effecting aquatic health.

6. WIDTH OF EPHEMERAL STREAMS

6.1. Ms Wharfe in discussing the appropriate width for the definition of ephemeral waterbodies to have setbacks included in the regulatory regime states under 103 "*In the absence of clear evidence why the active bed width should be reduced, I cannot support the change being recommended*". The change Ms Wharfe is referring to is from an active bed width of 2m to an active bed width of 1m.

6.2. I have discussed in my evidence in chief the ecological importance of ephemeral waterbodies. I support amendments to the notified version of the plan in regards to '*or has an active bed width greater than 2m*' to '*or greater than 1m'*. There would be few ephemeral streams greater than 2m so a threshold of 2m would essentially mean no protection for ephemeral streams in the region. I would oppose that.

7. WETLANDS

7.1. Mr Hartly raises concerns regarding the definition of wetlands and the appropriateness of setback distances from these habitats (paragraphs 3.1 –3.7). He states *"However, I do not support the application of a 10m setback from activities from wetlands as I do not consider that the need for this has been substantiated"*.

7.2. There is considerable research on the dramatic loss of wetland habitats in New Zealand (and in the Manawatu) from land use activities (Ausseil *et al.*, 2011) much of which was presented by Dr Gerbeaux in his evidence in chief at the Biodiversity Hearing. I support Dr Gerbeaux evidence, and concur with his conclusions (appendix 1). Dr Gerbeaux in reviewing the extent of wetland habitat remaining in the Horizons region states under paragraph 28 that "*In this report the Manawatu-Wanganui Region was found to have only 2.6% of original wetlands remaining which updates estimated made by Horizons staff of 3.04% (Maseyk 2007). Therefore, the region is only sitting just third from the bottom in regards to regions with the least wetland remaining (just slightly above Wellington Region with 2.3% remaining and Hawkes Bay with 1.9% remaining)*". Dr Gerbeaux goes on to state (para 29) that "*this means that the remaining wetlands in the Manawatu Wanganui region have a special significance both regionally and nationally*", and that (para 30) "*the most insidious changes have involved the "nibbling away' at the edges of wetlands, resulting in incremental and cumulative loss. This often occurred (and still occurs) because of lack of understanding of how wetlands function and the resultant failure to properly secure wetland boundaries*".

7.3. The remaining wetlands rarity, sensitivity to land use change and role as habitat for many rare organisms place them in the same place as rivers and lakes for setbacks (see above). Thus I consider that a 10 m setback should generally be applied for all wetlands (excluding boggy paddocks), but 20 m setbacks should be applied from wetlands defined as rare or threatened habitats under Schedule E.

Associate Professor Russell George Death

REFERENCES

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Barling R. & Moore I. (1994) Role of buffer strips in management of waterway pollution: A review. *Environmental Management,* **18**, 543-558.

Collier K. J., Cooper A. B., Davies-Colley R. J., Rutherford J. C., Smith C. M. & Willamson R. B. (1995) *Managing riparian zones: A contribution to protecting new zealand's rivers and streams vols. 1 & 2.* Wellington: Department of Conservation.

Wenger S. (1999) A review of the scientific literature on riparian buffer width, extent and vegetation., pp. 59. Athens, Georgia: Office of Public Service and Outreach, Institute of Ecology.

Yuan Y., Bingner R. L. & Locke M. A. (2009) A review of effectiveness of vegetative buffers on sediment trapping in agricultural areas. *Ecohydrology,* **2**, 321-336.

Appendix 1

Evidence in Chief of Dr Philippe Jean Robert Gerbeaux for Proposed One Plan Biodiversity Hearing