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	**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

SUPPLEMENTARY REBUTTAL 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 SUSTAINABLE LAND USE/ACCELERATED EROSION

16 APRIL 2012

Helen Atkins
PO Box 1585
Shortland Street
AUCKLAND 1140

[redacted] 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

INTRODUCTION

1. My name is Andrew John Barber and I have prepared this supplementary statement of rebuttal evidence in response to the rebuttal evidence of Garth Eyles and Norm Ngapo for Wellington Fish and Game in relation to the Code of Practice for Commercial Vegetable Growing in the Horizons Region ("**Code**").

CONTEXT FOR THIS SUPPLEMENTARY REBUTTAL EVIDENCE

2. This statement of supplementary rebuttal evidence addresses the following statements in the rebuttal evidence of Mr Eyles and Mr Ngapo:

Garth Eyles

(a) "While I support the development of industry codes of practice I believe that these codes, in regards to sediment/ nutrient and erosion control, need to be supported by quantitative evidence that the practices will result in minimal sediment/nutrient generation and water quality change."[1];

(b) "Little information is provided on the research design and robustness."[2]

(c) "…there is a noticeable lack of quantitative information regarding the likely performance standard discharges…".[3]

(d) His conclusions in relation to the Code at paragraph 5.7.

Norm Ngapo

(e) "Although a useful document, the Code of Practice is relatively new. There has not been sufficient time to undertake trials, collect data and provide a satisfactory level of confidence in the engineering performance standards and efficiency of erosion and sediment control measures proposed in the Code of Practice. Ideally, the Code of Practice should be able to recommend measures that can achieve an effective level of control over storms of up to a specific critical design level.

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[1] Paragraph 5.3
[2] Paragraph 5.4
[3] Paragraph 5.5

Without this confidence, it is imperative that the discharge standards remain clear, measurable and enforceable."[4]

(f) "I have read through the Code of Practice, and concur that it provides a good basis for erosion and sediment control for vegetable crops. The four stages approach described in Mr. Barber's evidence is consistent with other methodologies relating to erosion and sediment control.

However, I am concerned that there is currently no provision for a number of key elements that should be included in the Code of Practice. These include:

- Checking the standard of works;
- Contingency provisions if a cover crop cannot be established;
- Monitoring for off-site effects on receiving environments as part of the process."[5]

3. I note that these specific concerns with the Code were not the subject of expert conferencing and if they had been I would have been able to provide this response then. I also note that the same issues have arisen in relation to the Surface Water Quality Topic and I have included this same information in my rebuttal evidence for that hearing.

SUMMARY

4. The sediment trap design criteria of 0.5% storage volume for a vegetable growing operation is equivalent to or better than the 2.0% storage required on earthwork sites (Erosion and Sediment Control Guidelines for the Wellington Region and Auckland's TP90). On vegetable growing land 0.5% decanting storage can accommodate a 74mm 24 hour rainfall event (P_{24}) while for an earthworks site 2.0% decanting storage will accommodate up to a 65mm rainfall event (P_{24}).

5. Based on the NIWA rainfall records for Levin since 1990 there have been only 5 rainfall events of more than 74mm per day, or an occurrence interval of once every 4 years. There have been 9 events of more than 65mm (the maximum was 84mm).

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[4] Paragraph 7.6
[5] Paragraphs 7.12 and 7.13

BACKGROUND

6. The Code is based on years of research into minimising soil erosion on vegetable growing land (e.g. Franklin Sustainability Project (FSP) 1997 – 2004 and Holding it Together (HIT) 2007/08 – 2010/11). The sediment control guidelines in the Code direct growers using a hyperlink (page 29) to TP90 and TP223 (Auckland Council's erosion and sediment control guidelines, which also forms the basis of Wellington's guidelines). Page 30 of the Code has a hyperlink to the Soil and Drainage Management Guide prepared by FSP. As stated in my rebuttal evidence for Sustainable Land Use the sediment control guide was developed based on many decades of combined experience 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).

7. The analysis presented below demonstrates the justification for the vegetable growing sediment control measures adopting a storage capacity of between 0.5% – 1.0% (50 – 100 m^3/ha) compared to TP90/TP223 using 2.0 – 3.0%.

8. TP90 was developed for Land Disturbing Activities like construction of subdivisions, roads, landfills and other earthwork sites. There are two distinct differences between earthworks and cultivation; the volume of runoff and type of suspended sediment.

9. Earthworks generate more runoff with finer clay sediment that takes longer to settle compared to the discharge from cultivated land.

10. The design criteria for a sediment control device on vegetable growing land can therefore be smaller than on an earthworks site, while still achieving the same outcome.

Runoff calculation

11. Based on the Auckland Regional Council guidelines for stormwater runoff modelling (TP108), runoff depth is determined using the equation:

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S}$$

Where:

Q = runoff depth (mm)

P = rainfall depth (mm)

S = potential maximum retention after runoff begins (mm)

Ia = initial abstraction

$Ia_{cultivation}$ = 4.6. This is based on 92% pervious area (100% pervious = 5)

$Ia_{earthworks}$ = 2.5. This is based on 50% pervious area

$$S = \left(\frac{1000}{CN} - 10 \right) 25.4$$

Where:

CN = curve number

12. The curve numbers were developed by the U.S. Department of Agriculture (SCS, 1986). The soil group is B – alluvial sediments. The cover condition is good, which encourages average to better than average infiltration. The CN value is 75 being a mixture of straight row crops plus fallow land with crop residue cover. Earthworks were given a CN value of 92.

$$Runoff\ \ factor = \frac{CN}{200 - CN}$$

The runoff factor is therefore 0.60 for cultivated and 0.85 for earthworks.

13. The cultivated runoff figure using the SCS approach is at the upper end of the runoff factor used in the Rational Method (CPA, 1983) where the runoff coefficient for a medium soil with an open crop is 0.58 at a high rainfall intensity of 30mm/hr. Actual runoff factors produced by Les Basher (Landcare Research, unpublished) from vegetable growing land in Pukekohe ranged between 0.07 and 0.45. This suggests that the runoff factor that we are using is conservative and gives us confidence that it is likely to be less than this.

Storage volume

14. Based on the methodology described above I determined the maximum rainfall over a 1 hour and 24 hour event that a 0.5% and 2.0% decanting sediment trap could accommodate before overflowing. The decanting rate was 3L/sec/ha (TP90). The traps will decant 10.8m^3 in an hour and 260m^3 over 24 hours.

15. A storage capacity of 50 m^3/ha or 0.5% will cope with a 74mm rainfall event over 24 hours before overtopping. Quadrupling the volume to 2.0% would accommodate a 94mm rainfall event. On an earthworks site, 2.0% storage can accommodate a 65mm rainfall event before overtopping.

16. On vegetable growing land 0.5% storage outperforms 2.0% on an earthworks site.

17. On vegetable growing land storage of 0.5%, with a decanting device, can accommodate a 1 hour rainfall event of 30mm.

Levin rainfall events

18. Based on the NIWA rainfall records for Levin the maximum daily rainfall since 1990 was 84mm. In that time there has only been 5 events of more than 74mm, or an occurrence interval of once every 4 years. In that same time there has been 9 events of more than 65mm where silt traps on earthwork sites would have overtopped.

19. Hourly rainfall records have been kept since 1995 and in that time the maximum rainfall in an hour was 26mm (23/12/1995), within the 0.5% storage capacity for vegetable growing land. In the 24 hours either side of this highest intensity rainfall event 64mm of rain fell, again within the design limits of a 0.5% storage volume for vegetable growing land.

Silt traps are just one piece of the jigsaw

20. It must also be remembered that sediment control measures, such as earth bunds and silt traps, are just one component in an overall erosion and sediment control plan. As stated in the Code the paddock assessment is absolutely critical and that "*silt traps work best in combination with other practices that reduce the amount of soil reaching the traps. Silt traps alone are not the only means of controlling soil loss, but are part of an overall system.*"

CONCLUSION

21. The approach advocated in the Code beginning with a paddock assessment followed by a hierarchy of measures starting with stopping or controlling water from entering a paddock, then erosion followed by sediment control is consistent with other erosion and sediment control guides. The erosion measures are based on years of trials and grower experience. The sediment control measures provide the same level of control as advocated in other guides.

22. Like the Whole Farm Plans the Code also reflects what can be practically implemented by growers.

A J Barber

16th April 2012

REFERENCES

Beca Carter Hollings and Ferner Ltd (April 1999) Guidelines for Stormwater Runoff Modelling in the Auckland Region, prepared for Auckland Region Council, Technical Publication 108.

SCS (1986) Urban Hydrology of Small Water Sheds, Technical Release No. 55, U.S. Department of Agriculture, Soil Conservation Service, 2nd ed.

Concrete Pipe Association of Australia, 1983. Hydraulics of precast concrete conducts pipes and box culverts - hydraulic design manual. Prepared by CPA Technical Committee.