BEFORE THE ENVIRONMENT COURT		**ENV-2010-WLG-00148**
UNDER	the Resource Management Act 1991	
IN THE MATTER	of an appeal under clause 14 of the First Schedule of the Act	
BETWEEN	**FEDERATED FARMERS OF NEW ZEALAND**	
	ENV-2010-WLG-000148	
	Appellant	
AND	**MANAWATU-WANGANUI REGIONAL COUNCIL**	
	Respondent	

STATEMENT OF EVIDENCE IN REBUTTAL BY
DR JOHN (JACK) ALLEN McCONCHIE

on behalf of

FEDERATED FARMERS
MICHAEL PETERSEN &
TAUMARANUI FARMERS' GROUP 2008

30 March 2012

INTRODUCTION

Qualifications and experience

1. My full name is Dr John (Jack) Allen McConchie. My qualifications and experience are set out in my evidence-in-chief to the Environment Court, dated 15 February 2012. My rebuttal evidence complies with the Code of Conduct for Expert Witnesses in the Environment Court Consolidated Practice Note (2006). Other than where I state that I am relying on the evidence of another person, my evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2. I attended both rounds of Technical Expert Conferencing held on 7 February 2012 and 9 March 2012. I am party to the outcomes of those conferences.

3. I wish to provide rebuttal evidence to the statements of evidence of:

   (a) Russell Death;

   (b) Allan Kirk;

   (c) John Quinn;

   (d) Andrew Barber;

   (e) Garth Eyles; and

   (f) Norm Ngapo.

EXECUTIVE SUMMARY

4. There are a number of common threads throughout the evidence of a number of the parties listed above. Rather than to identify these specifically in each body of evidence and then repeat my argument, I propose to discuss the specific issues only once. Further, many of the issues raised by these persons are addressed fully in my evidence-in-chief. I will not re-state that information here.

5. There is a basic argument implicit throughout all the above evidence that a vegetation cover, preferably a native vegetation cover, is the panacea to addressing erosion. As discussed at length, and supported by a growing body of scientific evidence, erosion and slope failure do occur under a

complete natural vegetation cover. In fact, there is considerable evidence to suggest that while the frequency of erosion may be less under forest, when it does occur the loss of regolith is greater, and the impact on lower slopes and wider catchment is considerably greater.

6. While it is potentially true that if the native forest had never been cleared erosion rates over the last 100 years may have been lower, the reverse is certainly no longer correct. As outlined in my evidence-in-chief, regolith has been stripped off New Zealand's pastoral hillcountry episodically. However, once the regolith has been removed these slopes become some of the most erosion resistant in any catchment.

7. There is also an argument that erosion today, under current land use, is worse than in the past. As outlined in my evidence-in-chief this is demonstrably incorrect. In fact, the productive low lands of the Horizons region and about 40% of New Zealand's land area would not exist if it was not for the products of past erosion. It is essential that a realistic perspective is retained, and that the effects of discrete, extreme events are placed in context when developing any land management regulatory regime.

8. Much of the motivation for the planning instruments proposed in Horizon's One Plan appears to be the shallow soil slips which occurred during the 2004 extreme rainstorm event. This raises a number of issues:

(a) This was an extreme event, certainly in excess of 100-years, and therefore sets standards for land management at a significantly higher level than for the management of any other natural hazard.

(b) The most obvious effects of erosion during this event i.e. the shallow soil slips, actually contributed very little sediment to stream channels.

(c) The slopes which failed are now some of the most stable throughout the Horizon's region.

(d) The majority of sediment contributed to the rivers and streams of the region came from a few large scale features.

(e) The majority of damage to infrastructure was actually caused by the failure of forested slopes and forest debris.

9. It is critical therefore that the actual problem being addressed by the proposed planning instruments is clearly understood. Any land management instruments must actually address the specific problem, and not just the perception of a problem, if they are to have any success.

10. It is also important to recognise that not all erosion is the same; either in cause or effect. Therefore an instrument for addressing a particular potential problem may not be appropriate in all situations. To address potential 'solutions' at the 'lowest common denominator' i.e. to spread the solution too thinly or in an untargeted fashion, is wasteful of resources and counter-productive. For example, to attempt to address gully erosion with the same instruments as soil slips fails to recognise the differences in the processes operating, the causes of the instability, and the potential for control.

11. There is no doubt that the clear identification of land which will erode if managed in a particular way would be a valuable tool. The difficulty is that we do not possess either the technology or ability to identify such a condition for the majority of natural slopes. What has been proposed are general mapping approaches at a range of scales. Invariably at a regional level the landscape has been mapped at a small scale i.e. 1:50,000 or smaller. Since erosion tends to be relatively small scale, a very conservative approach is adopted where all land with particular characteristics, in which some areas exhibit erosion, are classed 'erosion prone'. In reality, even those units mapped as the 'worst affected' areas are over 80% stable. Any other 'normal' classification system would consequently classify these areas as stable rather than erosion prone. To adopt such a planning approach therefore places restrictions over a large amount of stable terrain which can be, and most likely has been, farmed productively and sustainably for a considerable period of time.

12. I would certainly support the mapping of active erosion areas. However, to focus attention and resources on areas which are no longer eroding, or are unlikely ever to erode, is both inefficient and ineffective. To identify active erosion requires mapping at a large scale, such as the farm scale at say 1:8,000 or larger. To impose constraints relating to land management over areas which are demonstrably 'stable' is inappropriate.

13. It was pleasing to see that the Hearing Panel has recognised the potential benefits of industry Codes of Practice. Properly trained persons undertaking any work are in the best position to affect positive outcomes. I would endorse the incorporation of the CoP for horticultural land into the One Plan. I believe that similar CoPs relating to tracking, roading, and vegetation clearance would also be effective instruments for minimising the risk of erosion. Such CoPs would also remove the need for complex and ineffective regulatory mechanisms.

14. The key fact is that 'one size does not fit all' when it comes to erosion control and mitigation. The risk and control of erosion is highly site specific, and must be addressed at the individual site level. To have planning instruments which limit land use options over land which is predominantly stable is incredibly inefficient and potentially counter to sustainable land management. 'Broad-brush solutions' while appearing to provide a regional solution are also likely to be ineffective. Targeting erosion control at particular 'trouble spots' will achieve much more cost-effective and greater environmental outcomes.

15. It must be recognised that all activities involve some risk and all of New Zealand is subject to natural hazards. We continually have to balance the risk inherent in a particular activity against the benefits e.g. driving a car. While you can minimise the risk of having a vehicle accident by not travelling in a car, you will not stop erosion by preventing the formation of tracks or vegetation clearance. It is therefore critical to balance the risks against the benefits in a realistic framework.

16. In many areas of activity the guideline is the application of 'industry best practice' rather than not undertaking an activity at all. This links directly to the value of CoPs discussed above. Such an approach recognises the inherent uncertainty of environmental processes, and the need for site specific assessments and solutions with regard to erosion control.

17. The issue of setbacks from streams and water bodies reflects another area where there is a lack of understanding. Riparian margins are only potentially effective sediment traps where there is overland flow of water and sediment. Where flow is channelized, a riparian buffer is completely

ineffective; irrespective of its width. Therefore whether a riparian buffer will be effective, and how wide it should be to optimise any effect, is highly site specific. While a 5m riparian buffer from water-bodies identified in the rules appears to be a reasonable compromise, the optimum width will actually vary considerably throughout any catchment.

18. Requiring a setback from ephemeral water courses ignores the processes of flow generation, and consequently sediment and nutrient movement. Ephemeral water courses flow infrequently and not at all in many years. They are usually grass or vegetation covered. Therefore any sediment or nutrients which end up in such locations are invariably bound and 'locked up' prior to any flow event. Such areas therefore pose little or no risk of sediment and nutrient loss to the lower catchment.

19. Riparian buffers are only really effective at preventing sediment and possibly nutrients in overland flow from entering a river or stream. Where there is channelized flow, riparian buffers have been shown to be ineffective at achieving these environmental outcomes. It is significant that overland flow from other than agricultural or densely stocked land uses is very rare in New Zealand; so much so that when it is actually observed it is a 'special event'. Therefore, if overland flow is not occurring any riparian buffer is likely to be ineffective.

RUSSELL DEATH

20. *(12 & 28)* It would appear that Dr Death fails to recognise the wide diversity of landscapes, river systems, and environments within the Horizons region. As a result, comments which may apply to a few specific locations are applied generally across the entire region. For example, agriculture *does not* always result in increased levels of deposited fine sediment. Agricultural practices may expose the soil. However, whether this is eroded, transported off site, or deposited in a river is controlled by a wide range of factors. In fact, land use is only one of a multitude of factors which affect the erosion, transportation, and deposition of sediment. As mentioned earlier, there is considerable evidence that erosion and sedimentation have both been significantly higher in the past than at present.

21. Furthermore, the potential effect of any sediment deposition is directly related to the nature of the existing substrate of the water body. Areas where sedimentation rates are likely to be high are generally in softer, easily eroded material where the river beds are composed of similar material. Fine material in such rivers and streams therefore has little adverse effect. In the harder rock terrain, where fine sediment could potentially be a problem, the steeper river channels, faster flow velocities and greater turbulence mean that deposition of fine material is unlikely. Again, detailed site specific analysis is required to identify whether there is a potential problem relating to the deposition of sediment and how this can be best addressed. A 'one size fits all' actually fits very few.

22. Dr Death appears to support very wide riparian setbacks irrespective of their location or potential effect *(16)*. As discussed above and supported by the evidence of others and the decisions version of the Plan, if a standard setback is to be adopted then 5m appears realistic. Such a width recognises that the greatest increase in effectiveness of the buffer on sediment entrapment occurs within the first few metres. However, it must also be recognised that as soon as channelized flow occurs any riparian buffer, irrespective of its width will be ineffective.

23. Excessive riparian buffers are an example of where a 'broad-brush solution' applied across the region would have major consequences and costs for land managers but few quantifiable environmental benefits. Site specific solutions for particular erosion 'hot spots' would achieve more cost-effective and efficient environmental outcomes.

24. As discussed above, there are no practical reasons to have riparian setbacks from ephemeral streams (17). Since any sediment and nutrients are bound to the bed of the 'stream' prior to the flow of any water they are unlikely to be entrained and moved further down the catchment.

ALLAN KIRK

25. It is suggested that the dominant limitation to long term intergenerational use of soils in the region's hillcountry is accelerated erosion *(4)*. I would question this at two levels. First, as argued by myself and several other experts the use of the term 'accelerated' is emotive and difficult, if not

impossible, to confirm in rural areas. I have discussed this issue in detail in my evidence-in-chief, and Mr Eyles and Mr Ngapo have provided similar comments. Secondly, much of the hillcountry in the Horizon's region has already been farmed for generations. There is no evidence that this land has been farmed unsustainably, or that erosion is limiting the use of this land.

26. I would endorse and support Mr Kirk's recommendation of a *'realistic and effective riparian setback is 5m' (42).*

JOHN QUINN

27. It is significant that Dr Quinn recognises the site specific nature of the controls on an effective riparian buffer but then suggests a 10m buffer adjacent to particularly sensitive water bodies *(13).* This raises a number of issues, not the least of which is the definition and then identification of *'particularly sensitive water bodies'.* If some water bodies require a wider riparian buffer one can assume that others require a narrower buffer. Without a detailed site-specific scale survey the identification of the most cost efficient and effective buffer width is impossible to define. However, a width of 5m would appear to maximise the increasing effectiveness of the buffer to trap sediment. Again, it must be recognised that where channelized flow exists no riparian buffer will be effective at preventing sediment from entering the stream.

ANDREW BARBER

28. With respect to Mr Barber's evidence it is pleasing to see a number of issues addressed. First, Mr Barber provides detailed evidence that there is a wide range of techniques which can be used to prevent sediment from entering rivers and streams *(35).* Many of these soil conservation and erosion control techniques are significantly more effective than riparian buffers. Secondly, that the optimal solution to minimising soil erosion and sediment loss is achieved through detailed site specific investigation, and then the adoption of a range of measures. Third, that Horizon's Regional Council recognises the benefit of an industry adopting a CoP. When this industry best practice is implemented by those on the ground with the appropriate local and expert knowledge the most cost efficient and

effective solution is likely to result without the need for further planning instruments.

GARTH EYLES

29. The majority of Mr Eyles evidence focuses on the use of the LUC to guide land management decisions. I have no issue with the use of the LUC at the farm scale where the mapping detail and resolution is high enough to clearly identify the various land units, active erosion, and any potential limitations. The key issue is the clear and specific identification of active erosion features; their form, nature, and characteristics. Only once this is done can the risk of particular activities on the erosion processes be clearly and accurately assessed.

30. The major difficulty with applying the LUC is when it is used and mapped at a smaller scale, such as at 1:50,000. When used at small scales the various units are invariably larger, and therefore small areas of erosion (either active or relic) assume greater overall significance. The existence of one erosion feature, no matter how small or how old, when mapped (in some cases over 30 years ago) is assumed to imply an erosion risk to the entire unit. Even where the erosion is classified as 'severe', over 80% of the LUC unit is usually stable with no evidence of erosion. This land can most likely be farmed (and potentially has been farmed) sustainably over a long period of time.

31. The LUC is therefore a very blunt planning instrument when used at a small scale. Its use will impose a land management planning burden on farmers which in the majority of cases will subsequently be shown to be unnecessary i.e. having applied for a consent it will either be granted, or the land holder will be told that they do not require one for that specific activity.

32. I would like to see that all properties have an active Farm Plan, which would include LUC mapping at a large scale. However, the benefits of LUC mapping are not so quantifiable when the LUC is used at a regional scale. Education and training of those making day-to-day decisions will achieve greater environmental outcomes than regional scale planning instruments and potential enforcement.

NORM NGAPO

33. My comments regarding LUC mapping, and particularly the importance of an appropriate scale, also relate to Mr Ngapo's evidence. It is pleasing that he also recognises the difficulties inherent with using the LUC when mapped at a small scale i.e. regional scale *(24)*.

34. While riparian buffers can provide a range of positive environmental outcomes *(57)* they are not the solution to potential water quality issues in all situations. As explained earlier, riparian buffers are only effective when used to treat overland flow induced sediment and nutrient movement.

35. Riparian buffers also have a range of potentially adverse effects. These include trapping debris, blocking channels, constricting river flow which exacerbates flooding, depositing woody debris into the channel, and pest and weed control etc. It is important to recognise therefore that riparian buffers are not universally effective, or even an efficient means of controlling sediment movement in many situations.

36. While stock exclusion can on occasion improve the effectiveness of riparian buffers *(58)* this also has a range of management implications. These include the need for stock to access water, the cost of fencing, and on-going maintenance.

37. While Mr Ngapo argues that earthworks over 2500m² are 'very large' *(73)* such activity actually requires less than 30 minutes with a bulldozer. It is very important that the scale of operations and the scale of potential effects are kept in context. Furthermore, it is often important to consider the short term costs against longer term benefits. For example, earthworks required to install a culvert may result in an overall reduction in sediment to a stream, and improvement in both water quality and the aquatic habitat.

TECHNICAL CONFERENCING

38. As stated previously I have been involved in two rounds of Technical Conferencing on Sustainable Land Use and Accelerated Erosion. As is obvious from the correspondence relating to those conferences, while there was unanimity with regard to various issues there was still a considerable range of opinions as to how optimum environmental outcomes can be best achieved.

39. As is evident from the caucusing minutes I believe that any evaluation of erosion activity and susceptibility needs to be undertaken at a very large scale. It is important that emphasis is placed on clearly identifying where erosion is occurring or likely to occur. In this way remediation effort can be focused where it will achieve the greatest return. Mapping at a small scale, by whichever method, includes within any defined 'hazardous zone' a majority of stable land. As a result constraints will be placed on land use activities where they are unnecessary and will achieve nothing.

40. As explained in my evidence-in-chief the greatest return from any regional assessment of erosion would come from identifying those features which are supplying the bulk of sediment to the river and stream systems. The importance of these few large features to the overall sediment budget of rivers and streams was highlighted during the 2004 event.

41. Any erosion assessment must recognise the site-specific nature of erosion and its various controls. This requires detailed large scale mapping. As an alternative the hearings panel opted for the use of slope angle as the major criterion for assessing the erosion hazard. While not ideal, in the absence of any large scale tool which considers active erosion and its control, it is a relatively easy index to apply in the field if some guidance is provided as to how slope should be measured. My evidence-in-chief discusses the use of slope angle as an erosion hazard criterion in considerable detail.

42. Any regional mapping of erosion risk must provide a resolution which allows actual erosion or future erosion to be clearly identified. These areas must be distinguished from land which is stable and can be managed sustainably. The mapping also has to identify which erosion processes are operating, and why and how they are operating. In this way the controlling

parameters can be isolated. As explained all erosion is not the same, it is not caused by the same processes, and cannot be controlled by the same methods. Detailed regional mapping is currently not available as explained in my evidence-in-chief. Until precise mapping at a large scale and high resolution is available the most effective and efficient way to 'manage' the erosion hazard is at the farm scale. This involves working with and through the landowner.

43. The major difficulties with the HEL model are that of scale, and the assumption that future erosion is dictated by past events. As explained in my evidence-in-chief much of the potential erosion assessment in HEL is based on past slope failures. In many instances past erosion actually increases the resistance of the slope. Therefore to use past events is counter-intuitive for many forms of erosion. The authors' own testing of the HEL model showed that it was actually a very poor at explaining the location of soil slips during the 2004 event. And this was a large event where the potential of crossing some stability threshold was actually significantly greater than the norm i.e. the model should have actually been more effective at identifying erosion during this large event.

44. I believe that it is actually more credible to argue that, with the exception of perhaps gully erosion, the fact that land has not failed in the past means that it was actually more resistant than the adjacent eroded area. Such areas should not be considered inherently unstable as argued by the HEL mapping methodology.

45. It is important that any thresholds for land disturbance, either by earthworks or vegetation clearance, are defined by contiguous area and not simply cumulative area. Larger holdings may have many small areas of disturbance over the property. While individually small, collectively these areas may exceed the 2500m² threshold. Such small areas, however, pose no risk of erosion or sediment transport. It is significant that the 2ha threshold with respect to vegetation is stated to be a contiguous area in the evidence of Phillip Hindrup on the proposed rule 12-4A. It would appear therefore that this requirement should have also been applied to the land disturbance rules.

46. It is significant that no 'minimum threshold' is included with regard to land disturbance. For this reason, and to recognise the diversity of landscape across the region, it is important that some flexibility is provided within any rules. It is suggested that 'appropriate' be used in relation to the need for soil conservation and erosion control methods. For example, the requirements for digging a hole to bury dead stock should be significantly different to those required when extending a track or constructing a building platform.

47. While the technical experts could not reach agreement on the value of the current level of regional mapping there was general consensus regarding the value of individual farm assessments. That is, the experts recognised the problems caused by 'mapping or assessment scale' but there was a diversity of opinion as to how these should be addressed.

48. There was also general agreement on the value of Codes of Practice to ensure industry best practice rather than regulation. CoPs recognise the site specific nature of erosion, and the wide range of possible control measures which can be adopted to reduce, mitigate or remedy any potential effects. Just as there is no single criterion for land which will erode, there is no single solution. CoPs provide flexibility to tailor the most cost-effective and efficient solution to any potential problem at the site scale. Those on-site, with the appropriate knowledge and expertise, are best placed to make the informed decisions necessary to ensure sustainable land management.

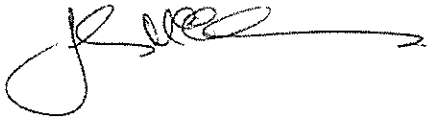
49. If a CoP was developed for contractors involved in earthworks and vegetation clearance, and if operators complied with the code, then further regulation would be unnecessary. Industry best practice would be applied to each situation providing the optimum environment outcomes.

SUMMARY

50. Soil erosion needs to be treated at a site-specific level because of its diversity of forms, causes, and potential consequences. The use of current regional scale mapping to identify areas with potentially higher risk of erosion is ineffective and inappropriate. It does not direct resources where they will be most effective. At a regional level attention and

resources should be directed at those relatively few large scale erosion features which supply the bulk of debris to the river and stream systems. Many of these features are already known, and have been active for decades. Others were formed, or became more obvious, following the 2004 event. Controlling the supply of sediment from these features would be the most cost-effective, efficient, and quickest way of reducing the sediment load in the regions' rivers and streams.

51. Erosion is best managed and controlled at the farm or project scale. Those on the ground must have the appropriate knowledge and expertise to make the informed decisions necessary to ensure sustainable land management. Land management at this large scale, and the application of industry best practice, will provide the optimum environment outcomes.



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30 March 2012