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 NORMAN IAN NGAPO

1. INTRODUCTION

1.1. My full name is Norman Ian Ngapo. I have the qualifications and experience set out in my Statement of Evidence dated 17 February 2012.

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.

1.3. 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 around areas of agreement and disagreement between me and other witnesses as recorded in the conferencing statement, and to respond to some matters raised in the evidence of Dr McConchie, Mr. Hartley and Mr. 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. COMMENTS REGARDING THE CONFERENCING STATEMENT

4.1. In paragraphs 6 and 7 of the expert conferencing statement, all the witnesses agreed that 2500 square metres of contiguous area was the area of land below which adverse effects resulting from erosion and/or sediment discharges from land disturbance were likely to be no more than minor for land that has a high risk of erosion (Erosion Management Areas), if 'appropriate' (site specific assessment by soil conservator and review and agreement to erosion and sediment control methods) levels of erosion and sediment control were in place to avoid sediment contaminated discharges to water (paragraph 7).

4.2. In my evidence- in chief, I did not cover the specific erosion and sediment control measures which would be required to ensure that land disturbance over 2500m^3 in erosion management areas would not cause more than minor adverse effects, and did not propose that they ensure no discharges to water. Rather my proposal relied solely on a very limited allowable area of land disturbance, together with the need for a resource consent with site- specific erosion and sediment control measures for disturbance beyond that area, to lower the risk of adverse effects to an acceptable level. I note that the agreement reached in conferencing still requires a site specific assessment by a soil conservator and review and agreement of the erosion and sediment control plan.

4.3. The agreed limits reached at the expert conferencing resulted from what those present considered to be a pragmatic approach, based upon the putting in place of 'appropriate' erosion and sediment controls which would avoid any discharge to water. It would allow for a range of common land disturbance activities (such as short access tracks, sites for yards, and forest skid sites), so the threshold level proposed is a practical one. However, I only consider that would be an acceptable area for land disturbance in an Erosion Management Land area if sediment and erosion control measures can be put in place which will ensure that the activity does not increase the risk of erosion and that the activity does not result (directly or indirectly) in a discharge of sediment to water.

4.4. I also note that in paragraph 7 of the conferencing statement, all the witnesses present agreed to the use of the word "appropriate" to describe the erosion and sediment

control measures required because of the variability throughout the region and consequently the need for site specific management decision –making.

4.5. We also agreed in paragraph 13 that the Council needs to scrutinize any erosion and sediment control plan and that it may be necessary for Council to require that changes be made to an erosion and sediment control plan to ensure its appropriateness for a particular activity, and to ensure that the activity will not result in an increased risk of erosion or the discharge of sediment to water.

4.6. I consider that is the case for land disturbance activities both within and outside Erosion Management Areas.

4.7. Paragraph 25 of the conferencing statement records that there was disagreement regarding the width of ephemeral waterways that setbacks should apply to. I consider that the term ‘active bed’ provides a clear definition that can be easily understood in the field. An ephemeral stream with an active bed will flow relatively often; otherwise it will not have an active bed.

4.8. I also consider that a 1 metre width is an appropriate stream width to use, particularly as it is linked to the definition of ‘active bed’. In tertiary geology, active stream beds will tend to naturally degrade (deepen) over time, and doubling the stream width from 1 metre to 2 metres could result in ephemeral streams with relatively high flows being left out. As an example, if a 2 metre threshold was adopted, then a 1.5 metre width stream would be left out. Therefore, if we assume a flow rate in a 1.5 metre wide stream during flood conditions of 2 metres per second, and adopt a conservative water depth of 30 centimetres deep, this gives a flow rate of 900 litres per second. At just under 1 cubic metre per second, that is quite a substantial flow rate, using assumed figures that are reasonably conservative.

4.9. I therefore consider that using a threshold of 1 metre wide ephemeral stream with an active bed for applying riparian setbacks provides an appropriate and practical approach, because it will then include streams that will have reasonably substantial flow rates in flood conditions. There will be no need to know how often the stream will flood

because using this definition, the flood conditions will just need to happen often enough for the stream to have an active bed.

4.10. In terms of setback distances from water bodies (discussed in paragraphs 23 -27 of the conferencing statement), all witnesses agreed that the Collier Report (Collier et al 1995) should be used to determine appropriate setback distances. In setting setback distances, confidence levels will vary depending on a range of variables; type of land disturbance and methodology used, slope, soils, vegetation type / land use of riparian area, rainfall intensity / duration and antecedent conditions.

4.11. In my opinion, considering the effects of erosion and sediment only, a 6 metres setback should be the absolute minimum on flat ground (0 to 7 degrees) near water bodies for earthworks carried out under an approved Erosion and Sediment Control Plan (which would need to ensure meeting in- stream water clarity standards), or for cultivation activities carried out under a suitable Code of Practice (which would also need to ensure meeting water clarity standards).

4.12. If the water body has higher values (sites of significance or high aquatic values) this should be increased accordingly, as discussed by Associate Professor Death. However, the increased setback is still conditional on following best management practices and on there being little likelihood of discharge to the water body.

4.13. For slopes of 8 to 20 degrees, I consider that any setback distance should be increased to a minimum of 10 metres for cultivation and earthworks subject to the same conditions; following best management practices and avoiding discharge. For higher value water bodies, the distance should be a minimum of 20 metres.

4.14. For all other steeper slopes (over 20 degrees) for cultivation and earthworks, I consider that the setback distances should be at least 20 metres from water bodies that are recognised as having special significance or high aquatic values. However, if the slope is still greater than 20 degrees after 20 metres setback, the setback should be extended to where there is a clear change in slope to be less than 20 degrees. Best management practices should still apply. The reason for the increase in riparian setback with steeper slopes is that any stormwater runoff is likely to be channelised flow, and the

effectiveness of the riparian buffer to control erosion and sedimentation is reduced markedly.

4.15. Finally, I note that the setback distances Associate Professor Death proposes may be greater than the distances I am proposing here, as he is not restricting his consideration solely to the effects of erosion and sediment discharges as I am.

5. DR MCCONCHIE'S EVIDENCE

5.1. At section 13(dd) of his evidence, Dr McConchie seems to be implying that soil conservation works are a waste of time and money. If that is what he is saying, I do not agree. He states that;

> *"In 1988, a 'weather bomb' exploded over Tinui in Wairarapa. This had dramatic consequences in terms of slope instability, soil erosion, flooding and sedimentation. Immediately after the event, I visited the Pottinger property behind Tinui. Jim Pottinger had been deputy chair of the Wairarapa catchment Board for a number of years prior to the weather bomb. His property was a 'show piece' of all the latest soil conservation and erosion control techniques. The property was often used for field days, and visited by international experts to view New Zealand's approach to soil conservation.*
>
> *During this weather bomb many of the better producing and well managed slopes failed, bring down with them all the various erosion control measures which had been implemented. When talking to Jim Pottinger, I can quite clearly remember him looking at the scarred hill sides and saying "I had done everything possible to improve stability and still look what happened. What more could I have done". The truth is probably nothing."*

5.2. While Dr McConchie describes the damage he considers resulted from this one storm event, and provides one landowner's comments, he does not provide any specific information on rainfall, antecedent soil conditions, or erosion classification. As Dr McConchie describes the event as a "weather bomb", I would expect that Dr McConchie has further background information on rainfall intensity / duration to validate the event

being described as a ‘weather bomb’. However, he has not provided any supporting information on the size of the storm event, what type of works were affected, or what they were designed to control. I do not know if it was it gully erosion, earthflow erosion or soil slip erosion.

5.3. If we use the same analogy, as that stopbanks may be overtopped when the design flood is exceeded, then we should not build stopbanks. But anyway, in the particular example provided by Dr McConchie, because I have no information on the size of the storm event, I am unable to put it into the context of whether or not it exceeded what would be considered the critical or design storm event for the soil conservation works.

5.4. Both regionally and nationally, soil conservators have built on experiences such as the 1980’s storm that Dr McConchie refers to. We have modified practices to implement more effective soil conservation works, building on what we learn. We will continue to learn in the future.

5.5. From Dr McConchie’s comments, and having seen similar situations immediately after storm events, I would expect that the farmer was still in a state of shock at the time of the visit. Any comments made by the farmer at that time, should be viewed in that context. In a similar situation, I would expect any competent Land Management Officer to empathise with the farmer, talk through what worked / what didn’t work, and together with the farmer, develop strategies of what to do now. In my experience, it is important that farmers have an immediate short term work program as a first step to recovery.

5.6. I have discussed the storm event that affected Tinui in 1988 with Mr. Cameron who is Manager, Land Management at Greater Wellington Regional Council. In 1988, Mr. Cameron was a soil conservator based in Masterton, and recalls the Wairarapa Catchment Board working with the Pottinger family both before and after the storm event. From discussions with Mr. Cameron, my understanding is that following the storm event at Tinui in assessing the erosion problems which occurred, there were a number of lessons learnt. This included re-assessment of soil conservation recommendations for the steep sandstone hill country in the Tinui area.

5.7. Mr. Cameron confirmed that Jim Pottinger was a man who did all he could to improve stability (to use the words quoted) – he was not a man who thought he could control or prevent instability. In fact he continued with his soil conservation work until he retired and passed the farm onto his son, Andrew Pottinger. The Greater Wellington Regional Council continues to work with Andrew Pottinger to this day.

5.8. We have to live with what nature delivers. This includes expecting that from time to time, we will have severe weather events that can overwhelm any soil conservation works. People trained in soil conservation have never claimed to be able to stop erosion. However, they accept that there are always lessons to be learnt.

5.9. Based on my experience in carrying out soil conservation works in the Bay of Plenty, and observing works throughout the North Island of New Zealand over the last three decades, I consider that we can use best known practices to reduce the impacts of less severe events, particularly small to medium sized storms (10 to 20 year return period). This is achieved by increasing the resilience of the land through wise land use and best management practices. In my opinion, well planned soil conservation works will in turn reduce the potential for damage from larger storms – perhaps up to 50 year return period.

5.10. My view is also based on studies such as Marden (2004) which show that soil conservation works (including the planting of appropriate species to control specific types of erosion) are effective in reducing storm damage. Although for the very large storms the design limits for soil conservation measures are likely to be exceeded, this does not mean the works are not worthwhile.

5.11. At section 13(ff), of his evidence, Dr McConchie states,

> *"An erosion management model based on a single slope angle, or the land unit approach of the Land Use Classification (LUC), for the entire region is inappropriate. It casts an unreasonable, overly conservative, and unjustifiable 'net' over the landscape. Many persons would need to apply for resource consents when on investigation, they will be found to be unnecessary. This will impose considerable financial cost, cause*

significant delays in implementing management decisions, and place a major burden on Council staff."

5.12. Dr McConchie in his evidence proposes instead an alternative approach using a range of existing data sources to develop what he considers would be a robust regional slope stability model to derive slope from indices. The model that Dr McConchie suggests would presumably replace the existing systems that use the Land Use Capability (LUC) data from the New Zealand Land Resource Inventory system.

5.13. In my opinion, it is more cost effective, efficient, and reasonable to use the existing model mapping Highly Erodible Land (Dymond 2006), which uses a six part process which includes LUC units. Furthermore, I believe that Dr McConchie's comments show a lack of understanding of the LUC system, and its usefulness for providing information at both regional and farm paddock level.

5.14. As noted in the evidence of Mr. Eyles, and documented in the LUC Handbook (3rd Edition), the LUC system is robust and well tested over time, and there is a methodology set out for assessing the erosion potential of land. This methodology is covered in more detail in Mr. Eyles' evidence dated 17 February 2012.

5.15. The LUC Survey Handbook (3rd Edition) was updated from the 1971 Edition by a select group of land scientists (from AgResearch, Landcare Research and GNS Science) as well as experienced land management practitioners from throughout New Zealand.

5.16. Since the updating of the LUC Handbook, there have been several training courses run by selected trainers throughout the North Island, to ensure consistency in LUC mapping.

5.17. I therefore do not consider it is necessary to develop an alternative approach as suggested by Dr McConchie. I also doubt that there is sufficient data to provide a model such as proposed by Dr McConchie, or that such a model would be superior to the existing model which uses LUC as a component.

6. MR. HARTLEY'S EVIDENCE

6.1. In sections 2.7, 2.8 and 2.9, Mr. Hartley discusses the measurement of visual quality in receiving waters, as a result of land disturbance activities. In his evidence Mr. Hartley supports Dr McConchie's suggestion of using "noticeable change (in receiving waters) in colour or clarity," as he contends this would be more easily recognised in the field.

6.2. I disagree with this contention, as the term 'noticeable change' can be open to different interpretations, and is therefore not clear enough to provide certainty as to whether the standard would be met in accordance with compliance monitoring purposes.

6.3. I consider that using the "20% change in visual clarity after reasonable mixing" standard as currently provided for in schedule D is a more acceptable condition. It is clear, measurable, and enforceable. In my experience, any change in discharge that is clearly discernible by eye, is likely to be a 20% change in visual clarity, or greater. If there is doubt, then measurement of actual visual clarity can be undertaken, using black disc, sight tube or another similar portable device. As long as there is sufficient water depth/length, these instruments are user friendly. Alternatively, a grab sample can be taken for analysis.

6.4. In sections 2.10 to 2.20, Mr. Hartley discusses the use of slope and how it could be used as a condition for permitted activity status if "guidance was provided as to how and where the slope was to be measured." While I have a degree of sympathy for this approach, in my opinion, there are some problems:

a. I believe that if a slope criterion was to be used as a threshold for a permitted rule condition, then 20 degrees should be used (rather than 25 degrees), as this would be more likely to capture land with a potential for earthflow erosion.

b. Normally, Land Use Capability classification would be a better criterion rather than slope, as it can be used to give a more precise measure of potential erosion problems.

c. I have helped landowners measure slope, and it can be difficult. This is because much of our hill country is made up of compound slopes. The Land Use Capability approach allows for this, as slope classes are part of the multi factor classification.

6.5. In sections 2.16 to 2.20, Mr. Hartley supports the approach adopted by the Waikato Regional Council, using prescriptive narrative, rather than simply area of disturbance. While a descriptive narrative can be more comprehensive, it is also more complex, and may be difficult to translate in the field. This because prescriptive narratives attempt to deal with a wide range of different situations in the field. As an example, the Waikato Regional Plan, has a wide range of different thresholds set out under controlled and restricted discretionary rules for land disturbance activities that need to be referred to when interpreting the permitted activity rule. In my experience, a provision such as this should not be so complicated that there is difficulty interpreting it in the field. Instead, I favor a simpler, more pragmatic approach of using threshold levels of disturbance based on area and/or volume.

6.6. In sections 3.8 to 3.12, Mr. Hartley suggests that setback distances should be reduced for wetlands. I disagree. Wetlands are effectively a sink for contaminants (including sediment) in stormwater runoff, and those contaminants are not readily flushed out of wetlands. I consider a larger setback distance is necessary to reduce the risk of contaminants discharging into wetlands.

7. MR. BARBER'S EVIDENCE

7.1. Mr. Barber's evidence in sections 15 to 23 contends that, in respect of land used for vegetable crops in the Horowhenua area, the Best Management Approach is the best way to effect change in a way that will provide for a better environmental outcome for landowners who adopt that approach. He notes that under a Best Management Approach, the landowner accepts responsibility for dealing with the problem of erosion and sediment-contaminated runoff from their land.

7.2. I concur with Mr. Barber's comments in that the Best Management Approach is an excellent method for educating landowners in respect of horticulture.

7.3. Mr. Barber states 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"*

7.4. If any land disturbance activity is likely to result in a discharge to water, then the effects of the discharge on the receiving environment need to be considered. In my opinion, cultivation activities have the potential to result in high discharges of sediment into water. The risk is real and significant.

7.5. Mr. Barber comments that the discharge event is influenced by intensity and distribution of rainfall events, which are out of the grower's control. This is correct. However, the grower can easily address this issue by designing control measures to specific critical storm levels. This is standard engineering practice.

7.6. 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.

7.7. Without this confidence, it is imperative that the discharge standards remain clear, measurable and enforceable.

7.8. Mr. Barber also notes in section 20 of his evidence, that growers will have difficulty in correlating their discharge into terms that reflect the effect on water clarity. While that may be the case, I consider that growers should undertake their activity so that they do not discharge sediment at all, not discharge sediment and then try and work out how bad the effects of that discharge are. It is up to them to set management practices in

place to ensure that they don't discharge, or that the effects of any discharge are absolutely minimal.

7.9. I also note with some concern there is a lack of quantitative information regarding the likely performance standards on discharges from horticultural crops managed under a Best Practice Approach.

7.10. I strongly support the development of the Code of Practice for Commercial Vegetable Growers in the Horizons Region. However, I do not agree with adopting a Code of Practice approach alone, without some form of measurable performance target in the receiving environment to provide a feedback loop if there are significant effects on receiving waters as a result of discharges from the activity.

7.11. 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.

7.12. 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.

7.13. All erosion control measures should be designed to a particular sized storm event that is acceptable to Council. An audit system should be included as an integral part of the Code to ensure that erosion and sediment control measures are designed, installed and maintained in accordance with the Code.

7.14. I do not support Mr. Barber's conclusion in paragraph 33 of his evidence that a 5m riparian margin should be applied unless other more effective sediment control measures are used

7.15. Reducing the potential for discharges of sediment or erosion from cultivation requires a mix of best management practices which include riparian setback distances. Riparian setback distances on their own would not be sufficient to reduce the likelihood of discharge events which would impact on water quality, especially setback distances of only 5m. The information provided in paragraph 34 of Mr. Barber's evidence, where he records that Blanco-Canqui et al (2004) found a 90% reduction in sediment after an 8m vegetated filter strip, supports increasing the riparian setback distance.

7.16. I would reiterate that a mix of best management practices, including provision of riparian setbacks, is likely to result in the most effective control over sediment-contaminated discharges. This provides a higher degree of confidence in the overall Erosion and Sediment Control Plan and allows for the contingency that particular measures may be less effective than expected.

7.17. In section 31 of Mr. Barber's evidence, he says *that "in the cultivation rule 12-3, the unintended consequence of removing any reference to sediment control measures.....may mean that these activities are captured by the land disturbance rule 12-1."*

7.18. I agree with Mr. Barber's concerns. In my opinion, erosion control measures such as benched headlands, bunding and silt traps should not be captured as being part of the disturbed area under a permitted activity rule for earthworks.

Norman Ian Ngapo

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