

**BEFORE THE HEARING COMMISSIONERS
AT HAMILTON**

IN THE MATTER of the Resource Management Act 1991
(**"the Act"**)

AND

IN THE MATTER of the hearing of submissions on The
Proposed Waikato Regional Plan Change 1 –
Waikato and Waipa River Catchments: Block
2

**STATEMENT OF REBUTTAL EVIDENCE BY ANDREW JOHN BARBER
FOR HORTICULTURE NEW ZEALAND**

10 MAY 2019

QUALIFICATIONS AND EXPERIENCE

1. My full name is Andrew Barber. I have the qualifications and experience set out in my evidence in chief and I reiterate my compliance with the Code of Conduct.

PURPOSE AND SCOPE OF REBUTTAL EVIDENCE

2. In this rebuttal evidence I refer to the evidence of Deborah Kissick and Kate McArthur for the Director-General of Conservation (**DoC**) in relation to cultivation practices and setbacks.
3. The purpose of my rebuttal is to provide my opinion that while the evidence of Ms Kissick and Ms McArthur are likely to have relevance to pastoral activities they do not have relevance to cultivated commercial vegetable production for the reasons set out in my evidence in chief and reiterated further below. In stating this, I acknowledge that neither Ms Kissick nor Ms McArthur purport to be referring to commercial vegetable cultivation but rather have used the word cultivation very generically.

KATE MCARTHUR

4. In her evidence in chief Ms McArthur states (paragraph [35]) that riparian buffers are needed to provide effective reductions in the risk of contaminants reaching water.
5. My response to this is that view is predicated on the basis that such riparian buffers are effective. As noted in my evidence in chief such buffers are not effective in the case of cultivated production. This is because channelised flow makes the buffers ineffective tools for mitigating contaminant transport to water¹.
6. At paragraph [36] Ms McArthur notes, from the Land and Water Forum (**LAWF**) Fourth Report, that "*Councils should impose riparian setback and management rules over and above GMP requirements in catchments with specific water quality issues, where this is an effective way of managing a particular issue.*" My underlined emphasis supports my evidence that the use of such setbacks should only be applied where they are an effective way of managing the issue. Ms McArthur's evidence that supports buffers being effective appears to relate exclusively to pastoral land, where sheet flow rather than channelised flow predominantly occurs.

¹ Paragraph [51]

7. Ms McArthur's cited Parkyn 2004 paper², on the effectiveness of vegetated buffers. However, all the farm types in the Parkyn (2004) paper (see Table 2 of that paper) are pastoral.
8. A more recent review than Parkyn (2004) was conducted by Yuan et al., (2009). However, just like the Parkyn (2004) paper most of the cited research does not relate to cultivated agriculture. Mankin et al., (2007) showed 98% reduction in sediment through buffers, 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., (2004a, b) found that under concentrated flow (simulated using a V shaped channel) that the combination of a 0.7m switchgrass barrier trapped significantly more sediment than a filter strip alone. In their later study (Blanco-Canqui et al., 2006) the efficiency under concentrated flow of the barrier reduced to 60% as runoff increased. 91% of the sediment was trapped in front of the switchgrass barrier. The barrier was the most significant measure, not the vegetated land that followed. Also, the vegetated filter strip become functional after the channelised flow went through the 0.7m switchgrass barrier, presumably spreading out the flow and reducing the channelising factor.
9. Figure 1 below dramatically demonstrates what channelised flow in a cultivated situation can look like. It does not matter how wide the buffer is, sediment will not be reduced. There are better tools, and if these are impractical for a site then an Erosion & Sediment Control Plan may select vegetated barriers and/or buffers.

² Paragraphs [42] to [48]

Figure 1: Channelised flow



10. At paragraph [43] Ms McArthur cites Smith (1989) where there was 80% removal of suspended sediment using vegetated filter strips of 10 – 13m in width. Again this was a trial conducted in a pastoral situation, and although the authors' referred to channelised flow, the use of 1.5 – 2.4m long interception troughs to collect run-off from the pastoral catchment suggests the flow was not channelised in the way in which that term is used to describe channelised flow in a cultivated situation.
11. In my opinion, rather than supporting large riparian margins the research shows that riparian margins are unlikely to be effective at minimising sediment entering water in cultivated field conditions. As covered in my evidence in chief, other measures such as bunding (barriers), and sediment retention ponds may be more effective and will result in less productive land being lost. Where these measures are not appropriate due to the site-specific situation, then vegetated buffers may be the next most appropriate tool, but they are not the only tool in the toolbox.

DEBORAH KISSING

12. In her evidence at pages [22] to [29] Ms Kissick deals with stock exclusions, cultivation and setbacks. At paragraph [79] Ms Kissing refers to and supports (the evidence of Dr Robertson, Ms McArthur and Dr Stewart for DoC) set-backs for cultivation of between 5m and 20m depending on the water body being setback from.

13. My evidence in chief illustrates that a range of mitigation measures can be used to minimise sediment loss from cultivated land. As I stated, setbacks are a very blunt and, often ineffective tool for mitigating sediment loss. Therefore, I do not support the recommended cultivation setbacks.

Andrew John Barber
10 May 2019

Literature cited:

- Blanco-Canqui H, Gantzer CJ, Anderson SH, Alberts EE, Thompson AL. 2004a. Grass barrier and vegetative filter strip effectiveness in reducing runoff, sediment, nitrogen and phosphorus loss. *Soil Science Society of America Journal* 68(5): 1670–1678.
- Blanco-Canqui H, Gantzer CJ, Anderson SH, Alberts EE. 2004b. Grass barriers for reduced concentrated flow induced soil and nutrient loss. *Soil Science Society of America Journal* 68(6): 1963–1972.
- Blanco-Canqui H, Gantzer CJ, Anderson SH. 2006. Performance of grass barriers and filter strips under interrill and concentrated flow. *Journal of Environmental Quality* 35(6): 1969–1974.
- Mankin K, Daniel R, Ngandu M, Barden CJ, Hutchinson SL, Geyer WA. 2007. Grass-shrub Riparian buffer removal of sediment, phosphorus, and nitrogen from simulated runoff. *Journal of the American Water Resources Association* 43(5): 1108–1116.
- Yuan, Y.P.; Bingner, R.L.; Locke, M.A. 2009. A review of the effectiveness of vegetative riparian buffers on sediment trapping in agricultural areas. *Ecohydrology* 2(3) 321-336.