

## Josephine Laing

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**From:** Kirsty Jacomb <Kirsty.Jacomb@chapmantripp.com>  
**Sent:** Friday, 18 September 2020 4:35 PM  
**To:** Plan Hearings  
**Cc:** Ben Williams; Bianca Sullivan; Brent Walton  
**Subject:** Rebuttal evidence on plan change 7 to the Canterbury LWRP by Waimakariri Irrigation Limited  
**Attachments:** WIL\_Neil\_Thomas\_rebuttal\_evidence.pdf; WIL\_Stuart\_Ford\_rebuttal.pdf; WIL\_Mike\_Copeland\_rebuttal.pdf; WIL\_David\_Black\_rebuttal.pdf; CHCDOC01-#1571651-v2-WIL\_Bianca\_Sullivan\_rebuttal.pdf

Kia ora Tavisha,

Please find **attached**, on behalf of Waimakariri Irrigation Limited, rebuttal evidence on the proposed Plan Change 7 to the Canterbury Land and Water Regional Plan of:

- Neil Thomas
- Dr David Black
- Bianca Sullivan
- Stuart Ford
- Michael Copeland

Ngā mihi,  
Kirsty

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*Under:* the Resource Management Act 1991

*In the matter of:* Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan

*And:* a submission (PC7-349) and further submission (FPC7-349) by **Waimakariri Irrigation Limited**

## Statement of rebuttal evidence of Michael Campbell Copeland

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Dated: 18 September 2020

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## **STATEMENT OF REBUTTAL EVIDENCE OF MICHAEL CAMPBELL COPELAND**

### **QUALIFICATIONS AND EXPERIENCE**

- 1 My full name is Michael Campbell Copeland. I am a consulting economist at Brown, Copeland and Company Limited.
- 2 I have the qualifications and experience set out in paragraph 1.2 and Appendix 1 of my evidence in chief (*EIC*) dated 17 July 2020.
- 3 I repeat the confirmation given in my EIC that I have read and agree to comply with the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note 2014.

### **SCOPE OF EVIDENCE**

- 4 This statement of rebuttal evidence responds to the evidence of Geoff Butcher, an expert witness for Christchurch City Council, on the proposed Plan Change 7 to the Canterbury Land and Water Regional Plan (*PC7*).

### **REDUCED FARM PROFITS**

#### **Mr Butcher's discount rate**

- 5 In his evidence, Mr Butcher suggests that it may be possible for the level of nitrate-nitrogen in the aquifer to be kept below 1.0 mg/L if all of the land in the Nitrate Priority Area (*NPA*) was converted to dryland farming and forestry immediately (paragraph 29). Butcher uses an estimate<sup>1</sup> for irrigated farming profits within the NPA of \$81 million per annum, to calculate a net present value (*NPV*)<sup>2</sup> for the cost of this conversion to be \$2.61 billion. Offsetting this with the returns from forestry (based on a forestry land value of \$5,000 per hectare) reduces the net loss to an NPV of \$2.52 billion (paragraph 31).
- 6 Mr Butcher estimates the loss in farm profits for Stages I and II of the Zone Implementation Programme Addendum (*ZIPA*) solution

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<sup>1</sup> Taken from: Waimakariri Land and Water Programme Options and Solutions Assessment; Economic Assessment. (S. Harris, July, 2019).

<sup>2</sup> The net present value (NPV) is the value of all future costs and benefits over the entire analysis period. A discount rate is used to account for the time value of money in determining the NPV – i.e. that costs and benefits occurring at the beginning of the analysis period are valued more highly than those at the end of the analysis period. The discount rate (or cost of capital) reflects the fact that a return can be earned over time on funds available now. The discount rate also reflects a time preference in that costs and benefits in the short to medium term are more certain than those in the longer term. For these reasons it is generally accepted that a dollar today is more valuable than a dollar in a year's time and the discount rate makes the adjustments to future cash flows to bring them onto a common present value basis.

(i.e.  $N < 3.8$  mg/L) to be \$16.3 million per annum, or an NPV of \$458 million over 100 years at a 3% discount rate (paragraph 21).

- 7 Therefore the additional NPV cost of lost farming profits from going from the ZIPA solution to  $N < 1.0$  mg/L is calculated by Mr Butcher as \$2.52 billion - \$458 million = \$2.1 billion (paragraph 32).
- 8 Mr Butcher (paragraphs 37-39) then identifies comparative costs for alternative water supply or water treatment options for Christchurch that would achieve the same water quality effect as keeping the nitrate-nitrogen level in the aquifer below 1.0 mg/L:
  - a. A water take from the Waimakariri River having an NPV cost of \$1.1-1.6 billion<sup>3</sup>. The range in the NPV costs reflects using different discount rates and analysis periods – 6% discount rate and 50 year analysis period at the lower end of the range and 3% and 100 year analysis period at the higher end of the range.
  - b. Under-bench treatment units having an NPV cost of \$1.5 billion (assumes discount rate of 3% and 100 year analysis period);
  - c. A reverse osmosis plant having an NPV cost of \$1.5 billion (assumes discount rate of 3% and 100 year analysis period); and
  - d. Ion-exchange treatment having an NPV cost of \$1.5 billion (assumes discount rate of 3% and 100 year analysis period).
- 9 All of these options have much lower costs than the \$2.1 billion NPV cost (at a 3% discount rate and 100 year analysis period) of immediate conversion of all of the land in the NPA to dryland farming and forestry.
- 10 Further, Mr Butcher states that these costs cannot be directly compared with the previous lost agricultural production costs, since these costs will only be incurred when Council decides that nitrate levels in the aquifers rise to unacceptable levels and an option needs to be instigated. For example, if this is 50 years hence, then these costs reduce by a factor of 0.23 for a 3% discount rate and 0.05 at a 6% discount rate (paragraph 40). Mr Butcher's comments are based on the evidence for the Christchurch City Council that in order for the level of nitrate-nitrogen in the aquifer to be kept below 1.0 mg/L, conversion of all of the land in the NPA to dryland farming and forestry would need to commence immediately.

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<sup>3</sup> Mr Birdling in his evidence at paragraph 48 identifies this cost as \$2.149 billion.

- 11 Therefore even at the comparatively low 3% discount rate, the costs of converting to dryland farming and forestry is significantly higher than the more distant future costs of alternative water supply or water treatment options for Christchurch. With a higher discount rate (e.g. 6%) this would be even more the case because as explained in footnote 2 the discount rate is used to convert future cash flows to present value terms. With a higher discount rate there is greater weight given to the immediate costs faced by those having to convert their land use as compared to the much more distant capital and O&M costs of alternative water supply or water treatment options.

### **Uncertainty of longtime frame**

- 12 Mr Butcher uses a 100 year time frame to assess the costs of alternatives. This is a very long analysis period and most cost benefit analyses with which I am familiar (e.g. the NZ Transport Agencies' roading projects and Asian Development Bank projects in developing countries) use 25-30 year analysis periods. Sometimes residual values for such projects at the end of the analysis period may be estimated, but these generally have little impact on results because of the effects of discounting.
- 13 It is generally considered appropriate to place greater weight on short to medium term costs and benefits, since these are subject to much less uncertainty. Technological change, changes in consumer preferences, etc. will impact on-farm and off-farm activities. In other words why incur considerable costs in the short to medium term for what might be much longer term future economic benefits when in the long term the farming, alternative water supply and/or water treatment landscapes may be substantially different to that which we think are most likely now. This is one of the factors underlying discount rates – i.e. future uncertainty means that we prefer a dollar today, as compared to a dollar in a year's time.
- 14 There would be significant short and medium term economic and social costs arising from the dramatic changes in land use required to achieve the much lower N target sought by the Christchurch City Council. Some of these costs will flow through to off-farm economic and social impacts affecting the region generally, which is discussed below.

### **EFFECT OF LOST FARMING PROFITS ON REGIONAL ECONOMY**

- 15 Mr Butcher says at paragraph 46 of his evidence that the benefits of allowing nitrate levels to rise to a higher level accrue to owners of land on which farming leads to nitrates entering groundwater, whereas the costs of higher levels of nitrates are imposed on the general public – higher environmental costs, higher health costs

and/or higher costs to source/treat water. Ms Carter makes a related comment at paragraph 101 of her evidence. However lost farming profits and reduced farming economic activity also flow through to other parts of the regional economy including the Christchurch City economy, especially in the short to medium term.

- 16 Farmers and their employees will reduce their expenditure with local businesses and there will be reductions in agriculture product processing activity. This will impact directly on business owners and their employees and then indirectly through the rest of the economy as a consequence of reduced spending generally. Mr Butcher at paragraph 32 of his evidence identified some of these types of economic impacts. He states that converting all the NPA land to dryland farming will lead to a loss of 296 on-farm jobs, 1,030 jobs throughout the region and reduced regional household income of \$68 million per annum. Also farmers having to convert to alternative land uses will face a loss in value of their capital assets, since many of these will become "stranded" – i.e. they will no longer have any productive value on their farms and in most cases cannot be sold to recoup any of their previous value.
- 17 In the longer term (especially taking a 100 year time horizon) we would expect resources made redundant to be redeployed in other forms of economic activity – see Mr Butcher's evidence at paragraph 33. But in the short to medium term we could expect reductions in farm profitability, expenditure and employment to lead to reductions in economic activity within the regional economy generally, with reductions in business profitability, employment and incomes.
- 18 As explained in my evidence in chief this can lead to efficiency losses from reduced economies of scale, reduced competition, increased unemployment and underemployment of labour and other resources and reductions in the quality of central government provided services. There may also be social costs related to bankruptcies to the extent farmers are forced off their land. Also some on-farm and off-farm assets will become "stranded" – i.e. their values are "sunk" and the assets cannot be sold or redeployed in other forms of economic activity.
- 19 The rebuttal evidence of Mr Stuart Ford states that the immediate conversion of all of the NPA land to dryland farming and forestry would lead to a considerable number of bankruptcies with many existing farmers being forced off their land. This suggests significant social as well as economic costs would be incurred.

### **CONCLUSIONS**

- 20 The additional NPV cost of lost farming profits from going from the ZIPA solution to  $N < 1.0$  mg/L has been estimated at \$2.1 billion. This is considerably in excess of the estimated NPV cost of investing

instead in alternative water supply or water treatment options for Christchurch that would achieve the target of nitrate-nitrogen in the aquifer to be kept below 1.0 mg/L, especially if investment in such an option was delayed a number of years.

- 21 It is generally considered appropriate to place greater weight on short to medium term costs and benefits compared to long term costs and benefits, since these are subject to much less uncertainty. This is one of the factors underlying discount rates. There would be significant short and medium term economic and social costs arising from the dramatic changes in land use required to achieve the much lower N target sought by the Christchurch City Council.
- 22 Reduced farming profits and reduced farming economic activity will flow through to other parts of the regional economy including the Christchurch City economy, especially in the short to medium term. Therefore it is incorrect to characterise the benefits of allowing nitrate levels to rise to a higher level accruing only to owners of land on which farming leads to nitrates entering groundwater. There are more widespread economic impacts on the regional economy generally.

**M C Copeland**  
**18 September 2020**