

# Canterbury

District Health Board

Te Poari Hauora o Waitaha

2 October 2009

Environment Canterbury  
PO Box 345  
Christchurch 8140

RECEPTION		
EC - CHCH		
FILE REF:	C060/13965H	
DOCUMENT No:	106617	
	02 OCT 2009	ACTION
	1600	INFO
	D. Fraser	

## STATEMENT OF EVIDENCE OF DR ALISTAIR ROSS GORDON HUMPHREY

Please find attached the evidence of Dr Alistair Humphrey relating to Central Plains Water Trust.

Yours sincerely



Ramon Pink  
Medical Officer of Health  
Canterbury District Health Board

CC. Central Plains Water Trust  
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**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** applications by Central Plains Water  
Trust

**STATEMENT OF EVIDENCE OF Dr Alistair Ross Gordon Humphrey**

1. My full name is Alistair Ross Gordon Humphrey. I live in Christchurch. I am a vocationally registered public health physician and have been practising public health for more than 15 years. I am designated by the Director-General of Health as a Medical Officer of Health in Canterbury, and I am employed as a public health physician by the Canterbury District Health Board.
2. I acknowledge that I have read the code of conduct for expert witnesses contained in the Environment Court's Consolidated Practice Note dated 31 July 2006. I have complied with it when preparing my written statement of evidence and I agree to comply with it when I give this oral evidence.
3. In regards to the Central Plains Water RMA hearings, I represent the Canterbury District Health Board as one of their public health physicians. I am not giving evidence independently as a Medical Officer of Health nor am I representing the Ministry of Health.

#### **Qualifications and Experience**

4. My relevant qualifications and experience are set out below in this evidence. I am employed as the Medical Officer of Health and Public Health Physician by the Community and Public Health Division ("C&PH") of Canterbury District Health Board ("CDHB"), and in this capacity I provide professional advice and leadership to the environmental health team.
5. I am also designated as a Medical Officer of Health for Canterbury by the Director General of Health, a role which carries broad ranging legislative responsibilities, primarily to promote and maintain the public's health. I am a Fellow of the New Zealand College of Public Health Medicine, Fellow of the Faculty of Public Health Medicine of the Australasian College of Physicians and Member of the UK Faculty of Public Health.
6. I have more than fifteen years experience of public health medicine. In addition, I am vocationally registered as a General Practitioner in New Zealand. I am a Fellow of the Rural Faculty of the Australian College of General Practitioners and the Australian College of Rural and Remote Medicine.

### **Ambit of My Evidence**

7. In my evidence, I will address the revised Central Plains Scheme and the implications of this on the health of Cantabrians having regard to the Health Impact Assessment (HIA) commissioned by the CDHB and the Ministry of Health. I will comment on the evidence of Clifford John Maxwell Tipler, Andrew Webster MacFarlane, Julian James Weir and public statements by representatives of Central Plains Water Ltd ("CPW"). Such evidence is within my area of expertise.

### **Facts Relied Upon and Formation of Opinions**

8. The data, information, facts, and assumptions I have considered in forming my opinions are set out in the part of the evidence in which I express my opinions.
9. The reasons for the opinions expressed are set out in the part of my evidence in which I express my opinions.
10. I have not omitted to consider material facts known to me which might alter or detract from the opinions I have expressed.
11. The literature or other material which I have used or relied upon in forming my opinions is set out in the footnotes of this evidence.

## **INTRODUCTION AND SUMMARY**

### **Previous Evidence**

12. In August 2006, C&PH, acting on behalf of the CDHB, opposed the CPW application on the grounds that insufficient information about the potential health impacts of the scheme had been included in the application.
13. One year later, C&PH acknowledged that some health issues had been touched on in the social impact assessment, environmental impact assessment and cultural impact assessment. However, it was felt that a formal Health Impact Assessment (HIA) was required to properly investigate the health effects of the scheme.

14. The HIA recommended rejecting the application of Central Plains Water since there is a significant risk of adverse health effects posed by the scheme to the population of Canterbury. In particular:
- There is a probable risk of cases of methaemoglobinaemia in bottle fed babies;
  - There is a possible risk of contamination of the Christchurch aquifer;
  - There is a probable risk of flooding and septic tank failures in downstream, low lying areas of Canterbury causing groundwater contamination and spread of infectious disease;
  - An increase in the groundwater level may lead to chemical contamination of the aquifer from old industrial sites on the outskirts of Christchurch;
  - The convincing positive health impact derived from increased wealth is small and limited in the short to medium term to relatively few people;
  - Correspondingly, there is a convincing negative health impact associated with the economic inequity of the scheme;
15. These risks would be generated by:
- Intensification of agriculture (cropping or dairying).
  - Raised groundwater levels.
  - The inequity of the scheme.
16. Under the Health and Disability Act 2000, every district health board has the responsibility to:
- “Improve, promote and protect the health of people and communities” [s22 (a)] and
  - “Promote the reduction of adverse social and environmental effects on the health of people and communities” [s23 (1) (h)].
17. In discharging its duty under the Health and Disability Act, the elected and appointed board of CDHB voted to accept the HIA's recommendation to oppose the CPW scheme as it considered the factors listed in paragraph 14 above presented an unacceptable health risk to Canterbury's population.

18. The HIA did not specifically deal with construction of the dam. The risks to the health of Cantabrians outlined in paragraph 14 were generated by the aspects of the scheme listed in paragraph 15 above.
19. I presented the findings of the HIA to the earlier hearings on the CPW applications ("original evidence").

### **Revised Scheme**

20. Despite the removal of the water storage option (i.e. the dam) in the amended proposal, the scheme as currently proposed will still drive agricultural intensification raise groundwater levels and social inequity. These issues still remain to be addressed. This in turn, means that the health concerns outlined in the CDHB original evidence remain to be addressed.
21. In addition, statements have been made within the applicant's evidence<sup>1</sup> and in public statements given in the media<sup>2</sup> by representatives of CPW, which indicate that the revised scheme is considered by the applicant to be an interim measure, with future development supporting agricultural intensification suggested. This amended proposal will, therefore, only form a part of the overall intensification of land use, resulting in the same or similar health effects to those outlined in the HIA.
22. If existing groundwater consents are used, as indicated by Mr Tipler, there will be no later assessment of these issues, as no further resource consent applications would be made. Likewise, if responsibility shifts to individual farmers to address their storage needs, applications will be made on an ad hoc basis, with no overall assessment of the cumulative health effects.

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<sup>1</sup> evidence of Mr Tipler para 8

<sup>2</sup> Christchurch Press 21 September 2009 Mr Derek Crombie

## Outline of Concerns

### Land Use Intensification and Health Effects

23. In New Zealand, one of the main tools that the Ministry of Health uses to assess whether a drinking water supply is safe is the Drinking Water Standards for New Zealand; currently in its 2005 publication, which was revised in 2008 (*DWSNZ2005 revised 08*). These are based on the World Health Organisation Guidelines with New Zealand specific changes, as appropriate.
24. The main body of *DWSNZ2005 revised 08* contains tables of MAVs (maximum acceptable values) for a wide range of organic and inorganic determinands. The MAV is the concentration of a determinand below which the presence of a determinand does not result in any significant risk to a consumer over a lifetime of consumption. An exception to this is the setting of the MAV for Nitrate which is based on a short term exposure, since Methaemoglobinemia ("blue baby syndrome") occurs after relatively short exposure to contaminated water. The MAV for nitrate is 11.3 g/m<sup>3</sup>.
25. The Proposed Natural Resources Regional Plan Objective WQL-2(2)(b)(i) states that "*The maximum nitrate concentration shall not increase by more than 2mg/L above the maximum measured between 1996 and 2001 and reported in 2002 and may not exceed the 11.3mg/l*".
26. The DWSNZ states that levels greater than 50% of the MAV are potentially significant to public health<sup>3</sup>. Action needs to be taken to reverse rising trends and unless the focus of mitigation measures is at 50% of the MAV, then it is highly likely that the 11.3mg/l will be exceeded and the pNRRP contravened and health put at risk.
27. CPW states, and it is accepted, that there will be less land use intensification under the revised proposal than under the original scheme, provided it remains limited to the scope of the proposal. This still however, is an increase in land use intensification within the command area over current land uses.

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<sup>3</sup> DWSNZ revised 08 page 95 para 8.2

28. There is variance between the different nitrate concentration assessment models and the discussion relating to this is set out in the evidence of Mr Tipler<sup>4</sup>, particularly the reasoning in paras 59 to 71. C&PH does not however, intend to comment on the various models or the reasoning employed for the choice of methodology made by Mr Tipler at para 71.
29. The concerns outlined in the evidence of Carl Hanson<sup>5</sup> also indicate that nitrate levels would increase in the groundwater beneath central plains. The summary of his conclusions set out in paras 13 to 20 of his report are consistent with the HIA commissioned by CDHB and would still apply to some degree, even without the storage option.
30. It is the current situation which is cause for concern and increased land intensification of any degree will increase that problem. Various reports issued by Environment Canterbury<sup>6</sup>, indicate that there are already localised nitrate exceedences in Canterbury, particularly in the Selwyn District, and that these are becoming more frequent in some areas. This evidence is cited in the HIA, that groundwater quality is currently being degraded by human induced contamination, such as intensification of farming activities<sup>7</sup>. There are regular exceedences of 50% of the nitrate MAV in the DWSNZ in Canterbury and of the MAV itself in some rural areas.<sup>8</sup>
31. An important cause of these exceedences is land use intensification. Localised circumstances (for example, upgradient contamination source, the geohydrology of the area) can result in exceedences of the nitrate MAV in the groundwater even where the average concentrations (as expressed by modelling and reports) across the plains may not indicate health concerns. The plains are not homogenous and therefore an average value across the command area as used in the modelling hides localised problems.
32. Increases in land use intensification have in part, led to increases in the frequency and severity of those exceedences, even with best practices to

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<sup>4</sup> 7 September 2009

<sup>5</sup> 25<sup>th</sup> February 2008

<sup>6</sup> Carl Hanson ECAN Nitrate Concentrations in Canterbury Groundwater (2002),

Raymond Ford & Ken Taylor, ECAN Managing Nitrate leaching to groundwater an emerging issue for Canterbury (2006)

<sup>7</sup> Page 45 HIA

<sup>8</sup> Page 32 HIA

reduce nitrate leaching. At the very least, mitigation measures should include enforcement of best practice for farm and land management and use of nitrate fixing technology, reinforced by adequate consent conditions including proper monitoring and reporting.

33. Any intensification of land use is, therefore, likely to lead to an increase in the nitrate levels in groundwater. This, in turn, will lead to the health effects outlined in my original evidence and summarised in paragraph 14 above. Even if the amended proposal will not result in as much land intensification as the original proposal, there will still be more intensification of land than currently exists.

### **Future Intensification**

34. Despite the amended proposal, other proposals are being explored to enable further land intensification.
35. Mr Tipler's evidence states that there may be an application at a later date for aquifer recharge (para 8). Mr Andrew MacFarlane has commented in his evidence about possible future development of water storage on farms located within the lower 30,000 HA's affected by the scheme.
36. Mr Derek Crombie was quoted in the media ("The Press" 21 September 2009) that should Lake Coleridge or Lees Valley be used for large scale water storage then that would "change the game completely" and that "we'd be back to the original" It is noted that the draft Canterbury Water Strategy document identifies irrigable land from a Lees valley option which roughly corresponds to the full area of the CPW proposal<sup>9</sup>.
37. Any further significant storage option would be the subject of separate consent hearings. It would however, amount to a possible future cumulative effect of the amended scheme and some acknowledgement or discussion of this should be directly made by the applicant if it is indeed the intention of CPW to move along this path. Any amended proposal is a step to further land intensification which will have health implications, and the Canterbury DHB would request that this be recognised and addressed.

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<sup>9</sup> Figure 4 page 101 Draft Canterbury Water Management Strategy.

38. Further, some interim options, such as the use of existing consents, may not require additional resource consents, and therefore, there would not be a later opportunity to consider the types of effects that have been raised. From a health perspective, is inappropriate to defer any consideration of the groundwater quality issues, despite the applicant's assertions that the level of intensification originally envisaged would no longer occur with the amended proposal.
39. The CDHB believes there can be no compromises in the area of catchment protection and supports the principle outlined in the Draft Canterbury Water Management Strategy Mayoral Forum Strategy.

#### **Increased Groundwater Levels**

40. In the DWSNZ2005 *revised 08*, the term 'security' in relation to groundwater sources has a specific meaning. Groundwater is considered to be secure when it can be demonstrated that contamination by pathogenic organisms is unlikely because the groundwater is both not directly affected by surface or climate influences and also abstracted from a bore head that provides satisfactory sanitary protection. It does not require further treatment.
41. Bacterial and viral contamination of groundwater sources must also to be considered alongside nitrate issues around land use intensification. While viral and bacterial contamination does not persist in the aquifer over long distances, contamination from farm animals can occur locally even with relatively deep bores. C&PH have experience of water borne bacterial outbreaks where land use intensification has been implicated. One example was the Springston outbreak in 2008.
42. Ground water mounding and more frequent flooding in low lying areas is also likely to occur when ground water levels rise. This in turn can give rise to septic tank failures with consequent bacterial and viral water borne outbreaks.

### **Inequity**

43. The CPW scheme is inherently inequitable, as it vests control of much of Canterbury's drinking water in the hands of a little over 300 investors. These investors stand to derive the most benefit from the scheme, while the employment opportunities conferred by the scheme are likely to be limited to people migrating to Canterbury from elsewhere in New Zealand or overseas.
44. The health risks from the scheme, particularly those derived from contamination of Canterbury's groundwater, fall predominantly on the most deprived groups in our community – the very people who stand to gain least financially. A far more equitable approach to the distribution of water in Canterbury is proposed in the Draft Canterbury Water Management Strategy, which representatives from the District Health Board have been involved in developing.

### **Supporting Documentation**

45. The draft Canterbury Water Management Strategy was launched on 3 September 2009. It indicates that if all potentially irrigable land in Canterbury was irrigated,<sup>10</sup> there would be a substantial increase in the areas where the drinking water standard for nitrate of 11.3mg/l is exceeded. It also states that the groundwater systems have a limit on how much nitrogen (or other contaminants) can go into them before drinking water standards are exceeded. The strategy confirms the approach that I have already outlined.
46. The Strategy also confirms the need to reduce nitrate discharges through improved land management practices if land intensification is to occur. Technologies such as active nutrient management in arable farming and nitrogen inhibitors in fertilisers are referred to in the Strategy.

## **Mitigation measures**

47. The draft Canterbury Water Management Strategy sets out four key processes aimed at addressing improvements in land management, being:
- a. Defined catchment limits for nitrate and other contaminants consistent with water quality objectives;
  - b. Primary sector initiatives around improved land management;
  - c. Zone implementation programmes to address land use;
  - d. Linking land use practice to access to reliable water from new and improved existing infrastructure.
48. The Strategy also sets out goals in relation to drinking water<sup>11</sup>. The goals from 2010 are:
- a. In communities that currently have access to untreated and safe drinking water, the source water quality must remain high enough to meet New Zealand Drinking Water Standards without treatment;
  - b. No further decline in source water quality for those communities that currently have to treat drinking water;
  - c. That there are no activities in a drinking water catchment that reduce access to sufficient quantities of drinking water supplies.

## **Conclusion**

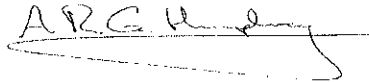
49. The goals of the Draft Canterbury Water Management Strategy confirm the approach taken by C&PH in relation to this application and it is important that these goals and processes are followed in relation to the CPW applications.
50. The amended proposal still threatens the quality of currently untreated and safe drinking water. It will amount to an activity that is likely to reduce the quantities of potable water available to drinking water supplies. This will be especially so if the Christchurch drinking water supply is threatened.

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<sup>10</sup> page 28

<sup>11</sup> Page 95, *ibid*

51. It is clear that the CPW scheme must be compatible with the Draft Water Management Strategy if the goals outlined above are to be achieved. Any consent conditions and mitigation measures must be robust enough to ensure with some confidence that the strategy is not compromised.
52. Further, it would seem that, although the dam storage has been removed from these applications, there are plans to develop other options to enable further land intensification. This will result in health effects previously outlined.
53. Whilst the amended proposal may result in less land intensification than the original proposed, my concerns about health matters still stand. There are current issues with nitrate levels in Canterbury groundwater, in particular, and the amended proposal will still likely add to that.

A handwritten signature in black ink, appearing to read 'A.R.G. Humphrey', written over a horizontal line.

Dr. Alistair R.G. Humphrey MPH FAFPHM FRACGP  
Medical Officer of Health (Canterbury)