

**BEFORE THE HEARING PANEL**

**AT HAMILTON**

**IN THE MATTER**

of the Resource  
Management Act 1991

**AND**

**IN THE MATTER**

of the Proposed Waikato  
Regional Plan Change 1  
Waikato and Waipā River  
Catchments

**AND**

**IN THE MATTER**

of Variation 1 to the  
Proposed Waikato  
Regional Plan Change 1  
Waikato and Waipā River  
Catchments

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**REBUTTAL EVIDENCE OF KATHRYN JANE MCARTHUR ON BEHALF OF THE  
DIRECTOR-GENERAL OF CONSERVATION**

**BLOCK 1**

25 February 2019

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**Department of Conservation**

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Submission number: 71759

## **INTRODUCTION**

1. My name is Kathryn (Kate) Jane McArthur.
2. I have been engaged by the Director-General of Conservation to provide evidence on freshwater management, water quality and ecosystem health, with a particular focus on streams and rivers, for the hearing on Proposed Plan Change 1 for the Waikato and Waipā Rivers (PC1).
3. I am the Practice Leader – Water, at The Catalyst Group, an environmental consultancy based in Palmerston North.
4. I provided a Statement of Evidence in Chief on behalf of the Director-General of Conservation dated 15 February 2019.

## **QUALIFICATIONS AND EXPERIENCE**

5. I confirm the qualifications and experience set out in my Statement of Evidence in Chief.

## **CODE OF CONDUCT FOR EXPERT WITNESSES**

6. Although this is not an Environment Court hearing process, I have read the Environment Court “Code of conduct for expert witnesses” (2014), and I agree to abide by it. I have prepared this Statement in accordance with that Code. I confirm that my evidence is within my area of expertise. I have not omitted to consider any material facts known to me that alter or detract from the opinions I express in this Statement. I have acknowledged the material used or relied on in forming my opinions and in the preparation of this Statement.
7. As a member of the New Zealand Freshwater Sciences Society, a constituent organisation of the Royal Society of New Zealand - Te Apārangi, I also agree to be bound by the Royal Society of New Zealand Code of Professional Standards and Ethics in Science, Technology, and the Humanities<sup>1</sup>.

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<sup>1</sup> <https://royalsociety.org.nz/assets/Uploads/Code-of-Prof-Stds-and-Ethics-1-Jan-2019-web.pdf>

## **SCOPE OF REBUTTAL EVIDENCE**

8. This rebuttal evidence relates to inconsistencies in Table 3.11-1 raised by a number of experts, and specifically responds to matters raised in the Statements of Evidence of Dr Martin Neale and Dr Jonathan Williamson filed on behalf of Wairakei Pastoral Ltd.

## **STATEMENT OF EVIDENCE OF MARTIN NEALE**

9. I agree with Dr Neale (and other submitter experts<sup>2</sup>) that there are a number of inconsistencies in the application of the numeric water quality attributes in Table 3.11-1. Dr Neale and I identify similar inconsistencies in some cases<sup>3</sup>. Other inconsistencies identified in Table 3.11-1 differ between our evidences. In my view, the inconsistencies identified by Dr Neale, other experts and myself are complementary in assisting the Panel to determine a more robust framework of water quality attributes and numeric limits/targets<sup>4</sup> for PC1. I agree with Dr Neale that applying the SMART framework to Table 3.11-1 is useful and I agree with the premise of other experts<sup>5</sup> who identify additional water quality attributes are needed in Table 3.11-1 to support ecosystem health and other values.
  
10. I agree with Dr Neale that nutrient management should apply to the whole of the Waikato-Waipā River catchment, including the tributaries<sup>6</sup>, in order to achieve the desired outcomes for the river and downstream receiving environments (including lakes, wetlands and the estuary).

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<sup>2</sup> Including Dr Ausseil (Waikato River Iwi), Dr Mueller (Beef and Lamb NZ) and Dr Canning (Fish and Game).

<sup>3</sup> Evidence in chief of Kathryn McArthur, paragraphs 104 and 105; evidence in chief of Martin Neale, paragraphs 50 to 60 and 73 to 86.

<sup>4</sup> Dr Neale identifies that the terminology describing the numeric values in Table 3.11-1 is confusing and inconsistent (paragraph 24) and that these numeric values should be referred to as freshwater objectives in PC1, along with other submitter experts such as Dr Ausseil. Although I note the PC1 approach is confusing in this respect, I leave interpretation of the numeric attributes to expert planners, see the evidence in chief for Block 1 of Deborah Kissick on behalf of the Director-General of Conservation, paragraphs 81 to 96 and 208 to 217.

<sup>5</sup> Including Dr Ausseil (Waikato River Iwi), Dr Mueller (Beef and Lamb NZ) and Dr Canning (Fish and Game).

<sup>6</sup> Evidence of Martin Neale, paragraphs 37 and 39.

11. I **do not** agree with Dr Neale's assertion that management of phosphorus (P) is more important than management of nitrogen (N) in the Waikato-Waipā catchments<sup>7</sup>. Both nutrients must be managed to achieve a healthy and swimmable river on a whole of catchment basis (including tributaries, lakes, wetlands and the estuary) as recommended by Wilcock et al. (2007). However, I do agree<sup>8</sup> that PC1 should have a broader focus, controlling **all** of the contaminants of concern and their transport pathways to surface water, not just N (or P).

12. The conclusions of Wilcock et al. (2007)<sup>9</sup> in their advice on nutrient management to Horizons and Hawke's Bay Regional Councils, do not support a single-nutrient approach to managing algae or periphyton. For the information of the Panel, the relevant conclusions of that report include:

- *“Not all rivers and streams will require nutrient management to minimise unwanted periphyton blooms. Those with soft-substrates, not discharging to lentic [e.g., lake and wetland] systems **and** with low macrophyte cover are largely exempt from nutrient management. All others need some form of nutrient management. [emphasis added]*
- *Although nutrient management is not necessary to control periphyton growth in soft-bottomed streams, it is still a sound strategy for (1) reducing inputs to sediments that might otherwise stimulate unwanted macrophyte growth [nuisance aquatic weeds], (2) managing downstream (hard-substrate) waters that might be subject to periphyton blooms and (3) avoiding eutrophication problems in downstream environments such as lakes, estuaries and coastal waters.*
- *Nutrient management is important for coastal waters and estuaries, where macroalgae and phytoplankton may be more of a problem than periphyton. Thus, it would be prudent to derive or use standards that prevent periphyton*

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<sup>7</sup> Evidence of Martin Neale, paragraphs 17 to 20.

<sup>8</sup> Evidence of Martin Neale, paragraph 4.

<sup>9</sup> Cited by Dr Neale and with which I am very familiar, having participated in the development workshop for this report.

*blooms in rivers that also provide adequate protection for estuarine and coastal waters.*

- *Both N and P need to be managed because of the interconnectivity of waterways (where different nutrients might be limiting in the same stream network). [emphasis as reported by Wilcock et al. (2007)]*
- *Periphyton growth and vigour is determined by antecedent water quality. This affects periphyton recovery from major disturbance events (floods). Lengthy exposure to high concentrations of nutrients is likely to give rise to vigorous growth that will respond more quickly than if it had grown in low nutrient waters. For this reason, year-round control of both N and P is important.” [emphasis as reported by Wilcock et al. (2007)]*

#### **STATEMENT OF EVIDENCE OF JONATHAN WILLIAMSON**

13. Dr Williamson provides evidence that the nitrogen (N) ‘load to come’ concept is scientifically flawed. While I am not a groundwater expert, I find Dr Williamson’s argument, based on fundamental water chemistry, scientifically compelling.
14. Dr Williamson recommends adopting an approach which deals with the current issue of quick-flow nitrogen transport to surface water from surface run-off and source areas of young groundwater discharge.
15. The implications of Dr Williamson’s evidence extend to the proposed timeframes for management of nitrogen inputs to surface water in the Waikato-Waipā catchments. The current PC1 framework is for a 10% contaminant reduction over an approximate (although not timebound) 10-year timeframe in the short term, with no approach currently available via PC1 to deal with the remaining required reductions to meet the long-term (80 year) goals. The approach assumes there will be a significant ‘load to come’ of nitrogen coming from old groundwater, and that this is a problem the plan cannot deal with, given current technologies.

16. If Dr Williamson's premise of no N 'load to come' is accepted, there is an even more compelling case for more to be done to manage contaminant inputs to surface water ecosystems in the catchment in the short to medium term, consistent with the relief sought by the Director-General of Conservation, and as outlined in evidence<sup>10</sup>.

## **CONCLUSION**

17. Inconsistencies in the numeric water quality 'targets' and the need for additional attributes requires consideration in Table 3.11-1 of PC1. A broader approach is needed to the management of contaminants from land, their sources and their transport mechanisms, if outcomes for ecosystem health and other values are to be achieved through PC1.

18. Approaches to nutrient management in PC1 must include management of the sources and transport pathways of both N and P. Nitrogen and phosphorus must both be managed to ensure nutrient enrichment of all ecosystems (including lakes, wetlands and the estuary) is reduced or avoided.

19. Short and medium-term management of transport pathways, and thereby targets or goals for nitrogen should be considered within the PC1 framework, as requested in the relief sought by the Director-General of Conservation.



**Kate McArthur**

25 February 2019

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<sup>10</sup> Evidence in chief of Kathryn McArthur, paragraphs 135 to 140 and evidence in chief of Deborah Kissick, paragraphs 280 to 287.