

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of **PROPOSED PLAN CHANGE 1** to the Waikato Regional Plan – hearing of **BLOCK 1** topics

AND

IN THE MATTER of the hearing of the submission by **WATERCARE SERVICES LIMITED** in relation to **BLOCK 1** topics

STATEMENT OF REBUTTAL EVIDENCE OF GARRETT JOHN HALL

1. INTRODUCTION

- 1.1 My full name is Garrett John Hall. I am a Technical Director - Environments at Beca Limited ("Beca").
- 1.2 I outlined my qualifications and experience and my commitment to comply with the Environment Court Expert Witness Code of Conduct in my evidence in chief ("EIC") dated 15 February 2019.
- 1.3 I have read the expert water quality statements of evidence, including those of:
 - (a) Dr Olivier Michel Nicolas Ausseil (Waikato and Waipā River Iwi);
 - (b) Dr Adam Douglas Canning (Auckland/Waikato & Eastern Fish and Game Councils);
 - (c) Dr Timothy Jason Cox (Beef + Lamb New Zealand Limited);
 - (d) Dr Christopher Ayokunle Dada (Beef + Lamb New Zealand Limited);
 - (e) Dr Craig Depree (DairyNZ);
 - (f) Ms Gillian Margaret Holmes (Horticulture New Zealand);
 - (g) Dr Phillip William Jordan (Wairakei Pastoral Limited);
 - (h) Ms Kathryn Jane MacArthur (Director-General of Conservation);

- (i) Mr Dean Craig Miller (Mercury New Zealand Limited); and
- (j) Dr Martin Neale (Wairakei Pastoral Limited).

Purpose and scope of rebuttal evidence

- 1.4 This statement addresses matters raised, and recommended modifications to, Table 3.11-1 and other related water quality issues.
- 1.5 Specifically, I address the following in terms of water quality:
 - (a) Current state of water quality in the catchments (Section 2);
 - (b) Future plan effectiveness monitoring (Section 3);
 - (c) Dissolved oxygen (Section 4);
 - (d) MCI and other water quality parameters (Section 5);
 - (e) Table 3.11-1 – attribute bands (Section 6);
 - (f) Table 3.11-1 – relationship between total nitrogen, total phosphorus and chlorophyll-a (Section 7);
 - (g) Nutrient limitation (Section 8);
 - (h) Proportionality of improvement in water quality (Section 9); and
 - (i) Expert conferencing (Section 10).

2. CURRENT STATE OF WATER QUALITY IN THE CATCHMENTS

- 2.1 I agree with various experts that the process and methodology used to define the “current state” of water quality in the Waikato and Waipā River catchments has not been documented and should be made available by the Waikato Regional Council (“WRC”) for review by all water quality experts involved in this process.
- 2.2 Other matters identified in evidence in relation to the definition of current state include the detection limits, precision and accuracy of laboratory tests, units of measurement and the period over which the current state was defined (2010 – 2014).
- 2.3 I agree with various experts that the methodology used to define the current state was not clear; a range of various methods have been suggested by water quality experts to resolve the definition of current

state. As discussed later in my evidence, I agree with the experts who have suggested this is a matter best considered at expert conferencing between water quality experts.

3. **FUTURE PLAN EFFECTIVENESS MONITORING**

3.1 I share the view that the process that will be followed to assess whether freshwater objectives / states will be met in the future, or whether progress has been made towards them, will be fundamental to assessing plan effectiveness. In my opinion, the process and associated methodologies should be clarified, agreed between experts and documented¹.

4. **DISSOLVED OXYGEN**

4.1 I agree with the experts who have recommended that consideration should be given to including dissolved oxygen attributes in Plan Change 1 ("PC1")². I agree that, as a minimum, dissolved oxygen attributes should apply to all sites on the Waikato River mainstem, although preferably sub-catchments should also have dissolved oxygen attributes³.

4.2 Dissolved oxygen should be monitored continuously for a set period (over 7 days), rather than at discrete times. This would allow for diurnal variations in dissolved oxygen to be recorded at a site in line with the requirements of Appendix 2 of the National Policy Statement for Freshwater Management 2014 (Updated 2017) ("NPS-FM").

4.3 This type of continuous dissolved oxygen monitoring would require a large scale deployment of continuous water quality loggers which would have to be managed in terms of monitoring logistics and costs. At the outset including dissolved oxygen objectives for the mainstem of the Waikato and Waipā Rivers, rather than the entire catchment, may resolve some of the concerns around the cost of monitoring in relation to continuous dissolved oxygen monitoring⁴. I note that WRC currently monitor dissolved oxygen continuously at two sites on the Waikato River (Hamilton and Tuakau)⁵.

¹ Paragraph 10, EiC of Olivier Michel Nicolas Ausseil.

² Paragraph 11, EiC of Olivier Michel Nicolas Ausseil.

³ Paragraph 129, EiC of Kathryn Jane McArthur.

⁴ Paragraph 3.51, EiC of Adam Douglas Canning.

⁵ Scarsbrook, M. (2016). Water Quality Attributes for Healthy Rivers: Wai Ora Plan Change. Waikato Regional Council.

5. **MCI AND OTHER WATER QUALITY PARAMETERS**

- 5.1 I agree with some experts that the Macroinvertebrate Community Index (“MCI”) is a popular and well known index of macroinvertebrate community health⁶. It is required for consideration by councils in the NPS-FM.
- 5.2 As I understand it, the Technical Leaders Group (“TLG”) considered the various technical issues associated with the MCI were too complex⁷ and for it not to be included as an attribute in PC1; however, this was before the MCI was included in the NPS-FM in the 2017 updated version.
- 5.3 I agree that the Panel should consider the possibility of including the MCI as an additional attribute, noting that WRC currently monitors the MCI at 62 sites through the Waikato and Waipā catchments⁸. I assume this historical monitoring would provide a sufficient dataset to define the ‘current state’.
- 5.4 For other additional attributes, with perhaps the exception of periphyton, it may be more appropriate to include these attributes in future plan changes when datasets and thresholds have been developed further; and therefore for PC1 to set out methods for those thresholds to be developed.

6. **TABLE 3.11-1- ATTRIBUTE BANDS**

- 6.1 I concur with Dr Ausseil’s views on the technical process used to arrive at the freshwater objectives set out in Table 3.11-1 was applied too rigidly, which has resulted in a number of issues⁹. In my EIC, I identified similar issues, particularly with respect to the attribute bands defined for the mainstem of the Waikato River for Total Nitrogen (“TN”), Total Phosphorus (“TP”) and chlorophyll-a.

7. **TABLE 3.11-1 – RELATIONSHIP BETWEEN TOTAL NITROGEN, TOTAL PHOSPHORUS AND CHLOROPHYLL-A**

- 7.1 I am of the same view as some experts that the freshwater objectives set out in Table 3.11-1 for chlorophyll-a, TN and TP appear to have been determined individually, without regard to their interconnection¹⁰. I agree that, with respect to chlorophyll-a, TN and TP, one should start with setting chlorophyll-a objectives, then set TN and TP objectives to meet the

⁶ Paragraph 3.26, EIC of Adam Douglas Canning.

⁷ Scarsbrook, M. (2016). Water Quality Attributes for Healthy Rivers: Wai Ora Plan Change. Waikato Regional Council.

⁸ Scarsbrook, M. (2016). Water Quality Attributes for Healthy Rivers: Wai Ora Plan Change. Waikato Regional Council.

⁹ Paragraph 13(a) to 13(f), EIC of Olivier Michel Nicolas Ausseil.

¹⁰ Paragraph 81, EIC of Olivier Michel Nicolas Ausseil.

chlorophyll-a objectives/states¹¹. Table 3.11-1 should be reassessed in view of this.

8. **NUTRIENT LIMITATION**

- 8.1 I agree with some experts that multiple lines of evidence indicate that algal growth in the Waikato River is more strongly controlled by phosphorus than nitrogen, including analysis of monitoring data and nutrient manipulation experiments¹². Additionally, I agree that these findings are consistent with WRC's previous long-term trend analysis that shows TP and chlorophyll-a have decreased, whilst TN has increased, indicating that TP is limiting algal biomass¹³.
- 8.2 With respect to the Pukekohe Wastewater Treatment Plant, the resource consent granted in 2017 recognised this by requiring a decrease in TP mass loads (when compared to the existing discharge) to achieve a downstream improvement in water quality when compared to the effects of the existing discharge on algal biomass within the Waikato River. In my opinion, it is therefore likely that future upgrades of WWTP's will be able to achieve greater downstream improvements in water quality (specifically algal biomass measured as chlorophyll-a) by targeting improvements in TP rather than TN.
- 8.3 However, it is my opinion, that any future management interventions through PC1 should recognise that both TN and TP have nutrient growth effects on algal biomass (and not focus solely on one nutrient or the other); however multiple lines of evidence suggest that algal growth is more strongly controlled by phosphorus than nitrogen for the majority of the time.

9. **PROPORTIONALITY OF IMPROVEMENT IN WATER QUALITY**

- 9.1 In his rebuttal evidence, Mr Scrafton discusses the policy void in identifying how much improvement in water quality is appropriate in any given resource consent process. As part of informal discussions with WRC resource consent processing officers for a recent discharge consent process I was involved in, WRC officers' expressed the view (with respect to PC1) that a 10% improvement over 10 years (with reference to the short term target in Table 3.11-1) would be an appropriate yardstick against which to measure an improvement in water quality.

¹¹ Paragraph 82, EIC of Olivier Michel Nicolas Ausseil.

¹² Paragraph 4, EIC of Martin William Neale.

¹³ Paragraph 18, EIC of Martin William Neale.

9.2 In my view, this is an inappropriate application of Objective 3, which outlines it is the “actions put in place and implemented by 2026”, sufficient to achieve the short-term water quality attribute states in Table 3.11-1, which are the measure of achieving the objective. I understand that reference to the “actions put in place and implemented by 2026” are the rules in PC1 and the related requirements for FEMPs, nitrogen reference points, etc., on a staged basis through to 2026 in accordance with sub-catchment priorities. Those rules and requirements do not relate to municipal point source discharges.

9.3 Given the above, more clarity is required with respect to how much improvement in water quality is anticipated through a single resource consent process.

10. **EXPERT CONFERENCING**

10.1 I agree that there has been no opportunity for the various freshwater experts involved in this process to meet and discuss various matters¹⁴ (beyond the Information Forum held in November 2018), and that expert conferencing can be extremely useful in resolving the type of issues raised in various experts evidence.

Garrett John Hall
26 February 2019

¹⁴ Paragraph 13(g), EIC of Olivier Michel Nicolas Ausseil.