

**BEFORE THE HEARINGS PANEL  
FOR THE CANTERBURY REGIONAL COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991 and the Environment Canterbury (Temporary Commissioners and Improved Water Management) Act 2010

**AND**

**IN THE MATTER** of Proposed Change 5 to the Canterbury Land and Water Regional Plan

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**MEMORANDUM OF COUNSEL ON BEHALF OF  
NGĀ RŪNANGA (TE RŪNANGA O KAIKŌURA, TE NGĀI TŪĀHURIRI RŪNANGA, TE HAPŪ  
O NGĀTI WHEKE, TE RŪNANGA O KOUKOURĀRATA, ŌNUKU RŪNANGA, WAIREWA  
RŪNANGA, TE TAUMUTU RŪNANGA, TE RŪNANGA O AROWHENUA, TE RŪNANGA O  
WAIHAO AND TE RŪNANGA O MOERAKI), NGĀI TAHU FARMING LIMITED, AND TE  
RŪNANGA O NGĀI TAHU (TE RŪNANGA)**

**20 October 2016**

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## MAY IT PLEASE THE COMMISSIONERS

### 1. INTRODUCTION

1.1 Te Rūnanga o Ngāi Tahu (Te Rūnanga) were invited to respond to specific questions from the Hearings Panel, following the presentation of their submission at Waihao Marae on 6 October 2016.

1.2 This memorandum addresses the following questions or matters raised by the Panel:

- (a) bearing in mind the relief sought in Ngāi Tahu's submission, does Ngāi Tahu understand the so-called "sinking lid" as involving reduction over time to *below* GMP loss rate?
- (b) does Ngāi Tahu consider the "sinking lid" to be an intended or unintended consequence of PC5?
- (c) to consider and address the lawfulness and drafting of the permitted activity rule for discharge of contaminants from mahinga kai enhancement sought to be included in Part B of PC5;
- (d) related to (c), what would be the mechanism/rule that limited the discharge of contaminants from mahinga kai enhancement?
- (e) to consider and confirm the Ngāi Tahu position on relief regarding requested definition of "Intensive Winter Grazing";
- (f) to provide a copy of a Di Robertson ecological report regarding the Ahuriri Delta as referred to in the evidence of Ms Waaka-Home;
- (g) for Dr Tipa to consider and address the Environment Canterbury booklet *Industry Agreed Good Management Practices relating to Water quality (ECan GMP booklet)* and advise as to the efficacy of this document in terms of coverage of mahinga kai issues identified in Dr Tipa's evidence;
- (h) related to (g), if the measures in the ECan GMP booklet are deficient, practical measures that farmers can take to address mahinga kai;
- (i) consider and advise on scope for Ngāi Tahu to request an addition to Schedule 7 through the new "*Management Area: Mahinga kai*";
- (j) consider and advise of re-drafting of suggested new clause (e) to Schedule 7 FEP definition of "*Management Area: Mahinga kai*"; and
- (k) provide further commentary or drafting (if any) on Fonterra's suggested policy regarding the "alternative consenting pathway".

## 2. EXTENT OF NGĀI TAHU SUBMISSION ON REDUCTION OVER TIME TO BELOW GMP LOSS RATES

2.1 It is accepted that the Ngāi Tahu submission does not *expressly* ask for a reduction over time to *below* GMP loss rates, and indeed the relief stated in respect of Policies 4.37 and 4.38<sup>1</sup> suggested that nitrogen loss reductions need not reduce below permitted loss baseline calculated for a property. This needs to be seen against the context that, at that time the submission was prepared, Ngāi Tahu was not clear about the predicted outcome that use of the Farm Portal was likely to achieve in terms of progressive reduction of losses over time.

2.2 Furthermore, it is submitted that the specific relief identified by Commissioner van Voorthuysen regarding Policies 4.37 and 4.38 needs to be considered against the rest of the Ngāi Tahu submission, which very clearly supported the concept and principle of a "sinking lid". In that respect, the Ngāi Tahu submission did clearly:

- (a) focus on *improvements* to water quality;<sup>2</sup>
- (b) seek that PC5 retain the use of a GMP Loss Rate as a tool to achieve *an overall cumulative reduction in nutrient loss* (particularly within over-allocated catchments);<sup>3</sup>
- (c) importantly, seek continued improvement in GMP, through review of what is good management practice (at least every five years), *which could result in a reduction in the GMP Loss Rate*;<sup>4</sup>
- (d) seek to ensure the region wide provisions retain measures that provide for staged reduction in nutrient loss on farm to assist with *overall cumulative reduction in nutrient loss* within over-allocated catchments, and maximum nutrient loss rates (nutrient caps);<sup>5</sup> and
- (e) seek inclusion of a new policy<sup>6</sup> in Part A under Nutrient Management that reads "*Freshwater quality is maintained or improved within catchment management zones by enabling the ability to establish provisions for Good Management Practice Loss Rates that in turn enable the management of freshwater to meet a specific water quality limit or limits. Measures may include staged reduction of nutrient losses,*

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1 See Appendix 3 of Ngāi Tahu's submission regarding Part A, policies 4.37 and 4.38.

2 See Whole of Plan Change 5 Part A relief on 1st page of Appendix 3 to Ngāi Tahu's submission.

3 *Ibid.*

4 *Ibid.*

5 *Ibid.*

6 *Ibid.* (see relief under "Policies general" on 3rd page of Appendix 3 of Ngai Tahu's submission).

*maximum nutrient loss rates and permitted levels of nutrient loss*", which clearly foreshadows and is entirely consistent with a "sinking lid" approach.

**2.3** Furthermore, it is submitted that while the specific relief sought by Ngāi Tahu with regard to Policies 4.37 and 4.38 was not to require reductions below GMP loss rates, that same relief seeks progressive reduction in GMP loss rates over time – which is undoubtedly a "sinking lid" approach.

**2.4** The principles that pertain to whether certain relief is within the scope of the submission of Ngāi Tahu can be summarised as follows:

- (a) the paramount test is whether or not amendments are ones which are raised by and within the ambit of what is fairly and reasonably raised in submissions on PC5. This will usually be a question of degree to be judged by the terms of the proposed plan and the content of submissions;<sup>7</sup>
- (b) another way of considering the issue is whether the amendment can be said to be a "foreseeable consequence" of the relief sought in a submission; the scope to change a plan is not limited by the words of the submission;<sup>8</sup> and
- (c) ultimately, it is a question of procedural fairness, and procedural fairness extends to the public as well as to the submitter.

**2.5** Overall, it is submitted that the Ngāi Tahu submission clearly raises a request for an overall cumulative reduction in nutrient loss on a staged and progressive basis over time, and for PC5 loss rates to not be set in a way which maintains the *status quo* but rather results in water quality improvements over time across the region.

**2.6** Appendix C of the s42A report says that this is the effect of PC5, and this outcome is acceptable to Ngāi Tahu as it is consistent with its principled position. To the extent that this position is now clarified by Environment Canterbury and accepted in principle by Ngāi Tahu, it would seek to modify its relief with regard to Policies 4.37 and 4.38 to remove any ambiguity and delete the additional wording which reads "*provided that these nitrogen loss reductions*

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<sup>7</sup> *Countdown Properties (Northlands) Limited v Dunedin City Council* [1994] NZRMA 145, at 166.

<sup>8</sup> *Westfield (NZ) Limited v Hamilton City Council* [2004] NZRMA 556, and 574-575.

*do not require the property's nitrogen loss calculation to reduce below the permitted nitrogen baseline".*

- 2.7 Such a modification would be entirely consistent with the overall thrust of the relief sought by Ngāi Tahu and the effect of the Farm Portal, and would not raise any scope issues.

**3. IS THE "SINKING LID" AN INTENDED OR UNINTENDED CONSEQUENCE OF PC5?**

- 3.1 It is not clear from the wording of PC5 as notified nor from the section 32 report, whether the "sinking lid" concept was an intended or unintended consequence of PC5. It however became clear, when the section 42A report was released (through Appendix C) that the Regional Council's intention was that PC5 will achieve, at the least, the same or more likely greater reduction in nutrient losses overall.

- 3.2 It is worth reiterating that Ms Davidson's rebuttal evidence was filed in response to Fonterra's witness Mr Willis, whose evidence appeared to seek the entire removal of or alteration to the Baseline GMP Loss Rate and GMP Loss Rate proposed by PC5. In addition to the earlier points regarding Ngāi Tahu's wish for both GMP and increased reductions in nitrogen loss rates being reviewed over time, the Ngāi Tahu stance has been to ensure that those who are operating above GMP Loss Rates reduce their losses over time.

- 3.3 Irrespective of whether the sinking lid concept was an intended or unintended consequence of PC5, Ngāi Tahu supports the effect of the Portal if it has the outcome outlined in Appendix C of the s42A report. Further, to the extent that this outcome is considered appropriate, Ngāi Tahu considers that the "sinking lid" needs express policy support in PC5.

**4. PERMITTED ACTIVITY RULE FOR DISCHARGE OF CONTAMINANTS FROM MAHINGA KAI ENHANCEMENT, PART B WAITAKI**

- 4.1 In its primary submission Ngāi Tahu sought that a permitted activity rule be included in Part B of PC5, as follows:

*The discharge of contaminants from aquaculture into surface water or from mahinga kai enhancement onto or into land in circumstances where*

*contaminants may enter water, is a permitted activity, provided that the following conditions are met:*

- 1. The nitrogen loss calculation for the property does not exceed 15kgs per year; and*
- 2. An Aquaculture Environment Plan is prepared in accordance with Schedule 26 and provided to Canterbury Regional Council on request.*

**4.2** The Panel queried whether the requirements of section 70 of the RMA had been considered when seeking this relief, or in Ngāi Tahu's evidence. For permitted activity rules to be included in regional plans, section 70(1) of the RMA provides that the Regional Council needs to be satisfied that none of a number of listed effects are likely to arise in the receiving waters, after reasonable mixing, as a result of a discharge of a contaminant or water into water.

**4.3** We confirm that section 70(1) was not expressly considered when preparing the submission and relief, nor in Ngāi Tahu's evidence to the Panel. Nevertheless, further consideration has been given to this issue since the matter was raised by the Panel, in response to Panel's invitation for Ngāi Tahu to provide revised wording of the proposed rule, to appropriately limit the nature and extent of contaminants that might be a permitted discharge.

**4.4** The proposed revised wording of the rule, which Ms Davidson has drafted, is:<sup>9</sup>

*The use of land for mahinga kai activities which is associated with the taking, use, damming or diverting of water from the allocation reserved for the enhancement of mahinga kai under the Waitaki Catchment Water Allocation Regional Plan where any nitrogen loss has been assessed as part of that resource consent process and the permit contains conditions which limit:*

- (i) The maximum rate at which nitrogen may be leached from the subject land (as measured in kg/ha/yr); or*
- (ii) The concentration of nitrogen in the drainage water leached from the subject land (as measured in ppm or g/m<sup>3</sup>); or*

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9 This rule would replace the rule proposed by Ms Treena Davidson in her evidence in chief, Appendix 4, page 6.

(iii) The water permit is subject to conditions which require the preparation and implementation of a plan to mitigate the effects of the loss of nutrients to water

is a permitted activity.

**4.5** In carrying out this redrafting exercise, Ms Davidson has turned her mind to whether the proposed revisions would meet the requirements of section 70(1) of the RMA so that the permitted activity rule would be *intra vires*. It is her view that the revised wording would adequately satisfy the statutory requirements of section 70(1) and would be valid. In addition, it is her view that the revised wording would not raise any scope issues in that the substance of the relief was clearly identified in Ngāi Tahu's original submission.

**5. RELATED TO THE PRECEDING POINT, WHAT WOULD BE THE MECHANISM/RULE THAT LIMITS THE DISCHARGE OF CONTAMINANTS FOR USE OF MAHINGA KAI WATER ALLOCATION?**

**5.1** The rule proposed above in paragraph 4.5 includes recommended limits.

**5.2** The mechanism/rule would be the use of a more onerous activity status where there is non-compliance with the permitted activity standards as set out in the section above. It was an oversight, in Ms Davidson's evidence in chief, to not recommend a corresponding controlled, restricted discretionary or non-complying rule, where the permitted activity rule standards are not achieved. Consequently, Ms Davidson has considered this omission and, given the rule structure, she recommends that discretionary activity status is appropriate. This is consistent with the activity status in PC5, for farming activities.

**6. CLARIFY POSITION ON NGĀI TAHU RELIEF REGARDING REQUESTED DEFINITION OF "INTENSIVE WINTER GRAZING"**

**6.1** In its submission Ngāi Tahu sought amendments to Rule 5.43A and an explanation and/or definition of 'intensive winter grazing'.

**6.2** The section 42A report recommends some amendments to the definition of 'winter grazing' and to the permitted activity rules for winter grazing. These recommended amendments satisfy Ngāi Tahu's concerns and, provided that

those recommendations are accepted by the Panel, it is confirmed that no new or specific definition of 'intensive winter grazing' is required.

## 7. DI ROBERTSON'S REPORT REGARDING AHURIRI DELTA

7.1 The Panel requested a copy of an ecological report prepared by Di Robertson, referred to in paragraph 4.29 of Ms Waaka-Home's evidence. This report is attached as **Appendix 1**.

## 8. ECAN GMP BOOKLET AND EFFICACY OF THIS DOCUMENT IN TERMS OF COVERAGE OF MAHINGA KAI ISSUES

8.1 The Panel asked Dr Tipa whether she was aware of the Environment Canterbury booklet "Industry-agreed GMPs" (**ECan GMP booklet**) when preparing the report which was the basis of her evidence. Dr Tipa did not recognise the ECan GMP booklet at the time, but has subsequently confirmed that it was part of the material that she considered when preparing her report and advice to Environment Canterbury.

8.2 The Panel also requested Dr Tipa to further consider the ECan GMP booklet,<sup>10</sup> and to advise as to the efficacy of this document in terms of coverage of the mahinga kai issues identified in Dr Tipa's written evidence (ie. what is missing from the ECan GMP booklet in terms of the GMPs identified in her evidence?).

8.3 As noted above, the report prepared by Tipa and Associates Ltd (at Appendix 1 of Dr Tipa's evidence) takes into account the ECan GMP booklet. However, the report also takes into account 20 other GMPs as shown in Appendix 2 of that report. As the GMPs are numbered (for ease of reference) and were mixed in with the GMPs prepared by a range of other organisations, it is difficult to determine what GMPs referred to are derived from the ECan GMP booklet.

8.4 Dr Tipa considers that, by removing any reference to the GMPs provided by Irrigation NZ, Beef and Lamb, Dairy NZ, and the Fertiliser Association of NZ, there would be considerably less certainty for Ngā Rūnanga that reliance on the ECan GMP booklet by itself will appropriately protect or provide for mahinga kai. To provide her advice, Dr Tipa has used the Table 1 from the Tipa & Associates report, and updated it to include her revised assessment

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10 [http://www.ecan.govt.nz/publications/General/Industry\\_Agreed\\_GMPs\\_A5\\_Version2\\_Sept2015\\_FINAL.pdf](http://www.ecan.govt.nz/publications/General/Industry_Agreed_GMPs_A5_Version2_Sept2015_FINAL.pdf).



based only on the efficacy of the ECan GMP booklet. This is set out in **Appendix 2.**

**8.5** The left hand column 'topics' and the middle column are copied from the Tipa & Associates report. The right hand column shows Dr Tipa's revised assessment based only on the ECan GMP booklet, and Dr Tipa has also provided a brief explanation for her advice, in italics. Where Dr Tipa's advice on whether mahinga kai will be protected, the table is highlighted in blue.

**9. IF THE ECAN GMP BOOKLET IS DEFICIENT, PLEASE ADVISE OF PRACTICAL MEASURES THAT FARMERS CAN TAKE TO ADDRESS MAHINGA KAI**

**9.1** In terms of practical measures on how mahinga kai could be addressed on farms the types of measures are extensive. At the hearings it was noted that actions include the likes of managing lanes and crossings, including guards on bridges and managing and control of stock near water. Practical measures could also include, as identified at the hearing, approaches to weed and pest management and the types of plantings used along waterbodies.

**9.2** The measures will be site specific and developed with farmers and Environment Canterbury.

**10. SCOPE TO RECOMMEND ADDITION TO SCHEDULE 7 - "MANAGEMENT AREA: MAHINGA KAI"**

**10.1** The Panel questioned the scope for Ms Davidson to recommend a new Management Area in Schedule 7, titled "*Management Area: Mahinga kai*".<sup>11</sup>

**10.2** The Ngā Rūnanga submission sought the following new management area and objective be added to Schedule 7:

*Management Area – Mahinga kai values and other sites of importance to Ngāi Tahu*

*Objective – to recognise and provide for mahinga kai values in any lakes, rivers, wetlands and springs within a property or farming enterprise and for any known wāhi tapu and wāhi taonga within any property or farming enterprise.*

*Targets –*

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11 Ms Davidson's evidence dated 22 July 2016, at paragraphs 5.6-5.10 and Appendix 4, page 7.

- *Include a map(s) or aerial photographs at a scale that clearly shows the location of any known mahinga kai areas, wāhi tapu or wāhi taonga within any property or farming enterprise.*
- *Managing the effects of farming activities to avoid adverse effects to mahinga kai, wāhi tapu or wāhi taonga.*

**10.3** In relation to Part B of PC5, Ngāi Tahu's submission supported the inclusion of "*Management Area: Mahinga Kai*" in Schedule 7 but sought that it apply region-wide.

**10.4** The principles that pertain to whether certain relief is within the scope of the submission of Ngāi Tahu are set out earlier in this memorandum.

**10.5** It is submitted that the Ngāi Tahu submission clearly requests the addition of a new management area and objective to Schedule 7 for Part A, and supported the inclusion of "*Management Area: Mahinga Kai*" in Schedule 7 Part B. When these matters are considered in combination, it is submitted that there is no scope issue arising in terms of the modifications sought in the evidence of Dr Tipa and Ms Davidson. Subsequent amendments to specific relief sought in submissions are not necessarily limited by the words of the submission, but instead must be a reasonable consequence of the relief set out in the submission. It is submitted that there must be some opportunity for reasonable refinement given the dynamic nature of the RMA process, provided that the substance of the modified relief sought can reasonably be contemplated when considering the original submission, and where it could not result in prejudice to third parties.

**10.6** It is submitted that the refined relief recommended by Dr Tipa and Ms Davidson, while differently worded, is clearly a new Management Area for a Farm Environment Plan as sought in the original submission, and includes an objective and associated targets. The refined wording is submitted to add greater clarity and certainty as to the expectations of what recognising and providing for mahinga kai values might look like, and how this can be practically achieved. As such, it is submitted that, when approached in a realistic and workable manner and not from the perspective of legal nicety, the modified relief is both contemplated by the substance of the Ngāi Tahu submission and would not result in prejudice to third parties.

## 11. RE-DRAFTING OF SUGGESTED NEW CLAUSE (E) IN SCHEDULE 7

11.1 Arising from the issue addressed directly above, the Panel requested re-drafting of the "*Management Area: Mahinga Kai*", for Schedule 7 of Part B of PC5, particularly with regard to the suggested final sub-paragraph (e) which was stated in Dr Tipa's and Ms Davidson's evidence as "*Implementing any measures identified by and agreed with Ngāi Tahu*". The re-drafting suggested by Ngāi Tahu is as follows:<sup>12</sup>

*Management Area: Mahinga kai*

*Objective: To protect mahinga kai values*

*Targets:*

*1. Mahinga kai values on the property are managed by achieving other objectives and targets in the Farm Environment Plan, and in addition by:*

*(a) maintaining existing indigenous vegetation in accordance with relevant regional council and district council vegetation clearance rules or any granted resource consent;*

*(b) identifying opportunities to undertake additional plantings of indigenous vegetation, and carrying out and managing any additional plantings in accordance with regional council guidelines for riparian planting;*

*(c) undertaking farming activities in a manner that minimises adverse effects on waterways, riparian areas, and existing indigenous vegetation and on any additional planting of indigenous riparian vegetation;*

*(d) managing pest plants in accordance with any regional council rules; and*

*(e) implementing any measures identified by and agreed ~~with Ngāi Tahu~~ between the landowner or farming enterprise and Te Rūnanga o Ngāi Tahu.*<sup>13</sup>

## 12. FONTERRA / MR WILLIS' POLICY

12.1 The Panel asked Ms Davidson whether she had (or would) come up with any drafting that addressed the points raised in paragraph 5.5 of her rebuttal evidence regarding Mr Willis' evidence that PC5 should provide for a policy

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12 Red text shows amendments from the wording proposed by Ms Treena Davidson in her evidence in chief, Appendix 4, page 7.

13 Recommended change from "Ngāi Tahu" to "Te Rūnanga o Ngāi Tahu", so consistent terminology used within PC5.

that enables GMP loss rates to not be imposed in atypical circumstances. While Ms Davidson has turned her mind to this matter again, she has not come up with wording which would clearly and effectively meet her concerns identified at paragraph 5.5 of her rebuttal evidence. Such drafting is respectfully submitted to be a matter for Fonterra (being the party that is advancing this relief) and its experts.

**12.2** It is noted that, despite an express request for appropriate drafting, the memorandum filed on behalf of Fonterra<sup>14</sup> following the presentation of its submission to the Panel, did not appear to fully address the Panel's concerns on the adequacy of or justification for the policy, nor the matters addressed by Ms Davidson's rebuttal evidence in terms of re-drafting of Mr Willis' policy 4.36A. Indeed, Mr Willis conceded that it is a difficult policy to draft and/or apply.<sup>15</sup>

**12.3** Consistent with Fonterra's position, and because of its inability to draft a suitable policy, Ngāi Tahu considers that the overall alternative approach cannot be justified, particularly to the extent that Fonterra's solution is that amendments are needed to remove reference to Baseline GMP and GMP Loss Rate as a condition of consent. Mr Willis' amendments seek removal of the requirement for farming activities to operate at or below the GMP Loss Rate, in any circumstance where the GMP Loss Rate is less than the Baseline GMP Loss Rate as these provisions give rise to the sinking lid approach.

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14 Dated 2 September 2016.

15 Mr Willis' evidence for Fonterra, at paragraph 11.13, and Fonterra's memorandum dated 2 September 2016 in response to matters raised at the hearing.

**12.4** Ngāi Tahu would suggest that these provisions are important to maintain as they support the Ngāi Tahu position seeking an overall cumulative reduction in nutrient loss on a staged and progressive basis over time and that methods are implemented that result in water quality improvements over time across the region.

**DATED** this 20<sup>th</sup> day of October 2016

A handwritten signature in blue ink, consisting of a stylized cursive name followed by a cross-like flourish.

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J G A Winchester / S J Scott  
Counsel for Ngā Rūnanga (Te Rūnanga o Kaikōura,  
Te Ngāi Tūāhuriri Rūnanga, Te Hapū o Ngāti Wheke,  
Te Rūnanga o Koukourārata, Ōnuku Rūnanga,  
Wairewa Rūnanga, Te Taumutu Rūnanga, Te  
Rūnanga o Arowhenua, Te Rūnanga o Waihao And  
Te Rūnanga o Moeraki), Ngāi Tahu Farming Limited,  
and Te Rūnanga o Ngāi Tahu

**APPENDIX 1  
DI ROBERTSON'S REPORT**



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# UPPER WAITAKI IRRIGATION CONSENTS

## AHURIRI DELTA

PREPARED FOR Te Rūnanga o Ngāi Tahu

BY Boffa Miskell Limited

DECEMBER 2009

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## INTRODUCTION / EXECUTIVE SUMMARY

Te Rūnanga o Ngāi Tahu commissioned Boffa Miskell Ltd to undertake an assessment of the ecological effects of large scale irrigation in the upper Waitaki on the Ahuriri delta and at Haldon Arm. These sites have been identified by Ngāi Tahu for potential mahinga kai restoration. The assessment particularly considers the effects on the wetlands, streams and deltas at these locations, and the mahinga kai values, restoration potential and taoka species at these sites. This ecological assessment aims to inform others in their assessment of the cultural impacts of the proposed irrigation.

An earlier report focussed on Haldon Arm and this second report focuses on the potential effects of the irrigation proposals on the Ahuriri delta.

In the preparation of this report the following resources have been used:

- Cultural Impact Assessment (Tipa and Associates)
- GHD Cumulative Water Quality Effects – Lakes and Rivers
- GHD Cumulative Water Quality Effects - Groundwater
- Environment Canterbury Section 42A Reports, including specialist reports Marc Schallenberg, Adrian Meredith, Tom Heller
- Evidence of Meridian Experts – George Griffiths, Matthew Ryan, Rob Potts, Peter Callander, Ton Snelder, Donna Sutherland, Bob Spigel.
- Evidence of Department of Conservation Experts – David Murray, Peter Ravenscroft, Richard Allibone
- Evidence of Mackenzie Guardians Experts – Susan Walker

This report is based on review of these reports and a brief site visit and discussions with John Wilkie and Paul Horgan in October 2009.

This report concludes that there are potential adverse effects on water quality in Ahuriri Delta as a result of the irrigation applications in the catchment. There is currently insufficient confidence in the data and modelling that has been provided by the applicants to be assured

that the mahinga kai values of the Ahuriri Delta will not be adversely affected by reduced water quality. The Ahuriri Arm is more sensitive than the Haldon Arm to increased nutrient levels and may already be experiencing increasing levels from irrigation systems in the catchment installed over the last two decades.

## 1.0 AHURIRI DELTA VALUES

### 1.1 Introduction

The Ahuriri Delta has been identified by Ngai Tahu as a potential site for mahinga kai restoration. The area around the current Ahuriri Delta is recorded as an important mahinga kai site prior to the formation of Lake Benmore, particularly associated with the wetlands and spring fed creeks that still exist in part slightly upstream of the current delta. It has also been used for mahinga kai since Benmore was formed. The key mahinga kai value associated with the site in recent times is longfin eel.

### 1.2 Ahuriri River and Tributaries Ecological Values

The Ahuriri catchment has high ecological values from the headwaters near the main divide down to the delta and Lake Benmore (and downstream through the other Waitaki Lakes and the lower Waitaki River to the sea). The wildlife habitat of the Ahuriri River is recognised in the National Water Conservation (Ahuriri River) Order 1990, with the outstanding characteristics and features listed as outstanding wildlife habitat, outstanding fisheries, and outstanding angling features.

Some of the ecological values of the Ahuriri River and tributaries have been described by other submitters to these irrigation consents, and include:

- High habitat value for birds in the braided river and associated wetlands, ranked at a national to international level of significance (David Murray evidence, DOC, and O'Donnell 2000)
- High habitat values for native fish in the Ahuriri and / or its tributaries, including the threatened species Waitaki lowland and bignose galaxias, and at risk species longfin eel and koaro, as well as more common galaxid and bully species (Richard Allibone and Peter Ravenscroft evidence).

### 1.3 Delta

The delta area is clearly important for its connection to the wider catchment as well as the ecological values in the vicinity of the delta. These include:

- Wetlands and spring fed waterways. These areas contrast to the braided river itself in providing waterways of relatively steady flows.
  - Ben Omar Swamp lies approximately 6 kilometres upstream of the delta and 1.5 kilometres from the true left of the Ahuriri River. 170 hectares of the *Carex secta* sedgeland is protected by the Department of Conservation.



- A stream from the Ben Omar Swamp meanders down to the Ahuriri delta of Lake Bemore and is joined by other spring fed stream which originate in the old flood plain of the Ahuriri or at the base of the adjacent terraces. These waterways provide habitat for long fin eel as well other native fish and trout. They also have associated scattered wetland areas.
- On the true right of the delta waterways drain extensive wetland areas.
- Ecological values of the lake include up to 15 fish species, of which 10 are native, a diverse range of open water birds including waterfowl and the threatened crested grebe.

The vegetation of the lake edge appears (from aerial photography and a brief site visit to part of the delta) to be dominated by crack willow and exotic grasses with occasional rushes and sedges. Occasional patches of raupo occur at the lake edge and in tributary streams.

Macrophytes are dominated by oxygen weed (Lagarosiphon), with pondweeds, milfoils and elodea also present. Lagarosiphon dominates large areas of the Ahuriri Delta with Sutherland noting some stands now reach 6km wide.

High levels of siltation are present in the lake shallows particularly on the true left.

Longfin eel have historically been the key species of interest for mahinga kai. Numbers have decreased in recent decades (Wilkie *pers. comm.*) and this has been associated with hydro development, commercial fishing and the general trend in population decline across the country. Eel utilise the lake itself as well as the tributary rivers and spring fed creeks and wetlands.

Eel habitat includes physical attributes such as connectivity to tributaries and upstream and downstream habitat, cover and undercut banks and biological attributes of healthy communities of other fish, macroinvertebrates, macrophytes and periphyton.

#### **1.4 Existing threats to delta ecology and mahinga kai values**

While eel numbers have decreased in the vicinity of the delta over recent years for a range of reasons, there are ongoing threats to the current habitat and habitat restoration opportunities. The recent establishment of Lagarosiphon and didymo have affected the aquatic habitat and, as discussed further below, these species are likely to increase in biomass with increasing nutrient levels. Nutrient levels already appear to be increasing as a result of irrigation in the catchment.

Siltation in the delta and the spread of willow are also likely to be reducing the habitat values.

Ecological values that could be enhanced to improve mahinga kai values include increased native wetland and riparian vegetation for habitat and use. This could include species such as raupo, sedges and rushes, ti kouka, possibly harakeke, and kowhai. Fencing of the spring fed creeks that enter the delta would help protect the water quality for both nutrients and sediment.

## 2.0 AHURIRI DELTA EFFECTS

### 2.1 Effects

The CIA (Tipa and Associates) identifies a range of potential impacts of the proposed irrigation and specifically mentions the importance of the Ahuriri delta under:

- *“Impact 1 Wetlands – the aquatic habitats of the Ahuriri Delta and the Haldon Arm of Lake Benmore are to be protected; and*
- *Impact 25 Mahinga kai – Loss of opportunities – Ngai Tahu has previously identified the Ahuriri Delta and the Haldon Arm of Lake Benmore as sites for enhancement of mahinga kai. As a priority, Ngai Tahu does not want to see new irrigation proposed for these areas degrade existing habitats and deny opportunities to undertake enhancements.*

As with the Haldon Arm the key aspect of the irrigation proposals that could affect the current and potential mahinga kai values at Ahuriri Delta is water quality. The Ahuriri Delta is susceptible to water quality effects as it is the receiving environment for upper catchment groundwater and surface water.

As discussed in the Haldon Arm Report increased level of nutrients has the potential to increase periphyton growth, which at certain levels, cause changes to water chemistry and to macrophyte and macroinvertebrate community composition which in turn can adversely affect bird and fish (including eel) habitat. High levels of periphyton are also likely to impact on the ability to locate and catch eel.

Provided the applicants fence and protect waterways and wetlands from stock the potential effects on water quality will be predominantly via groundwater entering waterways, not directly through surface water.

### 2.2 Review of science

Experts for other submitters, particularly Meridian, have provided some detailed review of the assessment of effects provided by the applicants' experts. Key concerns that have been raised were summarised in the earlier Haldon Arm report and are equally relevant for Ahuriri Arm:

- Lack of detailed information about the existing environment particularly with regard to groundwater systems (Potts and Callander), rivers (Snelder) and Haldon and Ahuriri Arm (Sutherland).
- Inappropriate use of the modelling to predict nitrogen levels (and consequently phosphorus) in receiving groundwater and surface water (Ryan and Potts).
- Inappropriate interpretation of the effects of the increased nutrients in the water bodies on the ecological values (Snelder and Sutherland). This includes concerns regarding the evaluation of the current and predicted future trophic status of the Haldon and Ahuriri Arm and the actual impact of increased nutrients on its status and specific ecological responses.

- Some new evidence was prepared for the commissioners in November by Bob Spigel on the modelling used by NIWA for Lake Benmore and the confidence that could be placed on this modelling in comparison to simpler models that had been used for earlier ECan report. Spigel concluded that:

*“The commissioners have asked in Minute 7 about the confidence that they can place in NIWA’s modelling predictions. I think the model performance is sufficiently good that, if I had to make decisions on issues relating to the possible responses of water quality in Lake Benmore to changes in nutrient loading, I would unhesitatingly base them on the results of our hydrodynamic-ecosystem modelling, rather than on predictions from any of the simpler models described in this report”.*

- In addition there is more concern regarding the water quality changes and effects in Ahuriri Arm (Sutherland). The Ahuriri Arm is more sensitive to increased nutrient concentrations due to:
  - the smaller volume of water entering from the Ahuriri catchment (in comparison to the Haldon Arm that received waters via the Ohau, Pukaki and Tekapo catchments);
  - the longer residence time – (75 days versus 57 days in Haldon Arm, and the Haldon Arm receives high volumes of low nutrient canal water from Ohau C tailrace); and
  - the likely increasing level of nutrients in Ahuriri Arm from irrigation systems in the Ahuriri catchment that have been installed in the last two decades and the groundwater from which have not yet reached the delta. Callander estimates this lag time to be in the order of 10-20 years in some areas. It is possible that the acceptable trophic level index may be exceeded even without new irrigation in the catchment. 0

Sutherland expressed concern regarding the location of the Ahuriri River sampling / monitoring for nutrient levels and considers that this should be measured at the delta to truly represent the nutrient load entering Lake Benmore from the river (paragraph 57).

These reviews conclude that there is a lack of confidence in the assessment of effects and that there is a significant risk of much greater ecological impact than that stated by the applicants.

### **2.3 Ecological effects at the delta**

The applicants state that the Ahuriri Arm could be kept in an oligotrophic status with the proposed irrigation. Submitter experts express concern regarding this both for the assessment of the current trophic level and the applicants’ modelled predictions of the impacts of the irrigation.

Sutherland predicts that algal growth will be stimulated by increased nutrient levels in Lake Benmore. NIWA have undertaken tests that indicate the phytoplankton communities in the lakes are both nitrogen and phosphorus limited and are therefore likely to increase in growth

with addition of either or both nutrients. Similarly didymo and other periphyton were tested in streams and found to be limited by either or both nitrogen and phosphorus.

Sutherland predicts toxic and nuisance algal and cyanobacterial blooms would become more prevalent with increased nutrient levels in the delta. Norton et al (2009) note: "*the general public has become increasingly aware of the risks associated with algal blooms. The frequent dominance of cyanobacteria in eutrophic waters is of additional concern to water quality considerations because several of these organisms can produce toxins*".

The shallows of the lake would be impacted particularly by increased filamentous green algae and didymo with increasing nutrient levels.

The delta is anticipated to experience the highest nutrient loadings as this is where the higher nutrient waters of the Ahuriri enter the lake and before they are diluted by the deeper waters of the lake (Sutherland), which are fed by surface and groundwater of lower nutrient levels.

Norton et al (2009) expressed concern that while *Lagorsiphon* is a current problematic weed in the Ahuriri delta, and is likely to increase in biomass with increased nutrients, it may be replaced by two more problematic weeds at higher nutrient levels. *Egeria* and hornwort are considered New Zealand's most problematic aquatic weeds in terms of invasiveness, competitive ability and production of biomass. These weeds are not yet found in the Waitaki Lakes but increased nutrient levels would make conditions more favourable for their establishment.

There is concern that nutrient levels in the delta may still be increasing from existing irrigation, given the recent increases in irrigation levels and the lag time in the groundwater movement. Any additional irrigation and associated additional nitrogen and phosphorus would compound these effects.

## **2.4 Mahinga kai effects**

The risks from the irrigation applications to the mahinga kai values at the delta relate to increasing nutrient levels causing increased algal and macrophyte growth. These affect the longfin eel habitat by altering the physical habitat, food supplies and potential toxicity from algal growth. Increased levels of algae and macrophyte are also likely to adversely affect both the harvesting experience and likelihood of capture.

## **2.5 Summary**

As with the Haldon Arm assessments, the effects predicted by the applicants have been disputed by other scientists who have expressed concerns regarding the applicant's description of the existing environment as well as the predicted effects of the irrigation. Given the susceptibility of Ahuriri Arm, the existing nutrient loads and the proposed and potential increases in nutrients entering the delta, the applications pose a risk to the existing aquatic habitats of the Ahuriri delta and limit its potential for mahinga kai enhancement, for successful and safe food gathering.

### 3.0 CONCLUSION

Any further increases in irrigation in the Ahuriri Catchment have the potential to adversely affect the water quality in the Ahuriri delta. The current applications pose a high risk to the ecological values and current future mahinga kai potential.

Scientists working for ECan and Meridian have expressed a lack of confidence in the applicants' reports relating to the understanding of the existing groundwater and surface water systems and lack of confidence in the nutrient modelling in the systems. The confidence in the assessment of effects could only be increased by more in depth study of the existing environment and a more widely agreed upon use of the modelling tools and implications of increased nutrients on the receiving environments. Beyond best farm management practices the only clear way to reduce nutrient load is by limiting stock units and fertiliser inputs. It appears from other submitter evidence that the use of nitrification inhibitors and removal of winter grazing alone are unlikely to provide a sufficient reduction in nutrient loads on the groundwater and receiving surface water environments.

### 4.0 REFERENCES

GHD 2009. Cumulative Water Quality Effects of Nutrients from Agricultural Intensification in the Upper Waitaki Catchment Rivers and Lakes Report. August 2009

Norton, N.; Spigel, B.; Sutherland, D.; Trolle, D.; Plew, D. (2009). Lake Benmore Water Quality: a modelling method to assist with assessments of nutrient loadings. NIWA Client Report CHC2009-091.

Tipa and Associates, 2009. Cultural Impact Assessment of New and Existing Irrigation in the Upper Waitaki.

**APPENDIX 2  
ADVICE FROM DR TIPA**

**Table 1: Summary of Assessment: Are GMPs sufficient to protect Mahinga Kai?**

	Initial assessment (Tipa & Associates Ltd 2016)	Revised assessment at request the request of Commissioners
<b>Irrigation Management</b>		
<b>Farm design stage</b>	Possibly	Possibly
<p><i>Dr Tipa concluded that the original assessment does not change. The majority of cultural expectations are covered by the ECAN GMPs. There still needs to be an emphasis upon not just irrigation efficiency but reducing environmental risk as well.</i></p>		
<b>Water application</b>	Possibly	No
<p><i>Dr Tipa has concluded that the original assessment does change from a "possibly" to a "no" The majority of key cultural expectations are not meet by the ECAN GMPs as there are not specific ECAN GMPs covering these expectations. Also the need to keep sufficient records is required by whanau and it not stressed enough in the ECAN GMPs.</i></p>		
<b>Monitoring</b>	Yes	Possibly
<p><i>Dr Tipa has concluded that the original assessment does change from a "yes" to a "possibly". The majority of cultural expectations are covered by ECAN GMPs but there are limited specific GMPs especially regarding soil moisture monitoring and soil mapping. Also the focus of the ECAN GMPs is upon accurate record keeping but not upon detailed record keeping or upon what records are required.</i></p>		
<b>Staff trained to use irrigation system</b>	Possibly	No
<p><i>Dr Tipa has concluded that the original assessment does change from a "possibly" to a "no" There are no ECAN GMPs covering staff training.</i></p>		
<b>Nutrient Management</b>		
<b>Sources identified</b>	Yes	Yes
<p><i>Dr Tipa has concluded that the original assessment does not change. The majority of cultural expectations are covered by ECAN GMPs. Although again sufficient records are required by farmers.</i></p>		
<b>Nutrient use</b>	Possibly	Possibly
<p><i>Dr Tipa has concluded that the original assessment does not change. The majority of cultural expectations are covered by ECAN GMPs. Although again sufficient records are required and farmers need to meet industry standards.</i></p>		
<b>Winter grazing</b>	Yes	Yes
<p><i>Dr Tipa has concluded that the original assessment does not change. The majority of cultural expectations are covered by ECAN GMPs. Although again sufficient records are required by farmers.</i></p>		
<b>On farm rubbish disposal</b>	Possibly	No
<p><i>Dr Tipa has concluded that the original assessment does change from a possibly to a no. There are no specific ECAN GMPs relating to on farm rubbish disposal and sustainable disposal of on farm rubbish (biodegradable or recycled).</i></p>		
<b>Effluent management</b>		
<b>Effluent system (Farm design as well)</b>	Possibly	Possibly

<p><i>Dr Tipa has concluded that the original assessment does not change. There are some ECAN GMPs which meet cultural expectations although systems need to be designed, certified and audited by an accredited organisation. There also needs to be an equal focus on nutrient use and environmental risk.</i></p>		
<b>Effluent application</b>	Yes	Possibly
<p><i>Dr Tipa has concluded that the original assessment does change from a "yes" to a "possibly". Some of the cultural expectations are meet by ECAN GMPs. Although there needs to be an emphasis upon reducing the amount of effluent created and putting in place specific plans or procedures for effluent management. Sufficient records need to be keep which show good effluent management.</i></p>		
<b>Staff</b>	Yes	No
<p><i>Dr Tipa has concluded that the original assessment does change from a "yes" to a "no". There are no ECAN GMPs covering staff training.</i></p>		
<b>Soil Management</b>		
<b>Farm design / infrastructure</b>	Yes	Possibly
<p><i>Dr Tipa has concluded that the original assessment does change from a "yes" to a "possibly". Some of the cultural expectations are meet by the ECAN GMPs but there needs to be more emphasis upon riparian planting.</i></p>		
<b>Soil issues</b>	Possibly	Possibly
<p><i>Dr Tipa has concluded that the original assessment does not change. Some of the cultural expectations are meet by the ECAN GMPs but no specific GMPs relating to soil compaction. The ECAN GMPs also need to focus more upon reducing environmental risk.</i></p>		
<b>Erosion issues</b>	Yes	Possibly
<p><i>Dr Tipa has concluded that the original assessment does change from a "yes" to a "possibly". Some of the cultural expectations are meet by the ECAN GMPs but farmers need to have specific records or evidence of compliance. Also more specific GMPs relating to an erosion, sediment or critical source areas management plan being in place or map is required.</i></p>		
<b>Riparian and Waterway management</b>		
<b>Farm design</b>	Possibly	No
<p><i>Dr Tipa has concluded that the original assessment does change from a "possibly" to a "no" There are no specific ECAN GMPs relating to integrating riparian and waterway management into farm design.</i></p>		
<b>Stock exclusion</b>	Possibly	Possibly
<p><i>Dr Tipa has concluded that the original assessment does not change. There is an ECAN GMP which mentions excluding stock from waterways. Although to meet cultural expectations waterways need to be clearly defined as "all waterways" or areas which are wet for a significant period of time and stock sufficiently excluded.</i></p>		
<b>Farm containments reduction</b>	Possibly	Possibly
<p><i>Dr Tipa had concluded that the original assessment does not change. One ECAN GMP covers some of the cultural expectations but more specific GMPs are required especially relating to riparian planting.</i></p>		
<b>Biodiversity / Taonga</b>	Possibly	No
<p><i>Dr Tipa has concluded that the original assessment does change from a "possibly" to a "no" The majority of cultural expectation are not meet with the ECAN GMPs. There is little or no enough emphasis on protecting or enhancing habitat for taonga species.</i></p>		
<b>Good Management Philosophy</b>		

**Continuous  
improvement**

No

No

*Dr Tipa has concluded that the original assessment does not change.  
There are no ECAN GMPs relating to good management philosophy.*

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