

**BEFORE THE HEARING PANEL**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of proposed Plan Change 2 for the One Plan

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**JOINT WITNESS STATEMENT OF EXPERTS**

**WATER QUALITY**

13 August 2020

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## INTRODUCTION

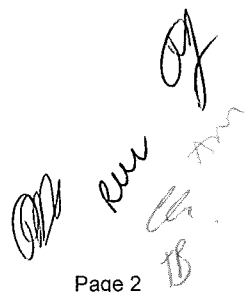
1. This joint witness statement relates to expert conferencing on the topic of Water Quality. In particular, it relates to proposed Plan Change 2 (**PC2**) of the One Plan by examining environment nitrogen load modelling and environment water quality impacts of proposed PC2.
2. The expert conferencing was held on 13 August 2020 at Palmerston North.
3. Attendees at the conference were:
  - (a) Rosemary Miller;
  - (b) Phil Teal;
  - (c) Nic Conland;
  - (d) Dr Craig Depree;
  - (e) Tim Baker;
  - (f) Dr Claire Conwell;
  - (g) Dr Ton Snelder;
  - (h) Dr Tim Cox; and
  - (i) Abby Matthews.

## CODE OF CONDUCT

4. We confirm that we have read the Environment Court Practice Note 2014, and in particular Appendix 3 – Protocol for Expert Witness Conferences, and agree to abide by it.

## PURPOSE AND SCOPE OF CONFERENCING

5. This joint witness statement follows on from an earlier expert conference between the witnesses on [28] July 2020. The purpose of conferencing was to identify, discuss and highlight points of agreement and disagreement on water quality issues arising from PC2, and the submissions received on the proposed plan change. There was a focus in this second session on the outcome of water quality modelling undertaken by Horizons.

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6. The previous joint witness statement of 28 July 2020 from the expert conference session on Water Quality and methodology and this JWS are to be read together.]
7. The scope of the issues covered at this conference included:
  - (a) Scenario modelling; and

#### **KEY FACTS AND ASSUMPTIONS**

8. See Annexure A

#### **METHODOLOGIES AND STANDARDS**

9. Modelling of Nitrogen Management in Manawatu-Whanganui Region: Supporting Regional Plan Change 2 and supplementary spreadsheet.
10. Manawatu-Whanganui Region Catchment Nitrogen Models: Supporting Regional Plan Change 2

#### **AGREED ISSUES**

11. Refer to Annexure A.

#### **DISAGREEMENT AND REASONS**

12. Refer to Annexure A.

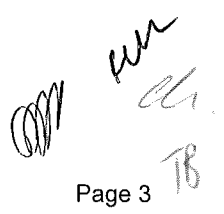
#### **PRIMARY DATA**

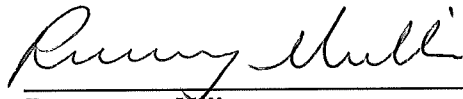
13. Modelling of Nitrogen Management in Manawatu-Whanganui Region

#### **RESERVATIONS**

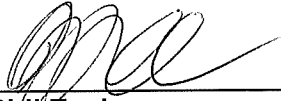
CD, NC: The current reporting doesn't reflect the proportionality between the loads of nitrogen from IFLU and non-IFLU within each water management subzones.

Date: 13 August 2020

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Rosemary Miller



Phil Teal

Nic Conland

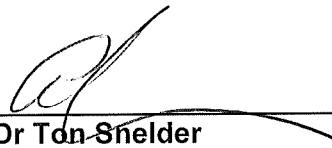
Dr Craig Depree



Tim Baker



Dr Claire Conwell

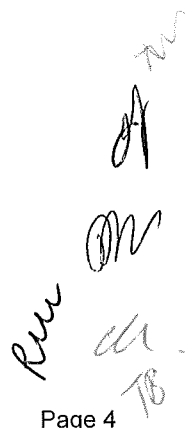


Dr Ton Snelder

Dr Tim Cox



Abby Matthews



## ANNEXURE A

### In the matter of Proposed Plan Change 2

#### Expert conferencing – Water Quality (Day 2 – 13 August 2020)

| Issue                                                                                                                                                                                  | Statements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Agreed Position                                                         | Disagreements, with reasons                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Do the experts agree that Horizon's modelling approach is appropriate for assessing the potential impacts of PPC2 on nitrogen loads and concentrations in rivers across the region? | <p>We are generally satisfied with the model calibration.</p> <p>Based on the principles and assumptions, the model is appropriate.</p>                                                                                                                                                                                                                                                                                                                                                                          | <p>All agreed</p> <p>All agreed</p>                                     | <p>CD: Limitation on how unknown and unconsented IFLU have been modelled.</p> <p>CD, NC: The current reporting doesn't reflect the proportionality between the loads of nitrogen from IFLU and non-IFLU within each water management subzones.</p> |
| 2. What can the model tell us about the impact of PPC2 on other receiving environments, for example groundwater, lakes, estuaries and the coast?                                       | <p>The long term annual average model can't predict short term changes or seasonality (including rivers).</p> <p><b>Groundwater</b></p> <p>The model reflects the shift in nutrients into and through the groundwater, but it is not a groundwater hydrological model.</p> <p><b>Estuaries</b></p> <p>The model outputs can inform the change in N loads to estuaries.</p> <p><b>Lakes</b></p> <p>Calibration points for the lakes catchment is not in the lakes catchment. It is calibrated to river loads.</p> | <p>All agreed</p> <p>All agreed</p> <p>All agreed</p> <p>All agreed</p> |                                                                                                                                                                                                                                                    |

  
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| Issue                                                                                                                                                                                                                                        | Statements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Agreed Position                                       | Disagreements, with reasons |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------|
|                                                                                                                                                                                                                                              | <p>Modelled outputs for the lake catchments are linked to their associated rivers. The outputs are not calibrated to a lake load.</p> <p>The model can predict changes to the external loads to the lake.</p> <p>The model cannot predict in-lake water quality, i.e. concentrations.</p> <p><b>Coast</b></p> <p>It can quantify the discharge of N load to the coast from the river.</p>                                                                                                              | All Agreed                                            |                             |
| <p>3. What does the modelling tell us about changes in N load as a result of consenting of IFLU since the OP became operative?</p> <p>Do the experts believe that water quality has improved or degraded as a result of consenting IFLU?</p> | <p>There is a scenario that specifically models the impact of 213 consented farms (post regulation scenario, compared to the pre regulation scenario) the result showed reducing leaching N loads and downstream improvements.</p> <p>Conceptually and everything else being equal, SIN should be improved in the catchment as a result of consenting.</p> <p>The model demonstrates this. However, it is unclear whether the observed SIN concentrations are directly attributable to consenting.</p> | <p>All agreed</p> <p>All agreed</p> <p>All agreed</p> |                             |
| <p>4. Do the experts agree that the scenarios have been appropriately modelled to</p>                                                                                                                                                        | <p>The model was consistent with OVERSEER 6 calibration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                           | All agreed                                            |                             |


| Issue                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Statements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Agreed Position                                                          | Disagreements, with reasons                                                                                                                                                                           |
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| <p>determine the expected impact On N load:</p> <p>I. Under the operative (pre-PC2) One Plan.</p> <p>II. Under PPC2, where unconsented IFLU does not exceed PPC2 Table 14.2 limits.</p> <p>III. Under PPC2, where some unconsented IFLU (those farms who cannot achieve the PC2 Table 14.2 limits using GMP) can exceed the recalibrated Table 14.2 limits.</p> <p>Under additional scenarios put forward by submitters (including natural state, dairy sector</p> | <p>(4.i) Modelling of N load reduction is overstated, using OVERSEER 6.3, as opposed to version 5, which would have been applied during modelling for the One Plan.</p> <p>It is an inappropriate scenario for what was anticipated the water quality outcomes would be under the operative One Plan.</p> <p>Yes.</p> <p>Yes, subject to the following comments:</p> <p>A discretionary pathway cannot be reliably modelled as there are too many variables and it is unlikely to represent a plausible scenario.</p> <p>However, it has been possible to model specific interpretations of GMP.</p> <p>The unknown and unconsented IFLU is not included. Their leaching rate has been assumed to meet Table 14.2.</p> <p>If we look across all of the scenarios we are able to understand the possible range of outcomes under all possible implementations of the discretionary pathway</p> <p>The natural state scenario doesn't fully represent the pristine state, e.g. wetland loss.</p> | <p>All agreed</p> <p>All agreed</p> <p>All agreed.</p> <p>All agreed</p> | <p>CD: Selection of five and 20 year scenarios is subjective and ten year scenario hasn't been included.</p> <p>CD: The scenario doesn't model the dairy proposal, as intended by the submitters.</p> |

| Issue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Statements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Agreed Position                                                                           | Disagreements, with reasons |
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| pathway, and horticulture expansion)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The additional scenarios are accurately parametrised in the model.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | All agreed                                                                                |                             |
| <p>5. How do the expected impacts of the discretionary pathway provided by PPC2 (where unconsented IFLUs operate at baseline rates less 9, 12, 15 and 18kg/ha/yr; Scenario 3e. 3f, 3g, 3h) on N load compare with the N load associated with the following scenarios:</p> <p>i. If all IFLUs (consented and unconsented) had continued leaching at their pre-consented (unregulated) N loss rates (Scenario 6).</p> <p>ii. If all consented IFLUs operate at their consented N loss rates, and unconsented IFLUs operate at up to, but not exceeding, the PPC2 (recalibrated) Table 14.2 limits (Scenario 1b)</p> <p>iii. If all consented IFLUs operate at their consented N loss rates where those rates do not exceed PPC2 Table 14.2 limits and reduction of N loss rates to Table 14.2 where consented rates are above Table 14.2, and unconsented IFLUs operate at up to, but not exceeding, the PPC2</p> | <p>(5.i) Refer figure 16 (pre-regulation scenario). <i>Scenario Modelling of Nitrogen Management in Manawatu-Whanganui Region</i> report</p> <p>(5.ii) Refer to figure 14</p> <p>Yes, discretionary consented pathways will represent a reduction.</p> <p>Flow and changes in concentration are important to demonstrate the relative differences for catchment loads within different water management subzones.</p> <p>The proposed plan change 2 modelled outcomes suggest an overall reduction in N compared to the pre-regulation scenario.</p> <p>However, under some of the proposed scenarios, there are increases in SIN concentrations at individual assessment points.</p> <p>Regulated scenarios show a modest improved state and each scenario will nuance the improvements achieved.</p> | <p>All agreed</p> <p>All agreed</p> <p>All agreed</p> <p>All agreed</p> <p>All agreed</p> |                             |

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| Issue                                                                                                                                                                                                                                                                         | Statements                                                                                                                                                                                                                                                                                                                                                          | Agreed Position | Disagreements, with reasons |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------|
| (recalibrated) Table 14.2 limits (Scenario 10).                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                     |                 |                             |
| 6: Taking into account the current state and trends in water quality (as discussed during the first day of water quality expert conferencing), what impacts are the modelled changes in N from the above scenarios likely to have on water quality in receiving environments? | The conclusion is that the Proposed Plan will lead to modest water quality improvements, compared to a pre-regulated conditions, in the Target Catchments but may allow some IFLU land to increase its nitrogen leaching rates up to the levels specified in Table 14.2 and this will decrease water quality (i.e., increase SIN concentrations) in some locations. | All agreed      |                             |

  
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