BEFORE THE CANTERBURY REGIONAL COUNCIL

HEARING COMMISSIONERS

IN THE MATTER	of the Environment Canterbury (Transitional Governance Arrangements) Act 2016
AND	
IN THE MATTER	of submissions on Proposed Plan Change 7 to the Land and Water Regional Plan and Proposed Plan Change 2 to the Waimakariri River Regional Plan

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SUMMARY OF EVIDENCE OF MICHAEL JAMES THORLEY FOR CHRISTCHURCH CITY COUNCIL

11 November 2020

Christchurch City Council
53 Hereford Street, Christchurch, 8011
PO Box 73016, Christchurch, 8154
Solicitor: Brent Pizzey
Tel: 941 5550
Email: Brent.Pizzey@ccc.govt.nz

INTRODUCTION

1. My name is Michael James Thorley. I here provide an overview of my evidence in chief, rebuttal evidence and the Joint Witness Statement – Groundwater Science (JWS) prepared as part of submissions in relation Plan Change 7 (PC7). I describe information about the groundwater science which indicates aquifer system linkages between the Waimakariri Plains and Christchurch and cumulative effects on groundwater quality.

SUMMARY

2. The urban Christchurch (including Lyttelton Harbour) community water supply system is solely sourced from groundwater supply bores. The groundwater source has historically been of a very high quality for community consumption however some parts of the Christchurch West-Melton groundwater system are showing signs of elevated nitrate-nitrogen.

3. The recent finding by Environment Canterbury that the Waimakariri Plains forms part of the urban Christchurch drinking water catchment indicates that interzone nitrate-nitrogen has been occurring and further increases of nitrate-nitrogen in groundwater are expected to further degrade the source water quality in some areas of the Christchurch West-Melton groundwater system.

4. I agree with the Environment Canterbury modelling evidence and previous investigations and research indicating sources of groundwater from north of the Waimakariri River flowing into the Christchurch West-Melton groundwater system. I note that none of the experts who signed the JWS disagreed that groundwater flow from the Waimakariri Plains to the Christchurch West-Melton groundwater system is occurring.

5. Elevated nitrate-nitrogen concentrations are found in deeper aquifers in northern and south-west areas of urban Christchurch and are most vulnerable to further cumulative effects from distal interzone transfers of nitrate-nitrogen in groundwater.

6. Environment Canterbury has not allowed for existing or future nitrate-nitrogen concentrations in groundwater in the Christchurch West-Melton groundwater system when determining limits for nitrogen reduction targets in PC7. If Environment Canterbury did allow for nitrate in groundwater south of the Waimakariri River, then the addition of nitrate-nitrogen in groundwater migrating from north to south of the Waimakariri River into the Christchurch West-Melton groundwater system will result in higher concentrations than indicated by Environment Canterbury scientists (Kreleger and Etheridge, 2019).

7. Kreleger and Etheridge (2019) compared average concentrations and increases of nitrate-nitrogen to the DWSNZ Maximum Acceptable Value (MAV) of 11.3 mg/L, which is inappropriate. In my opinion, maximum concentrations and increases in nitrate-nitrogen should be compared to the MAV, not averages and medians. Environment Canterbury estimates of existing baseline and increases in nitrate-nitrogen are therefore understated could exceed the MAV and the thresholds relied on in PC7. Therefore, in order to meet PC7 targets or lower water quality targets/standards, which are set out by Ms Bridget O'Brien, Dr Belinda Margetts and Dr Tim Chambers, my view is that nitrogen loss reduction requirements should be more stringent than proposed by PC7 to lessen the interzone transfer of nitrate-nitrogen to the Christchurch West-Melton groundwater system.

8. Kreleger and Etheridge (2019) identified a water quality target of 3.8 mg/L nitrate-nitrogen to protect 90% of aquatic species and recognises spring-fed stream connectivity to groundwater in Christchurch. Kreleger and Etheridge (2019) predicted groundwater in the Christchurch West-Melton groundwater system will be affected by interzone transfer of nitrate-nitrogen from an area of the Waimakariri Plains which is generally delineated by Nitrate Priority Area sub-area A in PC7.

9. In order to meet the water quality target of 3.8 mg/L, Kreleger and Etheridge (2019) identified 30% nitrogen loss reduction is required in Sub-area A listed in [Table 8-9] of PC7. The water quality target of 3.8 mg/L nitrate-nitrogen is critical to the outcomes sought by PC7 for land management and the consequential water quality in the Christchurch West-Melton groundwater system. More stringent water

quality targets require greater nitrogen loss reductions to be achieved, which was agreed by experts in the JWS at paragraphs 54-57.

10. Table 4-5 in Kreleger and Etheridge (2019) indicates that in order to meet a lower nitrate-nitrogen target of 2.4 mg/L (which is the Numeric attribute state for rivers Band B of Table 6 in the National Policy Statement for Freshwater Management 2020 (NPSFM)), 50% nitrogen loss reduction is required in NPA sub-area A. If a lower nitrate-nitrogen target of 1 mg/L is used, Table 4-5 in Kreleger and Etheridge (2019) indicates 80% nitrogen loss reduction is required in NPA sub-area A.

11. As outlined in my evidence in chief, there are indications that the interzone transfer of nitrate-nitrogen could be faster than relied on by Environment Canterbury in Kreleger and Etheridge (2019). In order to address faster nitrate-nitrogen incursion and to minimise future nitrate-nitrogen concentrations, and address the epidemiological evidence of Dr Tim Chambers that a nitrate-nitrogen target of 1 mg/L better protects public health, I consider that an 80% nitrogen loss target be sought for dairy activities in NPA sub-area A (based on Table 4-5 of Kreleger and Etheridge, 2019), and should comprise a 40% reduction in the first 10 year period of [Table 8-9] PC7, followed by a further 40% in the following 20 year period for Dairy Farming Activities.

12. The 40% nitrogen loss reduction target for dairy activities in the first 10 years is based on making changes to farming practices (Farmers Panel mitigation) and additional on-farm infrastructure (Systems change mitigation) such as feed pads, as outlined on page 57 of Kreleger and Etheridge (2019).

13. The Waimakariri River is a major source of recharge to the Christchurch West-Melton groundwater system and more explicit protection of its water quality in maintaining groundwater quality in the urban Christchurch community water supply system should be included in PC7 by way of a nitrate-nitrogen target of 0.1 mg/L and delineated by an NPA sub-area.

Dated at Christchurch this 11th day of November 2020

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Michael James Thorley