

## Memo

Date	24 July 2018
To	Jason Holland
CC	Alastair Picken
From	Maureen Whalen

## Private water supply wells – Waimakariri CWMS Zone

The following provides a brief summary of our understanding of current state and potential future trends nitrate concentrations in private water wells in the Waimakariri Canterbury Water Management Strategy (CWMS) zone, in particular the area between the Ashley River / Rakahuri and the Waimakariri River. This area has been identified as of most concern with regards to elevated nitrate concentrations in groundwater.

This summary is based on information contained in Environment Canterbury Technical Report No. R16/48, *The current state of groundwater quality in the Waimakariri CWMS zone (October 2016)* and Environment Canterbury Technical Report (Draft), *Nitrate assessment for the northern Waimakariri River tributaries catchment (May 2018)*.

### Current state

- Number and distribution of private drinking water supply wells:
  - Approximately 2,300 private water supply wells (see Figure 1)
  - Approximately 60% less than 30m deep
- Spatially-averaged measured nitrate concentrations (based on the last 5 years of data) range from less than 1 mg/L near Rangiora / Woodend – Tuahiwi / Waikuku to 5 mg/L at Eyreton. Private water supply wells in areas to the north around Ohoka, Cust, Clarkville contain average measured nitrate concentrations between 3 to 4 mg/L.
- We have recorded maximum nitrate-N concentrations of up to 9.4 mg/L in the private water supply wells we have sampled within the last five years, but have been told by some local residents that nitrate concentrations in their wells exceed the drinking water limit (Maximum Allowable Value [MAV]) of 11.3 mg/L nitrate-N.

### Projected nitrate concentrations

- To look at potential future nitrate concentrations, we developed a numerical groundwater model, which has been calibrated and peer-reviewed. The model was used to examine potential future nitrate concentrations in groundwater and surface water under various land-use scenarios and after the hydrological system equilibrates (catches-up) with current land use.
- One such scenario, Current Pathways, evaluates future nitrate concentrations under the assumptions that current land use and farming activities achieve compliance with the

decisions version of PC5 and that 50% of the permitted activity allowances for winter grazing and irrigation are used by landowners.

- Nitrate concentration projections in private supply wells under this scenario are spatially variable, but are expected to exceed the MAV on some occasions in approximately 40% of shallow (less than 50m) wells.
- The projected concentrations range from less than 3 mg/L near Rangiora / Woodend – Tuahiwi / Waikuku to above the MAV at Eyreton. Private water supply wells in areas to the north around Ohoka, Cust, Clarkville are projected see an increase in nitrate concentrations to between 6 to 8 mg/L under the median model results.

### **Nitrate concentration limit options**

We looked at three potential nitrate concentration target values:

- 3.5 mg/L (current concentration spatially averaged across the area)
- 5.65 mg/L ( $\frac{1}{2}$  MAV, LWRP Schedule 8 average annual concentration for groundwater)
- 7.1 mg/L (the maximum concentration at which most wells would remain below the 11.3 mg/L limit, after allowing for seasonal spikes)

### **Percent reductions in nitrogen load needed to meet nitrate concentration limits**

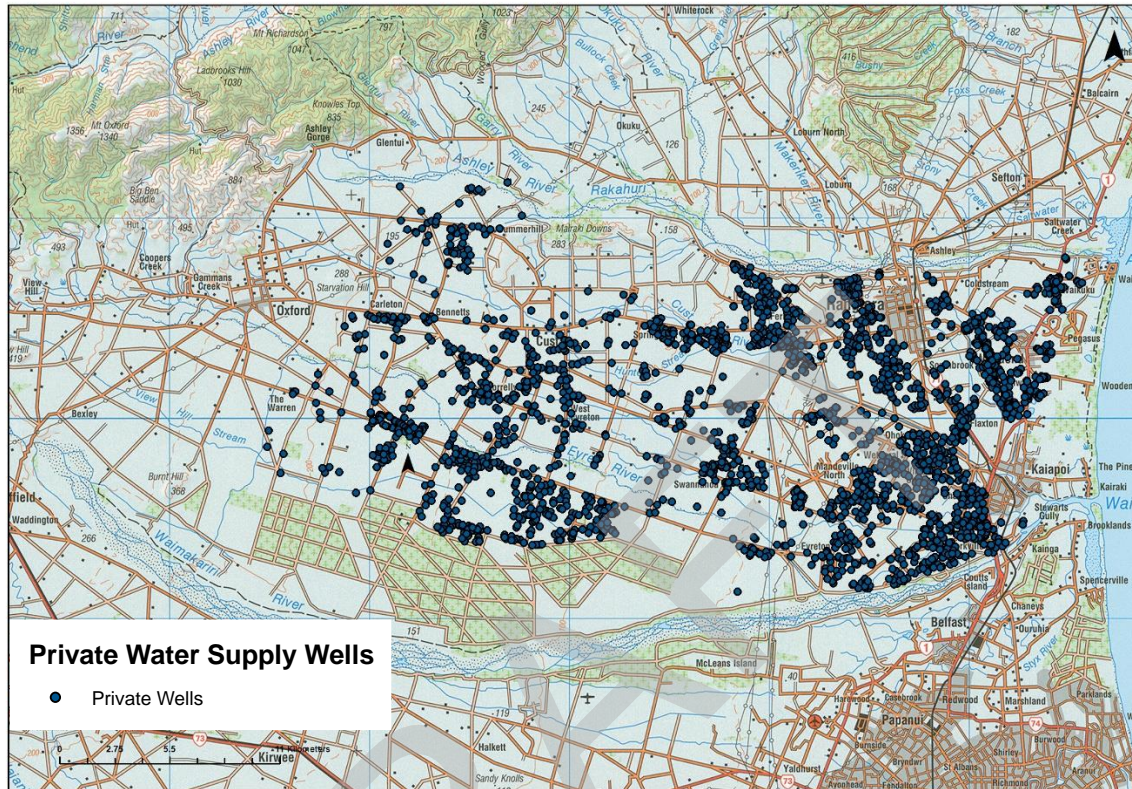
Under the Current Pathways scenario, assuming 50% certainty of the actual value equalling the modelled value, the percent reduction in nitrogen load required to meet a 3.5 mg/L limit in private water supply wells would have a wide range depending on geographic area. For example, the required reductions would be approximately:

- 0% near Rangiora / Woodend – Tuahiwi / Waikuku
- 50 to 60% for the areas around Ohoka, Cust, Clarkville
- 70% at Eyreton

Under the Current Pathways scenario, assuming 50% certainty of the actual value equalling the modelled value, the percent reduction in nitrogen load required to meet  $\frac{1}{2}$  MAV limit would be approximately:

- 0% reduction near Rangiora / Woodend – Tuahiwi / Waikuku
- 20 to 30% around Ohoka, Cust, Clarkville
- 60% at Eyreton

**Figure 1 – Private water supply wells**



**Attachments:**

**File reference: (SharePoint or TRIM)**