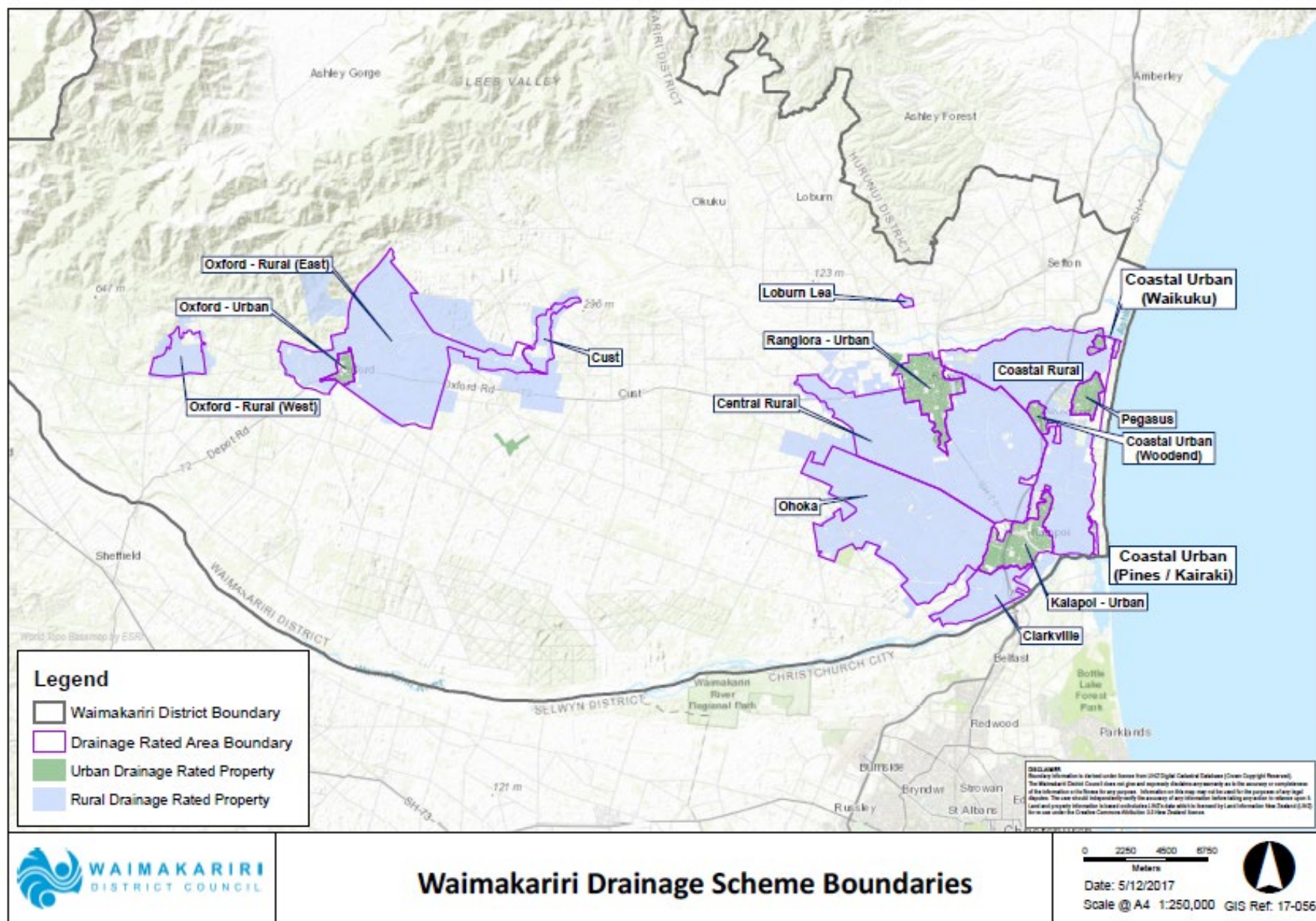


Figure 5-3: Proposed Nitrates Priority Sub Areas with required beyond GMP nitrates load reductions stages based on 50th percentile model results



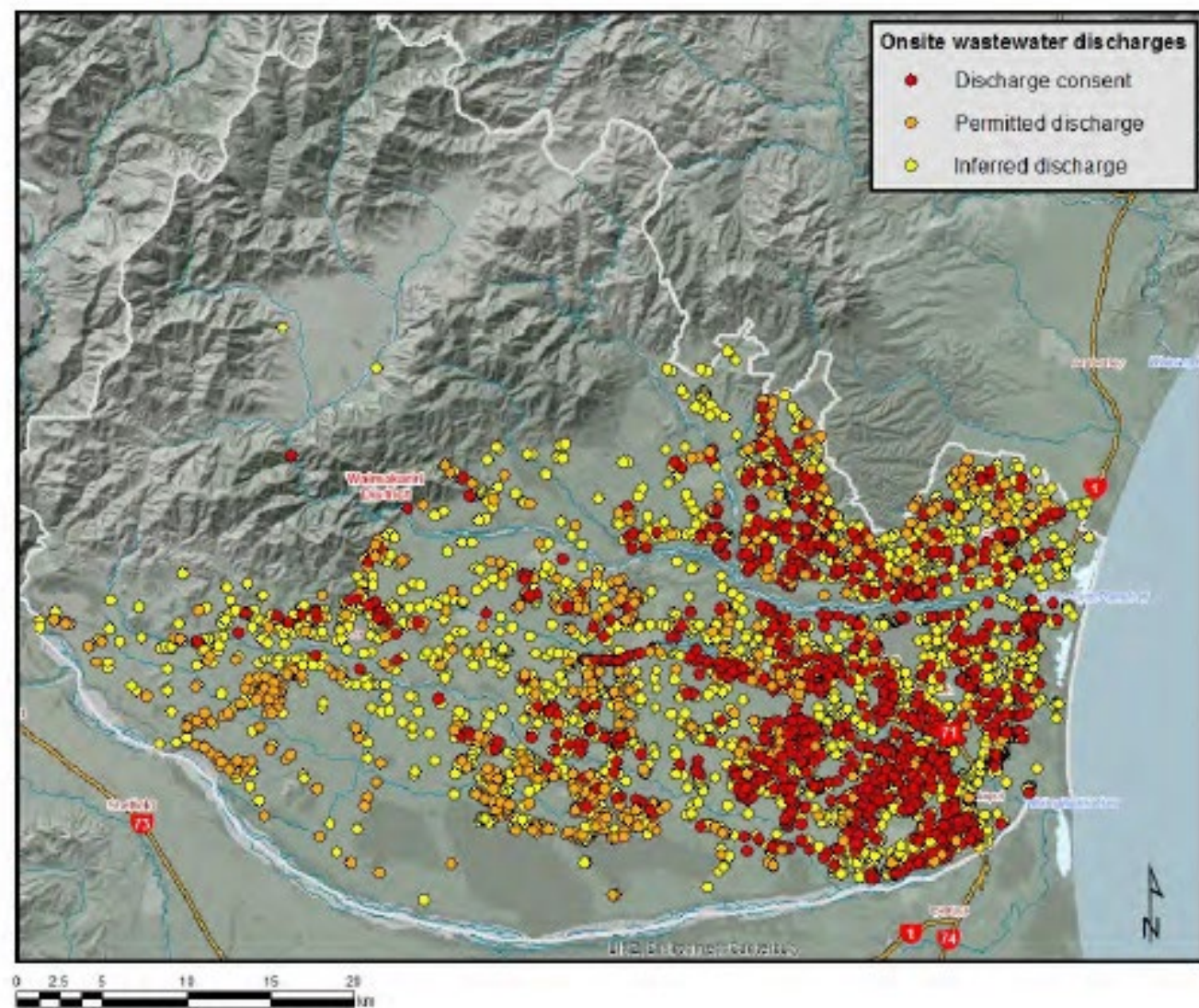


Figure 6-1: Locations of human effluent discharge point sources (mostly septic tanks) which can contribute nutrients and pathogens to groundwater (sites estimated as at January 2016)

The current state of groundwater quality in the Waimakariri CWMS zone

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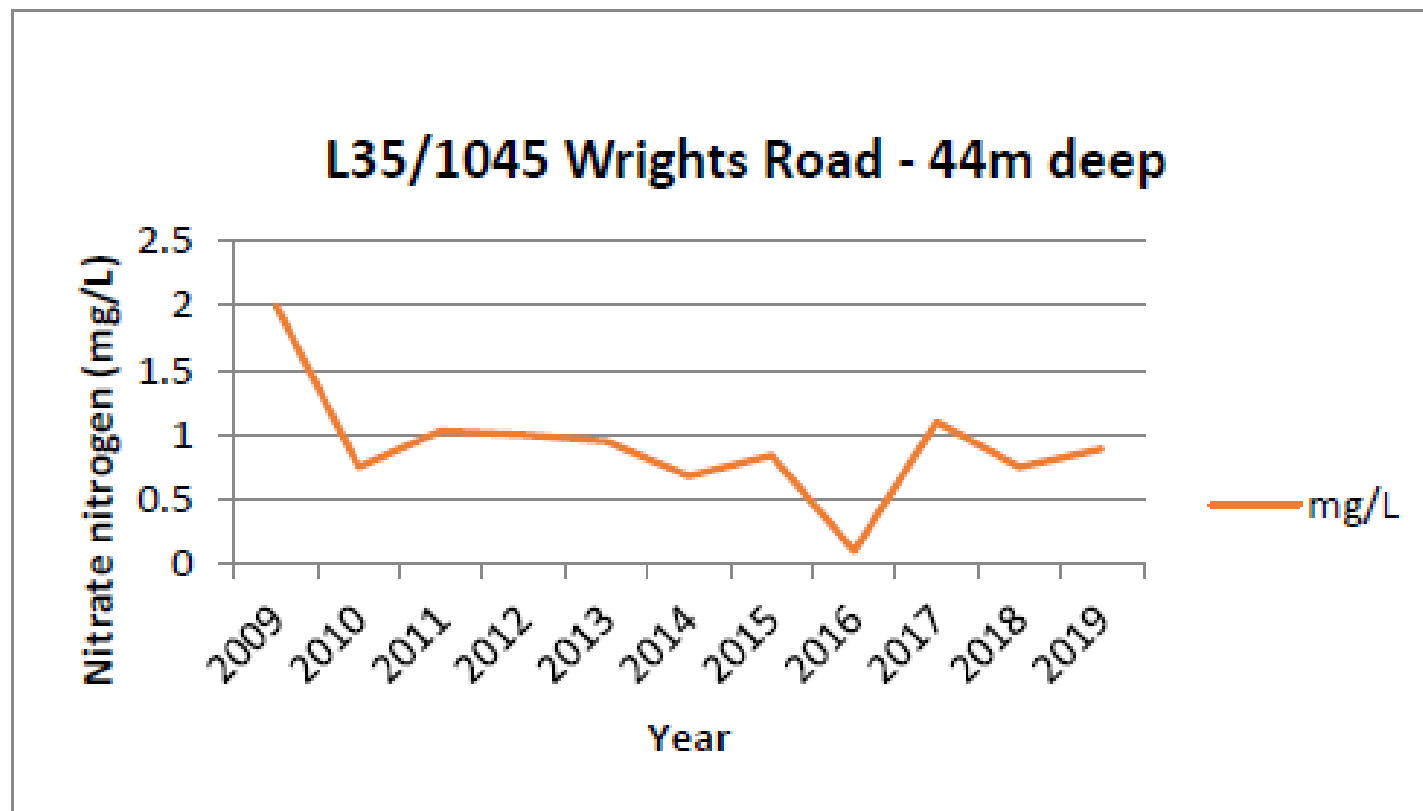
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On average, groundwater nitrate-N concentrations have been relatively steady in the Waimakariri zone for the past three decades. The Ashley and Coastal Wetland subzones have had persistent low nitrate-N concentrations in their groundwater, typically less than 0.5 mg/L, even in shallow wells. We think that the concentrations are kept low by a number of factors, including: recharge of low nitrate water from the Ashley River/Rakahuri; low nitrate leaching from heavy soils; low intensity agricultural land use (most of the urban areas are in these subzones) and removal of nitrate in reduced groundwater.

The Eyre River and Cust subzones have had higher concentrations of nitrate-N in shallow groundwater and show more variability over the long term. There are some long periods where nitrate-N concentrations appeared to be decreasing (e.g. 1999 to 2005, after the Waimakariri Irrigation Scheme/WIL came online) and other times when the concentrations have been increasing (e.g. 2005 to 2010). Average groundwater nitrate-N concentrations for these two subzones have not been as high under WIL irrigation as they were in the early 1990s before the scheme began.

Overall the median nitrate concentrations have tended to remain somewhere between 3 and 7 mg/L in the Eyre River subzone and between 6 and 9 mg/L in the Cust subzone. The Eyre River subzone median annual nitrate-N concentration has been below 5.7 mg/L since 1993, but the median for the Cust subzone has not been below this threshold in the past 28 years of monitoring. Median nitrate-N concentrations in shallow groundwater in the Cust subzone also exceeded the 6.9 mg/L nitrate toxicity threshold when monitoring began in the 1980s and have only infrequently dropped below this level.

The groundwater nitrate-N in the Cust and the Eyre River subzones show very similar directional changes in groundwater quality over time, which suggests that large scale controlling factors, such as changes in climate or land use, have a similar effect in both zones.



Refer appendices - Testing is undertaken annually by Waimakariri District Council Water Testing Services with results analysed by Hill Laboratories.