

# MEMORANDUM



**To:** Andy Bruere  
**Lake Operations Manager**

**From:** Paul Scholes  
**Environmental Scientist**

**Date:** 6 June 2014

**File Ref:**

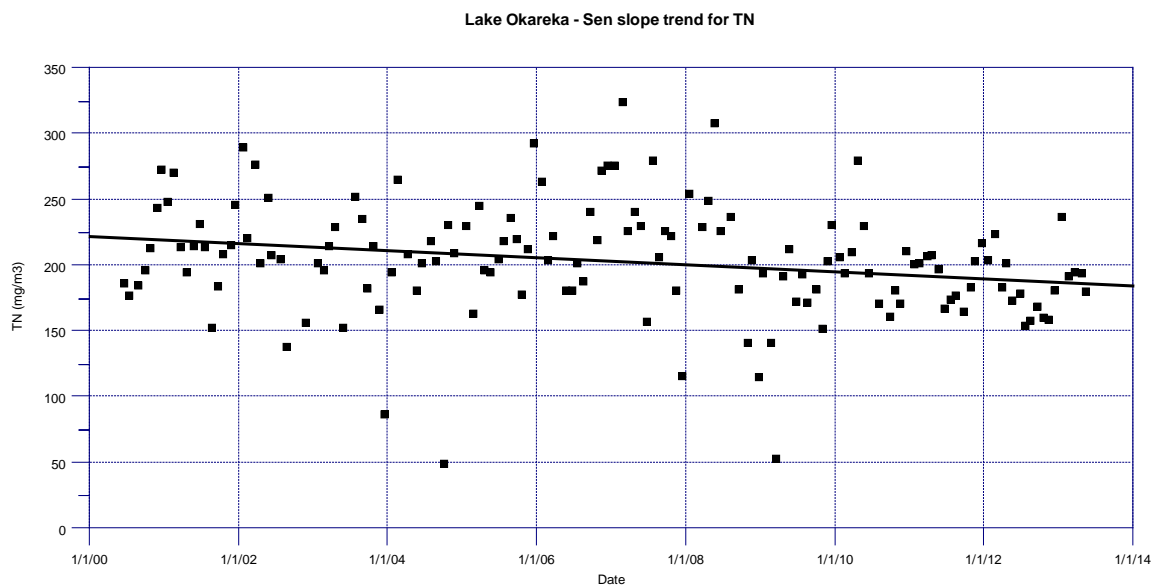
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**Subject:** Lake Okareka groundwater monitoring

Concerns have been raised by the Okareka community with respect to the progress of the Lake in reaching its TLI, and whether enough has occurred to address land use contributions of nitrogen and phosphorous to the Lake. David Hamilton and the team at the University of Waikato (Ryan Mallet, PhD candidate) are going to do some catchment and lake modelling work. This is to enable an evaluation whether the land use has been enough to get the lake to its long term TLI.

Lakeside community was reticulated in the late 2010 and it was projected at this catchment management action would remove a large proportion of the annual nutrient reduction target, predominantly for nitrogen. Revised nutrient reduction targets were 2.5 t N and 0.08 t P, the estimated annual contribution from septic tanks being 2.38 t/yr N and 0.02 t/yr P.

The Lake TLI is tracking in the right direction, three year annual average down to 3.2 TLI units (target 3.0 TLI units) and last annual average of 3.15 TLI units, and over the last decade is a statistically significant downward trend in nitrogen concentrations within the lake (see Figure 1)



*Figure 1 Trend for total nitrogen, Lake Ōkāreka.*

Phosphorus levels have remained reasonably stable with a large decrease occurring in 2008 with P looking intervention, to return to similar pre-intervention levels in the past five years.

To assess the effectiveness of reticulation and to monitor ongoing land use impacts some further monitoring may be required. NIWA in 2000 performed a septic tank leachate study of the Rotorua lakes which included sampling of shallow groundwater around the lakefront of the Okareka community. Nitrate-nitrogen concentrations of up to 6 g per cubic metre were found in some areas, as well as elevated ammonium. Repetition of this survey may help ascertain the impact reticulation has had on local groundwater.

Additional to this proposed survey, would be the installation of a permanent shallow groundwater monitoring bore to be located near the Steep Street tennis court. Putting the monitoring bore on a regular water quality sampling schedule would provide long-term monitoring data on a catchment wide impacts, and localised community impacts. The bore is likely to intercept holocene soils and earthquake flat pyroclastics (see Figure 2). Alternatively, establishing the existing groundwater bores are available for monitoring could be evaluated, however little is known how these bores are screened and their geological make-up. Installation of a new bore would guarantee higher quality data. Cost of a bore installation is likely to be under \$10,000.



*Figure 2 Lake Okareka soils and groundwater bore locations. Proposed bore location at this triangle.*

The current monitoring around the Lake Okareka includes surface water inflows on the eastern side of Miller road stream, farm stream, and Summit Road Stream. No Regional Council groundwater bore has been located around Ōkāreka.

## **Recommendation**

1. Repeat the NIWA 2000 lakeside shallow groundwater survey.
2. Install shallow groundwater monitoring bore at the Steep Street tennis court or suitable alternative location.