


Technical Comment		 <p>environment SOUTHLAND</p> <p><i>Te Taiao Tonga</i></p> <p>Environment Southland is the brand name of Southland Regional Council</p> <p>Cnr North Rd & Price St, Private Bag 90116 Invercargill New Zealand Phone 03 211 5115 Fax 03 211 5252 Tollfree (Southland only) 0800 76 88 45 Email service@es.govt.nz Web site www.es.govt.nz</p>
To:	Sonya Nicol	
From:	Michael Killick (Technical Specialist – Soils and Groundwater Quantity)	
Date:	19 February 2019	
Map Ref:	NZTM2000 4863384E N	
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Subject:	<i>Request for Technical Comment</i>	

Dear Sonya

the main points of the technical comment below are summarised as follows:

- The proposed take is assessed as sustainable in terms of rate and quantity.
- Interference with the nearest bore not on the same property (E46/0167) is estimated to be within acceptable limits.
- Stream depletion of Tomoporakau Creek is estimated to be <2L/s, in part due to return of the abstracted water to groundwater via the soakage pits. Management of the stream depletion effect by inclusion in surface water allocation, and/or by imposition of a low flow cutoff condition, is therefore not required.
- The connection of the soakage pits to the Creek via groundwater highlights the significance of the discharge water quality. Improved treatment of the discharge to mitigate contamination of groundwater and the Creek could affect the stream depletion assessment if the return of water via the discharge were to be less direct.

Aquifer sustainability

The proposed take is from the Lower Oreti groundwater management zone (GMZ) under both the Regional Water Plan (RWP) and the proposed Southland Water and Land Plan (pSWLP). Current allocation of the Lower Oreti GMZ under the RWP is at 20% of the discretionary activity limit, with 16.6×10^6 m³/year available. Under the pSWLP allocation is at 8.8% of the discretionary activity limit, with 17.6×10^6 m³/year available. The pSWLP limit represents the current best estimate of the sustainable capacity of the aquifer(s) in the GMZ, with some contingency for uncertainty in current knowledge, hence the proposed take is assessed as sustainable.

Interference with neighbouring bores

The nearest bore not on the same property as the proposed take (E46/0167) is quite close at 40m distance, however, the rate of the proposed take from the daily limit ($380\text{m}^3/\text{day} = 4.4\text{L/s}$) is not

high, hence the expected drawdown in E46/0167 even after 365 days of continuous pumping is less than 20cm according to the model of Theis. Based on bore information, the maximum acceptable drawdown in E46/0167 is 1.3m. There are no other groundwater takes on record nearby which might add additional drawdown to the calculation, hence it is within acceptable limits.

Stream depletion

In the Groundwater Technical Report by Land and Water Science (LAWS, 2019) hydraulic connectivity of the take to Tomoporakau Creek is found to be Low, as stream depletion is estimated at <30% of the proposed take. However, hydraulic connectivity is not normally estimated as the sum of two way interactions with a stream to the extent considered in this case, where the majority of the take is estimated to return to the stream via groundwater within a timeframe similar to the take. Hydraulic connectivity in this instance is significant but two-way.

My calculations show that hydraulic connectivity – without considering return of the soakage water – would be assessed as Moderate under the proposed Southland Water and Land Plan, in which case allocation of Tomoporakau Creek would be considered. While it is reasonable to consider the effect of soakage water in lessening the magnitude of stream depletion, this also indicates input to the Creek of approximately 1L/s, so it also relevant to consider the quality of this 'discharge'. As the Creek is small the effect could be significant if groundwater quality is also poor.

My colleague Ewen has commented further on the above, however, I note that the most recent sample from the monitoring bore E46/1007 in November 2018 showed nitrate at 11.5mg/L nitrate-N which is in excess of the NZDWS limit for drinking water. The return of groundwater to the Creek via the soakage pits is only one aspect, and possibly only a small part of groundwater interaction with the Creek. More general discharge of groundwater to the Creek would result in ecological degradation of the Creek by eutrophication which can occur at any nitrate-N concentration above 1mg/L nitrate-N in stream water. No data is available for dissolved reactive phosphorus (DRP) which could also be a significant contaminant of the Creek, contributing to similar effects.
