

Tabled at Hearing on 18 November 2015.

Summary of evidence – Richard Trevor de Joux

Hydrology

The hydrology of the Otaio River is rather unique in the Canterbury Region. The fact that the river goes dry under natural conditions annually makes it similar to some other Canterbury Rivers (eg Selwyn, Orari, and some of the smaller rivers draining the Hunters Hills). In the case of the Otaio River, the river will be dry in its middle to upper reaches under natural conditions whenever the flow at the gorge is at or about its median flow (approximately 300 l/s). However, unlike those rivers, the surface flow of the Otaio River becomes disconnected over its length, resulting in a series of dry reaches interspersed with reaches where water is either flowing or ponding in water holes.

Abstractions

Only 3 irrigation takes are directly from the main channel of the Otaio River, and these are located in the lower reaches between Grays Crossing Road and SH1. The remainder are from shallow groundwater and/or water holes that, although hydraulically connected, do not have a direct open connection with the river. The flow discontinuity means that it is possible to abstract water from some parts of the river without physically affecting the flow in other parts. It also means that at times of lower flows, most of the takes become self-limiting and cannot maintain continuous pumping. In essence, the abstraction of water is more akin to the taking of groundwater from storage, and it is for that reason that a flow sharing regime based on 7 day volumes was considered to be the most practical method of reducing abstractions at times of low surface flow.

I have calculated that historically, water for abstraction is approximately 70% reliable. While this is a low reliability it does mean that some water could still be used when needed for specialist crops.

Water Management

My evidence in chief (para 21 to 28) summarises the details of resource consents that take surface or hydraulically connected groundwater for the Otaio River, noting that although on paper it appears that the Otaio River has an excessively high allocation, this is tempered by the fact that most takes are not directly from the river, and the 7 day volume limits do not allow for water to be taken continuously at their maximum rates.

The lack of flow continuity in the Otaio River, combined with the interaction of the shallow groundwater system means that, depending on their location, abstractions of water do not result in a corresponding reduction in downstream flows. The proposed flow sharing regime is based on limiting the combined 7 day volume to specified limits, with a cessation of take at 90 l/s. Although the River would have been naturally

dry and disconnected at Gorge flows less than 300 l/s, cessation of takes at 90 l/s will ensure that there is still some underflow in the lower river to recharge the lagoon and sustain aquatic life in that area.

During the formulation of a flow sharing regime, it was agreed by all parties that the impact of flow restrictions should be offset by allowing some "B" allocation of water to allow for on-farm storage, and to also allow surface water and hydraulically connected groundwater takes to be exchanged for deep groundwater.

Any "B" allocation must be limited to ensure that the reliability of "A" takes is not adversely affected. In particular, "B" takes should not be allowed to be exercised until the shallow groundwater aquifers have been recharged. It is essential that no "B" takes are exercised until the flow in the Otaio River at the Gorge recorded site exceeds 750 l/s AND the groundwater level in shallow bore J39/0255 is higher than 3m below ground level. I note that while these criteria are specified in policy 15.4.28, they are not specifically mentioned in rule 15.5.37 (take "B" surface water). In its present form, Rule 15.5.37 simply refers to some matter of discretion. It is my opinion that rule 15.5.37 needs to specify both the Otaio River minimum flow of 750 l/s AND the groundwater level in bore J39/0255.

Exchange of shallow surface and groundwater takes to deep groundwater

Policy 15.4.23 and Rule 15.5.32 allow for the exchange of shallow takes for deep groundwater, and annual volumes have been specified for the water available within each groundwater allocation zone. There has been no supporting information provided by ECan as to how those additional volumes were determined. My evidence in chief (para 45) notes that the zone boundaries are purely arbitrary and that groundwater can move laterally freely between the zones.

My evidence also outlined (paras 47 to 49) that the original proposal to exchange shallow takes for deep groundwater would be based on the need to adequately irrigate the same or similar land area as that irrigated from surface or hydraulically connected groundwater.

The water users generally felt that this would assist in mitigating the impact of minimum river flows. However, rule 15.5.32 has been written to require that the annual volume for "exchanged " takes must be calculated in accordance with Method 1 of Schedule 10 (ie "demonstrated use"). This provides little or no incentive for water users to exchange their takes from deep bores.

The justification for this approach is predicated on the statement in the S42A report (para 12.2) that "information held by Environment Canterbury indicates that actual usage is, on average, only

approximately 30%". Paragraphs 51 to 53 of my evidence in chief shows that the statement is incorrect, and should not be used as a reason to promote "demonstrated use".

In simple terms, if ECan are satisfied that the annual volumes specified for each groundwater allocation zone are reasonable, and that there is sufficient allocation remaining in any zone, then provided a consent holder wishes to exchange a shallow take for deep groundwater for the same or similar area of land (in hectare terms rather than exact physical location), the actual consented volume granted should be based on Methods 2 or 3 of Schedule 10.

Richard Trevor de Joux
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