LAND USE ACTIVITIES TO ENHANCE GROUNDWATER AVAILABILITY - THE EYRE RIVER RECHARGE TRIAL

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During September 2005 Pattle Delamore Partners Ltd (PDP), Waimakariri Irrigation Ltd (WIL), Environment Canterbury (ECan) and Waimakariri District Council (WDC) conducted an aquifer recharge trial in the Horrellville area, north-west of Christchurch.

The discharge of water from the Waimakariri Irrigation Scheme into the Eyre River has always been a component of the Scheme's operation. It serves partly as a by-wash discharge for the water races, but it has also been recognised that the controlled release of water into the riverbed when it was dry would recharge the surrounding aquifer.

The discharge of water into the Eyre River bed authorised by WIL's resource consent covers both a routine operational discharge of up to 0.5 m^3/s and a discharge of up to 3.0 m^3/s to augment the surrounding groundwater resource. This groundwater recharge component is subject to a number of restrictive consent conditions such that it can only take place during the months of August to May inclusive and only at times of low groundwater levels. The purpose these restrictions is to avoid localised drainage problems caused by high groundwater levels during winter months. These restrictive conditions, when combined with WIL's operational irrigation requirements, have prevented the undertaking of recharge trials on many occasions. However, the low groundwater levels that existed in September 2005 provided an opportunity to allow a recharge trial to occur over a 23 day period.

The trial involved the controlled release of around 2.7 m^3/s of water from the WIL head race into the Eyre River at the Warren Road siphon between 5-28 September 2005. The release of water seeped into the underlying groundwater and caused water levels in nearby wells to be raised by varying amounts ranging from 0.5 – 6 m. As groundwater levels rose up to the level of the river bed the length of surface flow in the river extended further downstream, eventually creating an "artificial river" for a distance of 11.85 km along the river bed. The channel of flowing water was typically around 7 – 12 m wide and 0.3 – 0.9 m deep.

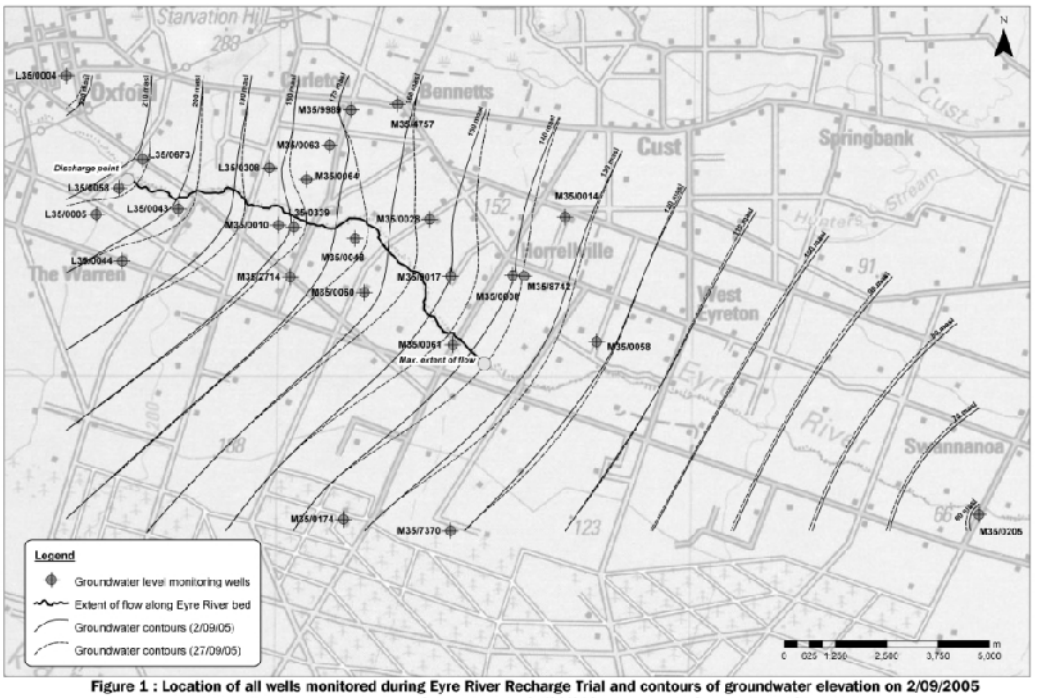

Figure 1 : Location of all wells monitored during Eyre River Recharge Trial and contours of groundwater elevation on 2/09/2005 (prior to the commencement of the trial) and 27/09/2005 (one day before the end of the trial).

Measurements of seepage indicate that when the groundwater level is low, water is lost from the riverbed at a rate of 0.3 – 0.6 L/s/m. When groundwater levels were high the flow in the riverbed fluctuated with some sections losing water into the gravels and other sections increasing in flow due to the return of groundwater seepage. The measurements indicate that the Eyre riverbed has a streambed conductance on the order of 7 – 57 m/day. This is consistent with it's free draining gravely composition.

Based on the network of monitoring bores that were used during the trial there appeared to be a direct area of benefit from raised groundwater levels extending between 0.5 – 2 km either side of the river bed and covering a total area of 2500 ha where groundwater levels were raised during the 23 day period when water was released and then receded over a similar length of time.

A second zone slightly further from the river and further downstream covering an area of around 3,800 ha showed a more gradual water level rise, with groundwater levels remaining elevated for a period of 2 – 3 months.

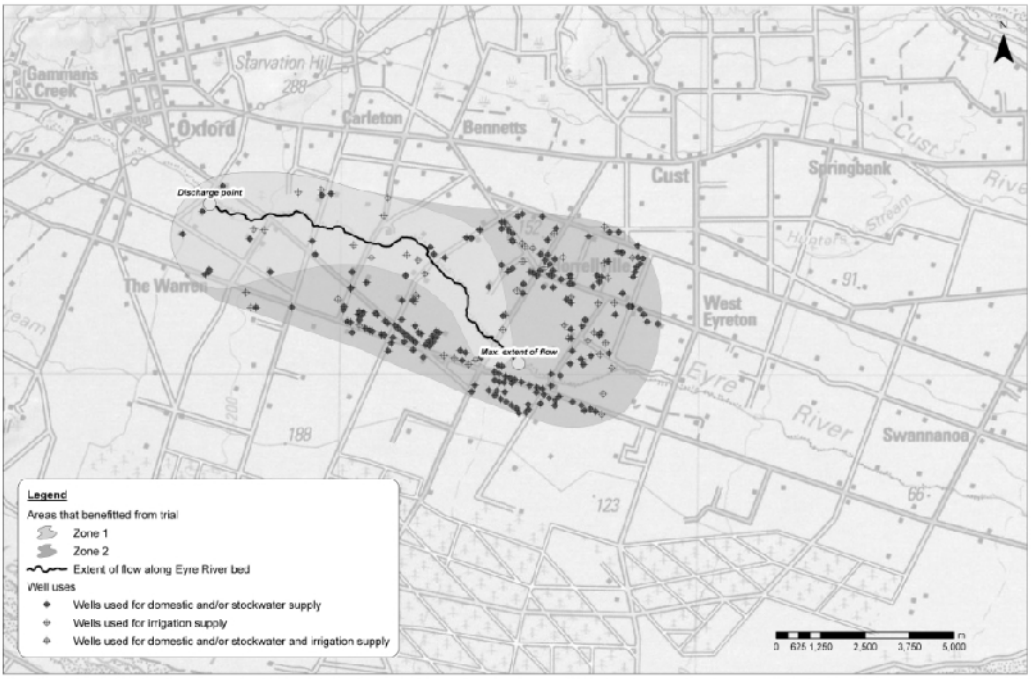

Figure 2 : Wells used for domestic, stockwater and irrigation purposes within the two zones that benefitted by an increase in groundwater levels from the trial

The trial demonstrates the potential effectiveness of the release of water into the Eyre River at Warren Road as a means of recharging the local aquifer to raise groundwater levels in surrounding wells. This can potentially be of benefit to well users during times of low summer time water levels as well as enhancing the overall availability of water within the resource. Although any such use of this water needs to be incorporated within the wider water management requirements of the irrigation scheme.