

CENTRAL PLAINS WATER LIMITED

A regional irrigation scheme case study

April 2017

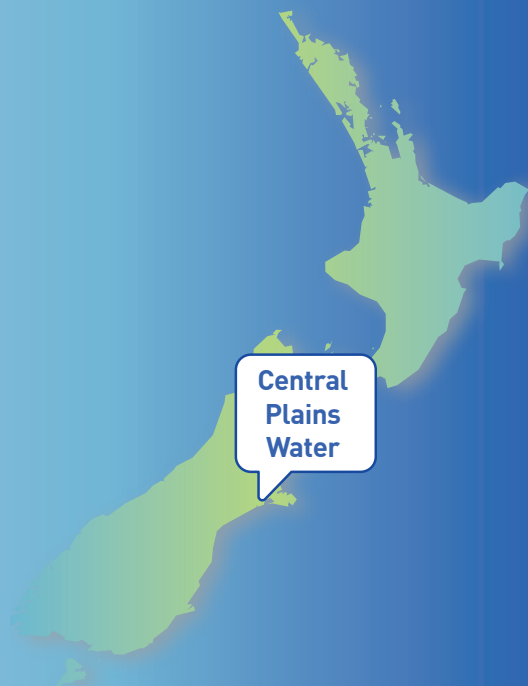
After its first year in operation, the Central Plains Water irrigation scheme has provided significant environmental and economic benefits to the region by permanently reducing groundwater takes by 19 million cubic metres per annum.

Ongoing collaboration with the Selwyn-Waihora Zone committee and Environment Canterbury will result in the improvement of the Selwyn Waihora catchment by further reducing groundwater takes, improving water use efficiency, managing to a nutrient load limit, audited farm environmental plans, and enhanced flows via near-river recharge. While CPW represents the modern face of irrigation in New Zealand, the completion of stage 2 will reveal the scheme's full potential.

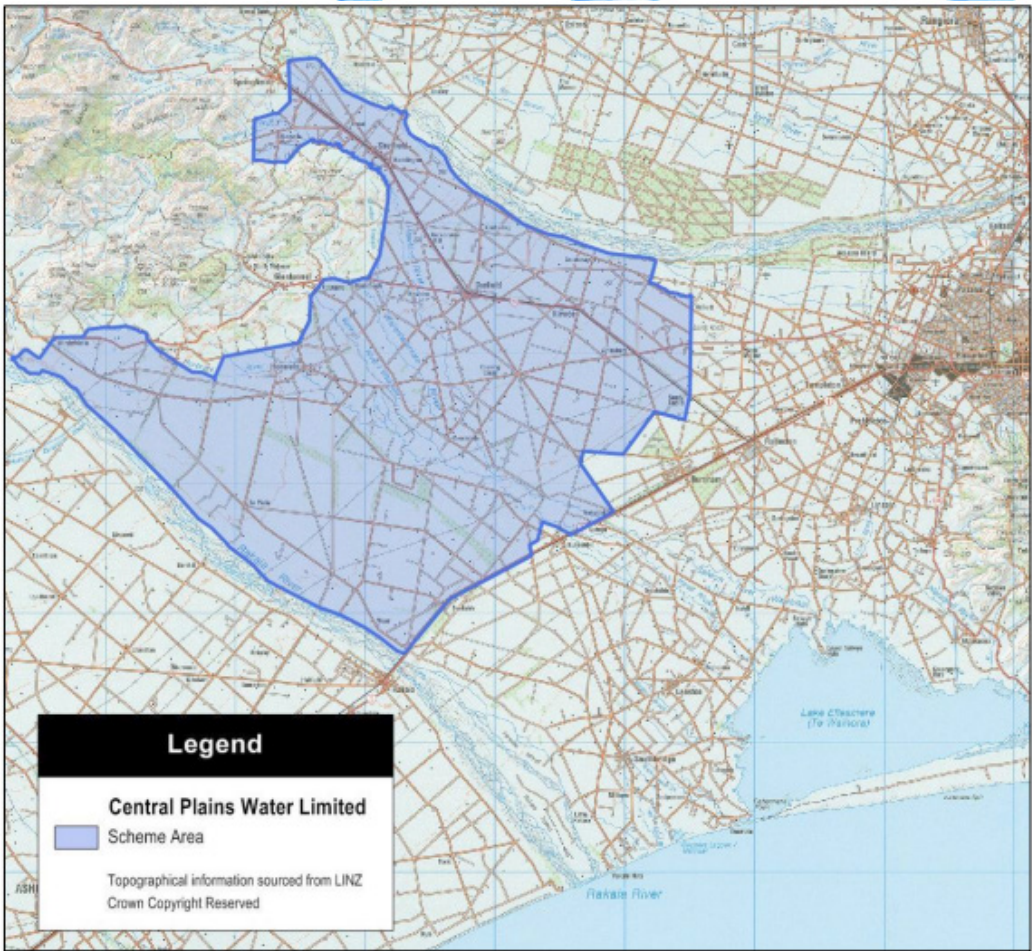
Central Plains Water Limited – at a glance

Fact box

Area irrigated	24,000ha Stage 1
	20,000ha Stage 2
	4,300ha Sheffield
Storage	Run of river from both the Rakaia River (using Lake Coleridge as storage) and Waimakariri River (Sheffield scheme only)
Maximum daily water allocation (per shareholder)	5mm/ha/day
Age	Stage 1 – completed 2015
	Stage 2 – operating Sep 2018
	Sheffield – operating Sep 2017
Groundwater savings (%)	To date – 75% reduction in groundwater takes
Estimated scheme cost to date (NZD)	\$400 million



Central Plains Water Limited – scheme area



Scheme focus

To provide reliable and cost effective water to the central Canterbury plains while safeguarding the environment.

INCREASED FOCUS ON GROUNDWATER & WATER QUALITY

CPW focuses on shifting from groundwater abstraction to more plentiful, and environmentally-benign alpine sourced surface water. The scheme will contribute significantly to ongoing improvement of water quality and quantity in both the Selwyn River and in Lake Ellesmere Te Waihora.

PROTECTING OUR FUTURE

The Environmental Management Fund (EMF) and the Te Waihora Environmental Management Fund (TWEMF) were established in the 2015/16 irrigation season. Funding comes from a levy on CPW water users, and is made available for a range of environmental initiatives within the Selwyn Waihora catchment.

ACHIEVEMENTS SO FAR

During the 2015/16 irrigation season, Stage 1 resulted in 75% (60Mm³) of groundwater in the area being replaced by scheme water. This resulted in groundwater levels stabilising in the area. Additionally, Targeted Stream Augmentation (TSA) (the controlled release of water) has been successfully trialled in a lowland stream; Boggy Creek. TSA allows nutrients and algae build-ups to be flushed out and improves sustained stream flows.

WHAT'S NEXT?

Construction of Stage 2 commenced in early 2017, and will provide an additional 20,000ha of land under irrigation while returning more water to the aquifers. There is also the opportunity to improve the water quality of the Selwyn River via near-river recharge (topping up groundwater levels near the river to improve water flows in the river) from the CPW Stage 2 infrastructure. The environment will be at the forefront of decision making for the zone committees and regional councils as they work towards a more sustainable and environmentally focused region.

Central Plains Water Limited: Major benefits have been seen already and there will be more to come

In 1999, Selwyn District Council and Christchurch City Council set up the Central Plains Water Enhancement Committee. Their aim was to identify the irrigation potential of Central Canterbury, the affordability of a scheme, and whether it would be consented. Central Plains Water Limited (CPW) was formed in 2003 to oversee the project, and after 12 years of consultation, consents, and funding applications, CPW Stage 1 was completed.

Stage 1 CPW delivers water to users via an open channel headrace from the Rakaia River and into pressurised pipelines. Once Stage 2 is fully completed, the CPW scheme will distribute Rakaia River water via the 17km headrace canal and 500km of underground pressurised pipeline to shareholders. Storage in Lake Coleridge provides water when the Rakaia River is flowing at environmental limits, to ensure reliability for water users.

Economic benefits

Stage 1 and 2, combined with the neighbouring Sheffield scheme will irrigate approximately 48,000 hectares of land, approximately 17,000ha of which is new irrigation.. The result is an increase of over \$100 million in Real Gross National Disposable Income (RGNDI) each year for the New Zealand economy (Infometrics, 2016). This 0.05% increase in national economic welfare results from higher on-

farm output made possible by irrigation, and delivered by an increase in farm workers, farm service providers, contractors, rural service providers and small businesses. The community around CPW has also become more economically resilient, benefiting from additional civic activities and higher school roles (Crown Irrigation Investments Ltd, 2017). The \$400 million capital cost of the full scheme has been funded entirely by farmer shareholders (CPW, 2017).

Reduced pressure on groundwater

The over-extraction of groundwater evolved in the absence of enforceable limits on groundwater allocation and long duration consents. One of the major benefits of the CPW scheme is the reduction in groundwater allocations and use.

Prior to the CPW scheme, users irrigated from deep groundwater effecting water availability for lowland streams and shallow groundwater users nearer the coast. By providing an alternative source of reliable water to groundwater, CPW has provided a major part of the solution to this issue.

In the first year of operation (2015/16), there was a 75 percent reduction in groundwater takes, including 19 million cubic metres that was permanently switched off, leaving unused groundwater in the aquifers (CPW, 2017). Switching off this groundwater pumping has also permanently removed 5MW of energy demand.

Allowing the aquifers to recharge in the CPW scheme area is important, because it is key for improving the flow in the lowland streams that feed Lake Ellesmere Te Waihora. The Selwyn River will also see more natural flows and improved water quality following reduced groundwater takes. CPW water could also be used to provide additional recharge when Stage 2 is built, resulting in more groundwater in the water system after very dry winters, like those from 2014-16. Susan Goodfellow, the General Environmental Manager of CPW, said in a 2013 interview that the “biggest bang for environmental buck is that these aquifers will be left alone and given the ability to recharge.”

While it is too early to confirm and quantify the benefits of reducing groundwater takes in the area, CPW have a detailed baseline to work from. They are now measuring water quality and quantity monthly which will enable the provision of accurate data in the coming seasons.

Targeted Stream Augmentation

The Targeted Stream Augmentation (TSA) Project aims to provide targeted flows to lowland streams to support ecosystem values (Painter, 2017 ECan).

Boggy Creek was identified as a nationally significant race system, which could benefit from augmentation. A TSA trial was carried out in winter 2015, and involved feeding deep groundwater into Boggy Creek at two points (Painter, 2017 ECan). To quantify the effects of the study, water quality and flow were measured a month prior-to, during, and following the trial. During the trial, there was an increase in creek flow of 50.7 L/s, a decrease in nitrate-N concentrations of 2.9 g/m³ and an overall dilution of contaminants in the stream (*Boggy Creek Trial Report*, 2015).

These promising results have the potential to be “scaled up” by utilising CPW infrastructure and run of river water on the shoulders of the irrigation season. The water will be used to augment the lowland streams and groundwater system.

Protecting our future

The Central Plains Water Environmental Management Fund (EMF) was established in the 2015/16 irrigation season to fund management projects that mitigate environmental effects of the scheme. At present, the EMF is focused on creating biodiversity corridors. These corridors will provide a route for wildlife to move through the farming landscape, so as not to isolate populations (CPW, 2017).

Once the scheme is fully developed, the EMF may have up to \$160,000 available per annum, which is generated from the levies paid by CPW farmers. The first round of applications opened last year, and the Te Ara Kakariki Greenway Trust was the successful recipient. They plan to carry out significant planting and biodiversity enhancement in the Selwyn-Waihora catchment, and the project is currently in the planning phase (CPW, 2017).

All eyes on the Selwyn River...

The declining water quality of the Selwyn River has been of increasing concern over the past decade. While the river has historically been known to run dry, there are community concerns around the effects of irrigation on the river quality and quantity.

In recent years, consistently low rainfall combined with groundwater takes have exacerbated concerns about the state of the Selwyn River. As discussed above, the reduced groundwater takes associated with an increasing number of users on CPW water (alpine-river sourced) increases the water quality and flow in the Selwyn River.

To prevent further degradation of the Selwyn River and waterways in the surrounding catchment, all farms in the CPW scheme must have farm environment plans. These plans aim to improve management to minimise nutrient losses from soils into surface waters and manage the effects of irrigated agriculture on the environment. These plans are audited annually by an independent assessor.

To ensure that the scheme is not negatively affecting the water quality and quantity in the area, CPW have a ground and surface water monitoring programme. This programme is directed by the Ground and Surface Water Expert Review Panel, comprised of a group of independent experts. Further information is available at this link: <http://www.cpw.co.nz/environmental-management/ground-surface-water-monitoring-programme>

...And on Lake Ellesmere Te Waihora

Lake Ellesmere Te Waihora is fed by the Selwyn River, lowland streams and the groundwater system. This coastal lagoon is culturally and ecologically significant, and is recognised as an important birdlife wetland. The lake is in poor health as a result of interventions since human settlement, including lowering the level, use of groundwater and nutrient loading. There is a strong community desire to improve the lake's quality.

Collaboration between CPW and the Selwyn-Waihora Zone Committee identified a vision for the zone – “to restore the mauri of Te Waihora while maintaining the prosperous land-based economy and thriving communities.”

Restoring lowland streams, and subsequently Te Waihora water quality is a major priority for the zone committee. With this in mind, it should be acknowledged that to pay for irrigation, land users often adopt more intensive farming practices which may increase lake nutrient loads. This was of significant concern to the Zone Committee. Modelling has demonstrated that even in the absence of groundwater abstraction and with complete change of land use, lake quality will not improve without increased water flow. This is where augmentation from CPW scheme water can assist in the restoration of Lake Ellesmere Te Waihora. Activities that influence lake quality are being carefully managed to achieve this, in collaboration with Ngāi Tahu.

