

Central Plains Water opens new opportunities for Canterbury

The completion of one of New Zealand's biggest private construction projects is providing new opportunities for farms to become more productive, a boost to the Canterbury economy, and is helping to resolve one of the community's most pressing issues – a shortfall of groundwater.

Central Plains Water (CPW) opened in October. It services around 380 farms and 47,000 hectares and is one of New Zealand's largest irrigation schemes. The \$450 million project took four years to construct in three stages, and has employed an average of 150 people over the past five years. Farmers are estimated to have spent a further \$187 million connecting to the scheme and installing new on farm irrigation systems.

CPW provides pressurised alpine river water to farms on the Canterbury plains between the Rakaia and Waimakariri Rivers. The scheme transports water from the Rakaia River through a 17km canal to connect to a 367km pipe network. Stage 1 of the scheme opened in August 2015 and covers 23,000 hectares south of Hororata. Stage 2 extended the pipe network to cover 20,000 hectares north of Hororata. The largest mainline pipe is 2.5 metres wide and was manufactured in Australia.

A separate, smaller 4,000 hectare Sheffield scheme is also part CPW. This sources water from the Waimakariri River, stores it in a large pond near Sheffield and transports it south to

around 30 farms.

The scheme lies in the centre of New Zealand's biggest agricultural region. Canterbury has 21% of New Zealand's agricultural land and produces nearly 90% of the country's grain, around 60% of our peas and nearly half of our potato crop. It's also home to 4.6 million sheep and 1.3 million cows.

Agriculture underpins Selwyn district's economy, with one in five jobs in the primary sector.

Selwyn Mayor Sam Broughton says that Stage 1 of the scheme's construction has already had an impact.

"There has been a huge change in Selwyn during the construction and opening of Stage 1. This has been due to the activity the construction has created, mixed with the growth that Selwyn is experiencing generally. The changes have been on-farm with good management practices and in our communities with a growing population, increased school rolls and activity in our towns."

It's estimated by Infometrics that the scheme will add over \$100 million in gross

income a year to New Zealand's economy as farms produce more, create more jobs and trade for rural and urban businesses.

"Having reliable water gives confidence to families and businesses thinking about their homes and investments into the future. It also allows a new way of thinking about using land and value added potential of what we produce. This will lead to new investment on and off farm, and an increase in Selwyn's contribution to the national economy," says Sam Broughton.

A VIEW FROM THE FARM

Damon and Judith Summerfield connected to the Sheffield scheme when it opened in November 2017 and are benefitting from the new options it provides.

They can now irrigate 185 hectares of their 225 hectare previously dryland mixed cropping farm.

Damon has wanted to install irrigation for a decade but had seen nearby farmers spend \$100,000 drilling to around 150 metres for groundwater. He saw CPW as a better long-term investment.



The Sheffield storage pond.

The Summerfields grow perennial ryegrass, peas, ryecorn, barley and some wheat. They recently added 4 hectares of mustard seed as well as a new chrysanthemum seed crop for export to Asia. They plan to grow more specialist hybrid vegetable seed crops in the future. Over winter they graze lambs for finishing.

As CPW opened in late spring, last season's crops didn't receive the full benefit of scheme water. Damon says this year's crops are looking good and with a reliable water supply he expects to double his production from pre-irrigation levels. The Summerfields will now be able to grow two crops a year – harvesting an autumn sown crop in the spring and then planting a second crop to harvest late summer.

"It was too risky as a dryland farmer to grow spring-sown cereal because we often didn't get enough rain at the right time over summer for it to grow," Damon says.

"The area is ideally suited to cropping with water and the soils improve as you get further up the plains. I have great hopes that this district could have a niche crop. We have a higher altitude, a cold winter and a large harvesting window with the hot nor'west winds here."

The scheme's Sheffield reservoir can hold two weeks water which provides farms with water reliability of 95–98%.

"A lot of shareholders have done it for the legacy it provides the district and for the long-term benefits to the community," Damon adds.

The Redfern family have also joined CPW as part of Stage 2.

Today the third and fourth generations of Redferns operate a family farm purchased in 1898. The 425 hectare farm grows seed crops of barley, ryegrass, white and red clover, cocksfoot and vegetable seed crops for export including radish, corn salad and Chinese cabbage. They graze lambs for finishing for nine months a year and provide grazing for dairy cows for other farmers over winter.

Canterbury is a leading exporter of seed vegetables which are grown around the world.

Before they connected to CPW, 260 hectares of the farm was irrigated with groundwater. "We joined CPW to allow us to irrigate most of the farm and to reduce our reliance on groundwater," Pete Redfern says.

Expanding their irrigated area to 410 hectares will allow the Redferns to grow more high value seed crops, and provide feed to graze more lambs.

"You can't grow high value crops on dryland," Pete explains. "Without irrigation you are never sure what sort of yield you will get. Having the right amount of water at the right time is really key for us."

"With New Zealand and the world's population growing, farms will need to continue to lift their production to feed everyone and keep food at a reasonable cost. Irrigation helps us do this."



Pete Redfern and a vegetable seed crop. The scheme will allow the Redferns to grow more high value seed crops.



Adding irrigation means Damon Summerfield expects to double his crop production.

Farmers also find it difficult to get contracts to grow crops and other produce without irrigation.

Being connected to CPW will also allow the Redferns to plant crops earlier and buy in winter grazing stock knowing they will have enough feed.

Pete and his wife Gretchen are in the process of stepping down from running the farm and handing this over to their son Hamish and his wife Janet, with Hamish already doing much of the farm management.

Pete says while joining CPW is expensive, the opportunity to access water will only be there for a limited time. He's expecting that scheme water costs will also reduce once much

of the construction cost is paid off.

"With New Zealand and the world's population growing, farms will need to continue to lift their production to feed everyone and keep food at a reasonable cost. Irrigation helps us do this," he says.

Pete says CPW's location close to Christchurch Airport presents huge opportunities to supply food to a world-wide market.

THE SCHEME'S IMPACT ON GROUNDWATER

60% of Stage 1 land and 50% of Stage 2 land were irrigated from groundwater before CPW opened. From 2015–2017 when Stage 1 of



Stage 2 of CPW under construction near Darfield.



Derek Crombie at CPW's Stage 2 opening.

CPW was operating, farms on the scheme used only 25% of their consented groundwater allocation. In 2017/18 CPW irrigated 23,000 hectares of Stage 1 land with only 2% of the Rakaia River's annual flow.

This switch has allowed 80 million cubic metres of groundwater to stay in aquifers. 4 MW of electricity has also been saved as less groundwater is being pumped.

"The demand for groundwater on the scheme has dropped right down. For many people it's cheaper to use scheme water as you have to dig very deep to source groundwater. We are continuing to get enquiries from both dryland farms and groundwater users wanting to join the scheme," says Derek Crombie, CPW's Managing Director.

From 2014 to 2016, Canterbury experienced three winters with low rainfall. Most groundwater recharge occurs over winter, and groundwater levels dropped in northern Selwyn, but well levels remained relatively stable in the area where CPW was operating. Two wet winters in 2017 and 2018 have since helped recharge groundwater. With Stage 2 of CPW opening in October, groundwater use will continue to reduce. Under the scheme's consent, shareholder farms must also surrender their groundwater consents if they sell up.

"Spring fed streams like the Selwyn and Irwell River will benefit from the rise in groundwater levels CPW will bring," says Allen Lim, Chair of the Selwyn Waihora Water Zone Committee, a community committee set up by Environment Canterbury to help resolve water issues.

The Selwyn River traditionally flows intermittently across the Canterbury Plains (its Māori name means river of gravel). The Zone Committee has plans to connect to CPW's network to fill a leaky basin beside the upper Selwyn River, allowing more water into the

groundwater system to keep the Selwyn River flowing more often in the future.

"It's a fantastic project which was developed to address community concern when Coes Ford dried up," says Allen Lim.

CPW can also provide water for Sheffield, Waddington and Springfield townships if required, and well as for fire fighting.

A STATE OF THE ART IRRIGATION SCHEME

Central Plains Water is one of the most sophisticated irrigation schemes in New Zealand. It sources water directly from the Rakaia and Waimakariri Rivers, and also stores water in Lake Coleridge – a 47km² lake which is home to a hydroelectric power station.

Much of the Rakaia and Waimakariri Rivers flow is from snow melt, and from rainfall which much higher in the alps than on the plains. Both rivers have minimum flow levels set by Environment Canterbury. Typically, river restrictions may operate through 30-40% of the irrigation season.

When no restrictions are in place, river water can be distributed through CPW's network. Farms can also request that water be stored in Lake Coleridge to use when river restrictions are operating. These two options mean the scheme can provide a highly reliable water supply to farms.

CPW has created an app to order stored and river water. Farmers have been trained on how to calculate how much water they need.

"To date around one third of the water used through the scheme has been stored water and two thirds has been directly from rivers," says Derek Crombie.

Central Plains Water is only rivalled in size by MHV Water in nearby Ashburton. Just over 85% of CPW's shares have been

sold to date. As more farms join, CPW is expected to become New Zealand's largest irrigation scheme.

The latest irrigation technology is also being adopted on farms. 74% of the scheme area is irrigated with centre pivots.

Damon Summerfield is one of the farmers who has installed three new pivot irrigators which are controlled by phone. "It's a great feature, easy to monitor and reliable," he says.

A LONG PATH TO SCHEME CONSTRUCTION

The idea to create an irrigation scheme originated from Selwyn District Council and Christchurch City Council in the early 1990s. The councils commissioned a number of studies which found that developing irrigation could significantly boost Canterbury's economy.

In 2003, the councils set up the Central Plains Water Trust to apply for resource consents. The Trust established Central Plains Water Limited to raise share funding.

The seven month consent hearing for CPW's 30 plus consents was the largest ever held in Canterbury. A plan to develop a dam in the Malvern Hills – one of the most controversial aspects of the proposal – was modified at the hearing stage to instead use Lake Coleridge for water storage.

Derek Crombie, CPW's Managing Director, is one of the original team of three employed by CPW in 2011. He is a civil engineer with a background in major infrastructure projects, having worked previously as MWH's Managing Director for New Zealand and General Manager for Asia.

Derek says a key decision made early on was to employ staff in house rather than contracting out technical roles. "This worked out a lot cheaper over time and it meant that we retained project knowledge within

the organisation.”

The team were fortunate to recruit staff with expertise in resource consents, engineering and infrastructure management from Solid Energy when they reduced Christchurch staff numbers in 2013.

Obtaining funding was also a challenge throughout CPW’s development, Derek says.

Of the \$450 million construction cost around \$12 million was received as a government grant. \$60 million in loan funding came from Crown Irrigation Investment and Selwyn District Council. \$12 million of this has already been repaid along with interest, with the other loans to be repaid over the next 15 years as shares are sold. The bulk of the construction cost is being funded by farmers from \$90 million in equity and \$300 million in bank loans.

Joining the scheme is a major investment for farmers. For a 200 hectare farm to join Stage 2 it would typically cost around \$464,000 in shares and \$145,000 in annual water charges without storage (or \$171,500 in annual water charges with lake storage). On-farm irrigation installation costs are added to this. Adding irrigation pays off long term as crop yield typically double.

Negotiating easements for a 367km pipe network could have been a major roadblock had the team not planned their approach.

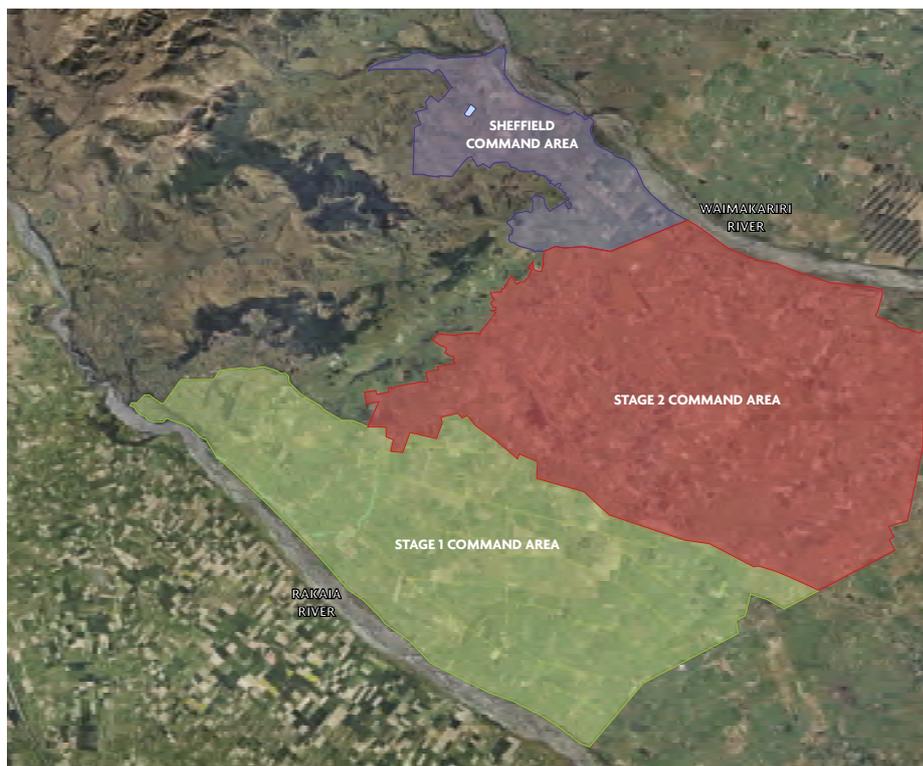
“Normally a survey or valuation company would negotiate easements but we thought that we might have more success if we sent our own team who already had a relationship with the landowner as many of them were our shareholders. This approach worked pretty well,” says Derek.

The project construction was carried out by Downer and Fulton Hogan. Engineering specifications were drafted by CPW to speed up pre-construction negotiations, rather than by contractors.

Undertaking a major construction project in a tight labour market while the construction sector was in overdrive completing earthquake repair and rebuild projects was a big challenge.

“The timelines were extremely tight at every stage of the project. The contractors had to work hard to attract staff, for example they arranged transport to the site for workers from Christchurch, provided good facilities at the site management office and held social functions like barbeques. It was still quite challenging as the wet conditions over the past two winters slowed down construction at times and it can get very cold in winter,” Derek says.

Up to 35 staff were part of CPW’s project management team. Project and construction staff were drawn from across New Zealand and overseas.



The Stages of Central Plains Water.

“One of the drawbacks for the project team was the opportunity to be involved in all aspects of the project. It was also quite different to the other projects going on during the immediate post-earthquake period as it was focused on new infrastructure rather than repairing damage,” Derek says.

Derek says that having technical staff in house has made the transition from construction to operation much smoother than had they contracted out a lot of services.

SCHEME AND FARM ENVIRONMENTAL REQUIREMENTS

Farmers operating in Selwyn must meet some of the toughest environmental requirements in New Zealand. Like all Canterbury irrigated farms, farms connected to CPW must have a Farm Environment Plan which sets out how they will reduce their environmental impacts. These cover nutrient, irrigation, erosion and effluent management, and riparian planting and fencing.

Farmer Pete Redfern says the way he manages irrigation today is quite different to 20 years ago when he first installed roto rainer irrigators.

“We have eight centre pivots which apply 4–5mm a day. The roto rainers used to apply a lot more water whereas the pivots apply a little water quite often. That allows us to make the best use of our rainfall as the ground can still absorb rain if irrigation is applied in small amounts.”

Applying smaller amounts of irrigation

is also a better practice environmentally as it reduces the risk of nutrients running off into groundwater or rivers.

As part of their Farm Environment Plan, the Redferns use soil moisture probes to monitor when irrigation is needed, and assess their irrigator performance annually through bucket tests to check faults aren’t wasting water.

Pete says technology is driving a lot of changes on the farm. For example when a contractor spreads fertiliser, the location and amount of fertiliser applied is recorded through TracMap’s GPS technology. TracMap calculates the amount of fertiliser needed, which avoids accidental over applications. These records are linked to their Farm Environment Plan.

By 2022, all farms in Selwyn must reduce their nitrogen losses under Environment Canterbury rules. Dairy farms are required to reduce nitrogen losses by 30%, sheep and beef farms by 5% and arable farms by 7%.

While there has been concern that CPW would result in widespread dairy conversions, the nitrogen rules mean that most farms won’t be able to convert. For example, an arable farm receives a significantly lower nitrogen allocation than a dairy farm and keeps their arable allocation even if they convert to dairy. The scheme’s shareholder surveys indicate that most farmers plan to keep their present farming systems, with only around 12% of the new irrigation land in Stage 2 being considered for dairy conversion.

90% of Stage 1 farmers are achieving good

farming practice according to the independent farm auditors who review Farm Environment Plan progress.

“Selwyn farmers have led huge change in practice over the past five years to align with regional rules,” says Mayor Sam Broughton.

The scheme monitors the environmental performance of their 380 member farms, reports on this to Environment Canterbury, and arranges training for farmers on different aspects of environmental management. Farmers who are struggling with the requirements are offered support, but anyone who doesn't comply can ultimately have their water cut off by CPW. This creates a strong incentive for farms to meet their environmental requirements.

Central Plains Water Trust members are appointed by Christchurch City Council and Selwyn District Council and oversee the scheme's environmental and financial performance.

CPW also has a groundwater and surface water monitoring plan and employs a hydrologist to monitor sites for a range of water quality measures. An action plan is in place if any measures exceed permitted levels. CPW farmers also contribute to a \$100,000 plus environmental and community projects fund.

ABOUT CENTRAL PLAINS WATER

Scheme area: 47,000 hectares
– 23,000 hectares in Stage 1,
4,000 hectares through the Sheffield
scheme and 20,000 hectares in Stage 2.

Shareholder farms: 380.

Length of the scheme pipe network:
367kms plus a 17km headrace canal.

