

Central Plains Water Update

September 2001

The Central Plains Water Enhancement Steering Committee was set up by Christchurch City and Selwyn District Councils in March 2000 to investigate ways to improve the security and prosperity of the Central Canterbury region through water management schemes that enhance ecological and recreational values while providing opportunity for agricultural and horticultural diversity. Requests for further copies, previous issues and all other enquiries about the content of this newsletter should be directed to Central Plains Water project manager Eddie Thomas, tel (03) 963 1748.

More information on www.cpw.org.nz

Scheme concept published for consultation

More details about how to irrigate 84,000 hectares on the upper Canterbury Plains have been published in a consultation paper. Providing stakeholders with more certainty on the technical variables before any final plans are agreed, the paper shows the picture is becoming clearer, but that some important issues must still be resolved.

The base option in the report includes:

- Intakes, with associated stilling basins, at the Waimakariri Gorge and opposite the Rangitata Diversion Race discharge on the Rakaia.
- A reservoir at Wairiri Valley to store 250,000,000 cubic metres of water.
- A 26 m wide headrace canal between the Rakaia and Waimakariri Rivers along the 235 metre contour.
- A pump station close to the Wairiri Valley to transfer water from the headrace to the reservoir.
- A discharge canal from the reservoir, between the Malvern Hills and the Selwyn River, to the headrace.
- Irrigating 10,000 ha in the Springfield/Sheffield area from a second Waimakariri River intake.

Costs to construct the base scheme option are now estimated at \$200 million.

Focus on issues

Many of the technical issues outlined in the consultation report need careful consideration by the community. Before any commitment by the Christchurch City and Selwyn District Councils – when they decide on the project in December – many environmental, social, recreational and financial features of the proposals need to be more firmly defined. This will only occur after further consultation with stakeholder groups.

Some questions arising from the base scheme option include:

- Financing options to equitably apportion costs and determine the most appropriate way to operate a scheme.
- How best to integrate environmental enhancements.
- Whether the social and environmental issues raised by the communities of Wairiri, Coalgate, Glentunnel and Whitecliffs – neighbouring and within the proposed reservoir site – can be satisfactorily addressed.
- Decisions on what water to use – at present using water from the Rakaia and Waimakariri Rivers is proposed, however using water from Lake Coleridge has not yet been ruled out.

Central Plains Water's technical investigations and community consultation programme are scheduled to give answers by the end of 2001. Then the feasibility study will be reported back to the two parent Councils with a recommendation on whether to proceed further with this project or not.

Deciding the fairest way to 'share'

Since Central Plains Water published its Scoping Study in December last year, the Ashburton Community Water Trust has published its assessment of a possible large community water scheme to irrigate 108,000 hectares in Mid Canterbury.

As both proposals depend on the water in the Rakaia River still available under the National Water Conservation Order, the two parties have worked together to identify how each can co-operatively access enough water without exceeding the established limits.

Since both proposals seek to 'harvest' and store water for use when the rivers are under restriction, the key issue to ensure both schemes are viable is the time it will take to refill each reservoir. A

number of possible formulae exist to share the water available in the Rakaia between a proposed Mid Canterbury scheme and its counterpart on the Central Plains. These need to be further developed and tested before the most suitable for both parties can be agreed on.

Level headrace canal increases flexibility

Central Plains Water's proposals for consultation include a level headrace canal between the Rakaia and Waimakariri Rivers along the 235 metre contour.

Flow rates, width and depth of the canal would vary, with a maximum capacity of 40 cubic metres per second – equivalent to one third of the mean flow of the Waimakariri, moving at approximately 0.6 metres per second, up to five metres deep and 26 metres wide.

Being level, this canal could take water either north or south. Depending on demand and availability, water could flow from either river for pumping to storage or for discharge to distribution canals down the Plains, supplying irrigators and environmental enhancement schemes.

The 235 metre contour makes water available as far up the Plains as possible, while limiting the cost and environmental issues of construction along the toe of the foothills around Coalgate. Although the precise canal route is to be decided, it will need to stay close to the 235 metre line to enable water to flow in either direction.

Crossings would be needed to take the canal under existing roads, as well as rivers such as the Hororata and Selwyn.

Construction would be a large scale earthmoving operation using motor scrapers, bulldozers, hydraulic excavators, dump trucks and compaction equipment.

Sheffield/Springfield area included in calculations

Providing sufficient reliable irrigation water to 10,000 hectares in the Sheffield/Springfield area has been included as part of the base scheme, via a take from the Waimakariri River adjacent to the Kowai River mouth. At a peak take rate of 6.5 cubic metres per second, this would be pumped up onto the plains into a headrace canal approximately 10 metres wide, running from near Springfield to Wyndale Road.



Although this appears technically feasible, there are cost implications to the whole scheme and also cultural issues to be addressed with tangata whenua over the implications of mixing Rakaia and Waimakariri River water. Both issues will be discussed with stakeholders as part of the ongoing consultation programme.

Investigations scope dam and reservoir

Studies of Wairiri Valley's geology and topography have developed a more precise picture of the dam and storage reservoir crucial to Central Plains Water's proposals, showing what is necessary to create a reservoir and how much water it could hold.

The topographical survey shows a maximum water level 313.7 metres above sea level would turn Wairiri Valley into a reservoir holding 250 million cubic metres of water. This would ensure reliability for irrigation to 84,000 hectares for all but ten days through the driest summers on record.

A dam 47 metres high and 600 metres long would achieve this. A reservoir of approximately 1,000 hectares surface area would be created, inundating all 14 Wairiri Valley houses behind the proposed dam, as well as a six kilometre section of State Highway 77. Ridge dams up to 25 metres high are also needed between the Wairiri Stream and the main valley. These would protect NZ Defence Force facilities located north of the site.

An earth dam is most appropriate for the purpose, topography and geology concerned. The Benmore on the Waitaki is one of numerous examples of successfully constructed large earth dams in New Zealand.

Geological investigations reveal Wairiri Valley is an ancient lake – probably about two million years old. Fine sediments deposited on the bed of this lake now sit up to 25 metres deep beneath the proposed dam site. These are not suitable for an earth dam, nor as a foundation for one.

Before dam construction, these weak sediments would need to be dug out and replaced with stronger, less permeable foundation material. This, and the material necessary to construct a dam, can all excavated further up the valley, in part of the area that would eventually form the reservoir bed.

Although no active faults have been found in Wairiri Valley, the dam would be located in a significant earthquake hazard area. However, when properly designed earth dams are widely recognised as more resistant to seismic activity than concrete dams, a fact they have consistently demonstrated in strong earthquakes.

Funding options known soon

'How much will the water cost?'

This was the most frequently asked question at meetings with potential scheme users in July. With total costs to construct the base scheme option now estimated at \$200 million, many assume initial irrigation cost estimates of \$200 per hectare per annum to will increase.

By a straight comparison, \$200 million scheme equates to \$291 per hectare per annum.

However, this includes the cost of paying off capital over 20 years – after which maintenance and operation of the scheme would drop to \$64 per hectare per annum.

Neither figure, however, necessarily indicates the cost irrigators might pay for scheme water in the final analysis.

Many factors will impact on this, including equity ownership levels, debt servicing costs and the eventual irrigation area.

These issues are currently under investigation as part of the feasibility study to be reported to the Councils in December.

City water options included in study

Enhancement possibilities for Christchurch city's water are part of Central Plains Water's feasibility study.

Possible benefits to the water resources available in the city's include:

- Maintaining flows in the Avon, Heathcote and Styx Rivers; and
- Injecting water direct into the aquifers that supply Christchurch, therefore maintaining spring flows and helping prevent saltwater flowing back into the aquifers – a risk if they are depleted too far.

Findings on the possibility of building these and other potential benefits into a community irrigation scheme for the Central Plains will be reported later in September.

120 years later...

"No doubt, in a few years, works will be constructed for the purpose of using the waters of all principal rivers for irrigating the plains, thus making water meadows which will fatten probably five or six sheep, or a proportionate number of cattle to the acre on land two acres of which will barely support one sheep."

The words of one GF Ritso from a paper on Canterbury rural water written in 1883.

Mr Ritso's prophecy remains unfulfilled – so far – but not for want of trying by the generations since. Proposals, trials, plans, public meetings and resolutions by the various Central Canterbury local councils have followed through the decades.

In 1936, influenced by a race supply failure and construction of the Rangitata Diversion Race – built at taxpayer expense and handed over to the farmers of Mid Canterbury – Malvern County Council started lobbying Public Works Minister Bob Semple. By 1949, after being kept on hold for 13 years – and in spite of other Canterbury councils joining the cause – the answer was finally in the negative: no government scheme for the Central Plains.

Through the 1950s, the onus fell back on locals to push irrigation. Supported by the Canterbury Progress League, the councils that make up the area that is now Selwyn District continued to work together. In 1957 a 125,000 acre scheme was proposed for land south and east of Waddington, similar in size and location to the 84,000 hectares in the present proposals, but again thwarted by government discouragement.

Large scheme proposals resurfaced in 1965 with the Ministry of Works discussing irrigation possibilities from the Waimakariri to irrigate 144,000 acres of the then Malvern, Ellesmere and Papanui districts through a border-dyke system. In spite of central government support, the 12 shillings an acre foot of water estimated as the contract cost for irrigators was considered too much and proposals went back on the shelf.

Four years later demand had turned around again and a scheme to serve 168,000 acres with water from the Waimakariri, assisted by storage and supplementary water from the Rakaia, was endorsed

by a meeting of 99 farmers. However, this involved a dam on the Waimakariri – a fatal flaw when surveys indicated it would deplete the lower reaches of the river below acceptable levels. The Southern Energy Group unveiled a new plan 1974, proposing to take water from Lake Coleridge by channel across the top of the plains for electricity generation as well as irrigation. This needed proper investigation at a cost of between \$200,000 and \$500,000. Schemes at Waiau and Morven Glenavy were given priority and it was not until 1983 that the government allocated funds for further investigation.

This study resulted in a scheme based on water from the Rakaia to irrigate below the 240-metre contour – a proposal that could not work within the National Water Conservation Order on the Rakaia River, which was enacted shortly afterwards.

More information 'In the Shadow of the Alps – A History of Malvern County 1853-1989' by Ray Dobbie and Brian Perrin, published by Selwyn District Council, 1998)

Personal view...

Andrew Gillanders farms with his two brothers on 765 hectares just out of Darfield. He also chairs the North Canterbury grains division of Federated Farmers.

“Since 1865 the family photo album shows how the countryside has been transformed and will continually change, with or without water – the only thing that remains the same is the summer drought,

If it goes ahead, a community water scheme will make a difference to farmers and the towns that service them in ways that most will probably not even imagine. The only thing you can say for sure is that when water comes, don't expect to be doing what you're doing now.

When water is limited, it is valuable, and goes to produce whatever is giving the highest return. At the moment, that means dairy and supplying feed to dairy, but in a few years it could be process vegetables, seed multiplication or any number of different land use possibilities that are not obvious to anybody just yet.

The opportunities will grow from having irrigation you can rely on.

Today's markets are based on the quality and quantity that is produced. Imagine a processing factory on the outskirts of a small town and the associated benefits to the community.”

Ministry publishes stream water guide

Recently published by the Ministry for the Environment, 'Managing Waterways on Farms' sets out the causes of rural waterway degradation, the reasons why water quality needs to be improved and the options available to achieve it.

The guide outlines options for farmers and landowners to improve stream water quality. Areas covered include fencing streams to keep stock out of waterways and proper management of fertiliser and effluent run-off.

The guide is available from the ministry or at www.mfe.govt.nz

Efficient irrigation manual published

A group of Darfield farmers, assisted by Environment Canterbury, recently published the 'New Zealand Irrigation Manual'. Focusing on efficient water and energy use, the manual contains around 100 fact sheets. Topics include:

- Irrigation system management, including practical machine tips
- Soil moisture monitoring systems and record keeping
- System design options, including advice on new equipment
- Regulatory requirements
- Irrigation technology such as variable frequency drives, automatic control systems and selecting the best electricity supplier
- Energy efficiency.

The manual is available from Environment Canterbury.

Study into regional water use

An extensive year-long study into the availability and use of water in Canterbury is due for completion by February 2002. Covering 14 catchment areas from the Clarence to the Waitaki and jointly undertaken by the Ministry of Agriculture and Forestry, Ministry for the Environment and Canterbury local authorities, initial findings of the study show that:

- The current peak demand for water from all sources (i.e. from rivers and from groundwater) in the region totals 290 cubic metres per second.

- Over the next 30 years, this could rise by 240 per cent to 696 cubic metres per second. This includes all the projected requirements for urban supply; industrial needs, livestock and irrigation, and assumes water is not limited. It is calculated after allowing for maintaining all minimum flows and environmental standards at present levels.
- Irrigation accounts for 84 per cent of the present demand and 91 per cent of the projected future demand.
- While large river systems like the Rakaia offer the greatest surface water resource, most demand falls on smaller catchment systems such as the Selwyn.

The next stage of the study will be to analyse the groundwater resources (i.e. from aquifers) and demands on each catchment in more detail. Where shortfalls are projected in particular catchments, storage systems – such as that proposed by Central Plains water – will be required. Project manager for the study is MAF regional policy manager Grant McFadden, tel 03 358 1860.

Irrigation Association re-launch

Agriculture Minister Jim Sutton will re-launch the NZ Irrigation Association in September. Originally formed in 1978, the association went into recess in 1993 after government stopped support for irrigation.

The association is an incorporated society, aiming to benchmark training standards, introduce certification of suppliers and designers, establish sustainable irrigation practices and lobby for irrigators.

It will work closely with the Irrigation Association of Australia.

For more information contact John Young, 03 307 8320 – rdrman@xtra.co.nz

Needs of braided river birds in focus

Keeping two major braided rivers habitable for birdlife is one test of Central Plains Water's proposals.



The Waimakariri and the Rakaia – together with the Rangitata and the Waitaki – form a unique ecological system. They are large, wide, unstable, in relatively low-lying areas – and in demand for irrigation.

These rivers are an important habitat for a number of threatened bird species.

The Rakaia, in particular, is the most important breeding habitat for wrybills, a species numbering less than 4,000 and declining. It is also important for black-fronted tern and black-billed gulls, the total population of which is also in decline.

Conditions that make the Rakaia a good wildlife habitat throughout most of its length are the multiple channels helping protect birds from predators; a suitable flow regime with maximum feed opportunities and bare shingle islands for nesting.

Threats to this habitat include extracting water for irrigation. However, Central Plains Water's options do not propose exceeding the limits set by the National Water Conservation Order on the Rakaia, established to protect the river as a natural habitat.

Other threats to birds include encroaching exotic plants; predation by introduced mammals; anglers and four wheel drives.

Resource consent considerations for a water enhancement scheme will include protecting the life supporting capacity of the rivers: ensuring the characteristics that make the Rakaia a good habitat for birds are not degraded and – if possible – finding ways to counter some of the threats to birds on the river.

Central Plains Water Base Option Components and Costs

Component	Capital Cost	Operation/ Maintenance (\$/yr)
Wairiri Reservoir	\$58,930,000	\$118,000
Level headrace	\$36,533,000	\$731,000
Canal from Wairiri to headrace	\$5,674,000	\$114,000
Canal and pump from headrace	\$16,949,000	\$2,053,000
Downstream distribution	\$67,200,000	\$1,680,000
Sheffield/ Springfield supply	\$16,445,000	\$725,000
Coleridge to Wairiri canal	\$32,032,000	\$2,184,000
Rakaia to Wairiri pump and canal	\$29,601,000	\$2,053,000
Wairiri outlet tunnel	\$20,000,000	\$400,000
Buried outlet channel	\$15,653,000	\$314,000

