

BACKGROUND INFORMATION

February 2006



A digital version this document can be accessed at www.cpwl.co.nz.

For a full description of the proposed scheme, download the complete 'AEE' application from the same site.

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OVERVIEW

Canterbury has more than sufficient water¹ to meet the province's diverse environmental, social, cultural, recreational, and economic demands, but this water is not always in the right place at the right time.

Because it involves water storage, the Central Plains Water (CPW) scheme is designed to:

- provide a reliable irrigation supply, even during droughts
- meet the irrigation needs of farmers within the scheme area for the next 100 years
- bring balance back to the groundwater system
- provide security against climate change
- promote the most efficient, economic and environmentally sensitive farming practices
- future proof the region's economic base
- enhance the region's ecological and recreational resources.

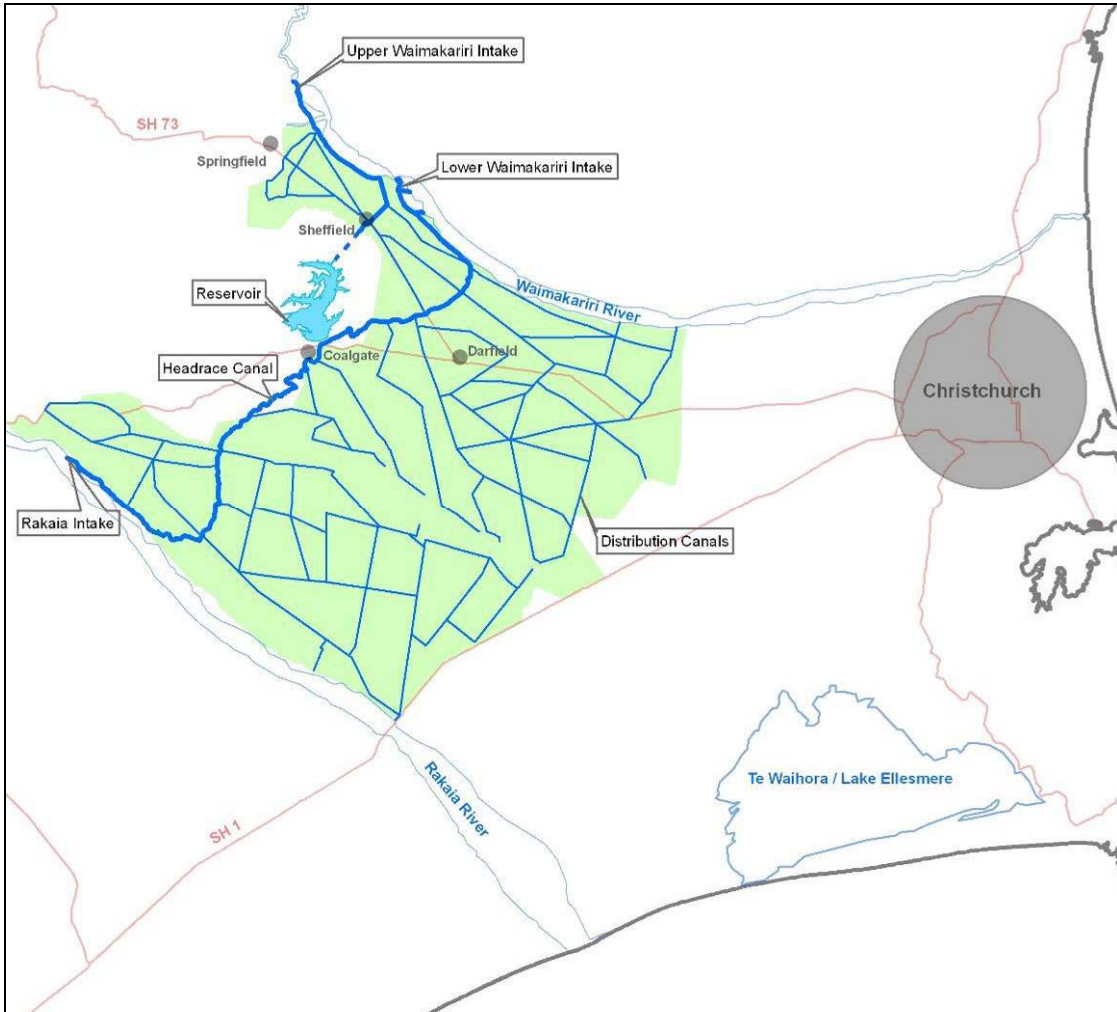
Irrespective of whether the CPW scheme goes ahead, surface water will continue to be allocated from the Rakaia and Waimakariri Rivers to individual farmers or small groups of farmers (up to the limits established by their respective National Water Conservation Order and Regional River Plan). The CPW scheme offers an alternative to this status quo where, in addition to providing irrigation water, it will provide a range of environmental and recreational benefits that can only be delivered by a large scale, centrally managed, community scheme.

Mounting construction and resource consenting costs mean CPW represents a one-off opportunity to deliver maximum benefits to the greatest number of people.

Scope of the scheme

- With a current estimated construction cost of \$350 million, the proposed CPW scheme will be one of the largest construction projects ever undertaken in the South Island.
- It will consist of a canal, a network of irrigation channels and a water storage reservoir capable of irrigating 60,000ha of land between the Waimakariri River, the Rakaia River, State Highway 1 and the Malvern foothills.
- Water will be sourced from the Waimakariri and Rakaia Rivers.

¹ *The Water Quantity section of ECan's proposed NRRP (Natural Resources Regional Plan) cites the Canterbury Strategic Water Study which "estimates that potentially about one million hectares could be irrigated [in Canterbury] ...a review of river flows showed that there is enough water to do this but not on a run-of-river basis (that is, relying on the natural flow of the rivers). Construction of water storage systems to capture water during higher flows will be necessary to give the reliability of supply that is needed, particularly during periods of low river flow in summer." Also, "with storage, the region has enough water to meet its foreseeable abstractive needs and provide for instream flow requirements."*



For detailed technical information, including size of headrace canal and dam, water volumes etc, please see separate section on page 8, TECHNICAL ELEMENTS OF THE SCHEME.

The process – ownership, consultation and resource consents

- The project is being driven by the Central Plains Water Trust (CPW Trust). It was conceived and established by the Christchurch City and Selwyn District Councils to facilitate sustainable development of central Canterbury’s water resource.

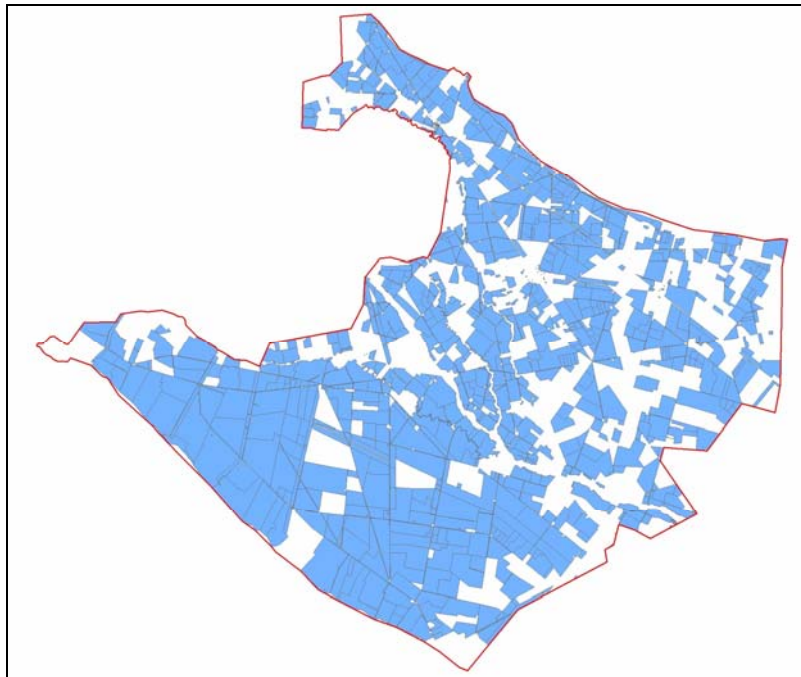
The CPW Trust is a charitable trust established by the city and district councils. The scheme is a public, not private, venture.

- In 2003, the CPW Trust established a company – Central Plains Water Limited (CPWL) – to raise the money required and obtain the consents needed for the project to commence on behalf of the CPW Trust. If the consents are granted, the CPW Trust will license their use to CPWL which will be responsible for implementation and operation of the scheme. The consents will be owned and administered by the CPW Trust and water will be allocated to CPWL and others, such as recreational users.

For more detailed information about the history of the project, please see separate section on page 22, HISTORY.

- The scheme cannot be built until it has been granted nearly 100 resource consents by Environment Canterbury and Selwyn District Council. The cost of the legal and technical work involved in gaining those consents is estimated at more than \$4 million. *For more detailed information about the consents and designations, please see separate section on page 21, CONSENTS AND DESIGNATIONS.*
- To date, this work has been financed by shareholders – farmers who own land within the scheme area who responded to CPWL’s oversubscribed share offer in 2004 which raised \$4.7 million – and via loans provided by Christchurch City Council and Selwyn District Council.

There is strong farmer support for the scheme. Approximately 75% of farms in the scheme area (around 300 farms) are shareholders and each has invested an average \$15,000 to fund the feasibility study and resource consenting phase.



An estimated 75-80% of farmland in the scheme area (red boundary) is owned by CPWL shareholders (shown in blue)

- Extensive consultation has been undertaken over the last five years, involving more than 100 meetings with potential water users, landowners, environmental groups, Department of Conservation, Fish & Game, recreation groups, township committees, tangata whenua and other landowners who will potentially be affected. *For a summary of the consultation history, please see separate section on page 23, HISTORY – CONSULTATION.*

The purpose of consultation has not only been to communicate, but to identify any potential environmental, social, economic and cultural impacts of the scheme, and to identify ways to enhance the environment. This has greatly assisted the technical experts to design the scheme in such a way that it avoids or mitigates adverse effects wherever possible.

Consultation to address potential effects and concerns is ongoing and will continue throughout the resource consenting and construction processes.

- A range of options are currently being considered in order to finance the current estimated \$350 million construction cost.

- Once resource consents are obtained and the scheme is built, farmers who own shares in CPWL will have the opportunity to enter into a water use agreement whereby they pay for water delivered to their property. The cost per unit of water will depend on final construction costs and how the scheme is financed.

Ultimately, individual farmer shareholders will base their decision on whether to access water from the scheme according to a range of financial benefits including the productivity gains that a reliable water supply delivers, the opportunity to change land use to more profitable farming activities and lower electricity costs (as they no longer have to pump water from wells).



Typical structure used to pump water from an irrigation race to a farm

- In order to receive water from CPWL, individual farmers must commit to the scheme's Sustainable Management Agreement (the 'Agreement'). This requires them to adopt best farming practices in relation to fertiliser application and rates of water use so as to best maintain and enhance healthy groundwater and river / stream systems.

The Agreement is still under development but will be detailed in full at the resource consent hearing. It is likely to involve restrictions on certain farming practices and ongoing monitoring and independent auditing of individual farmer's activities.

CPWL is also actively supporting a national Sustainable Farming Fund project entitled "Development of an Irrigation Scheme Sustainability Code of Practice".

All water supplied to farms by the CPW scheme will be subject to a levy collected on behalf of the CPW Trust. Called the Environmental Trust Fund and amounting to around \$60,000 a year, the fund will be used to support and encourage various environmental enhancement initiatives (eg. Riparian planting and habitat restoration) within and 'downstream' of the CPW scheme area.

For further information about CPWL's commitment to environmental sustainability, please see separate section on page 12, BENEFITS – SUSTAINABILITY.

- The CPW Trust and CPWL will remain closely linked, with the Trust owning the resource consents on behalf of the wider community to manage the potential recreational, social, cultural and environmental benefits.

A new irrigation scheme for central Canterbury – do we need one?

- Of all the land in New Zealand that is irrigated, over 70% is in Canterbury. However these farms rely heavily on water sourced from deep wells – an estimated 50% of farmers within the proposed Central Plains Water scheme area currently pump from underground aquifers, many of which are suffering from over-abstraction.

Other farmers that irrigate rely on what is termed ‘run of river’ water – they hold or apply for individual resource consents to take water directly from lowland streams and the Waimakariri and Rakaia rivers. The downside of this situation is their water supply is not reliable – their consents do not allow them to take water if river levels drop for extended periods, particularly in droughts during January and February.

- A comprehensive irrigation scheme for central Canterbury was first proposed in 1883.



However in the last 120 years, other regional schemes successfully attracted central Government funding (including the Rangitata Diversion Race in South Canterbury built in the 1930s and 40s, the Lower Waitaki and Morven Glenavy schemes in South Canterbury, and the Amuri schemes in North Canterbury) but the majority of the prime agricultural land closest to Christchurch missed out.

(image, left) Example of irrigation water entering a siphon under a road.

- Across the area of the scheme, the central Canterbury plains have an even slope of around 1:150. This makes the region ideally suited to a large scale irrigation project – with the exception of some pumping to get water up from the supply races to the higher levels of plains, the system proposed by CPWL will mostly rely on gravity. The scheme’s very low energy requirements future-proofs it from likely increases in electricity costs.
- Many international experts have noted the extremely favourable natural conditions for irrigation on the central Canterbury plains – flat land, no drainage or potential salinity problems which bedevil many overseas schemes, potential to improve access to groundwater systems, and a highly developed and skilled agriculture sector.
- The 2005 ‘State of the Canterbury Region Water Resource’ report by Environment Canterbury includes the following conclusions:
 - over most of the Canterbury Plains, groundwater levels particularly in deep aquifers are currently 1 to 3 metres lower than the same time last year
 - record groundwater lows have been recorded in many areas
 - lowland streams that depend highly on groundwater supply are very low
 - it is expected that record groundwater lows will be recorded across the Central Plains as a consequence of lower rainfall over winter and the anticipated summer draw down for irrigation. This may lead to some well owners having to deepen pumping for

underground water and, towards Te Waihora / Lake Ellesmere, many wells will lose artesian pressure as the season progresses.

ECan's prediction (above) has proved to be correct and has been reported extensively by Canterbury media, eg. "...about two dozen shallow wells in central Canterbury have run dry, leaving people without water to drink or for showers" (The Press, 01/02/06), "I've never seen so many people ringing up saying their well has gone dry ... I've had irrigators ringing up who have been on to drillers to deepen their wells" (ECan groundwater scientist Russel Sanders reported in The Press 31/01/06)

- *Please also see separate section on page 12, ENVIRONMENTAL BENEFITS OF THE SCHEME.*
- *Please also see separate section on page 16, CENTRAL CANTERBURY – WITH THE SCHEME AND WITHOUT.*

TECHNICAL ELEMENTS OF THE SCHEME

- With a current estimated construction cost of \$350 million, the proposed CPW scheme will be one of the largest construction projects ever undertaken in the South Island.
- The scheme will comprise a water storage reservoir, a headrace canal and a network of irrigation channels capable of irrigating 60,000ha of land between the Waimakariri River, the Rakaia River, State Highway 1 and the Malvern foothills of the Southern Alps.
- A headrace canal will channel water for 56km from intakes in the Waimakariri and Rakaia riverbeds. Water within the canal will be about 4m deep and 20-25m wide at the surface. Water will be able to flow in both directions however flow velocities will be kept below 1m/second, a rate similar to a slow walking pace.

The exact on ground location of the headrace is still being determined in consultation with potentially affected landowners but will generally be around the 235m (above sea level) contour. This is dictated by the river level at the two intakes and cannot be varied.

- The headrace from each river converges at a point north east of Coalgate. The headrace flow will be augmented at a point north east of Coalgate. There, where the Waianiwaniwa Valley opens out to the Canterbury Plains, a dam will be constructed measuring between 35-55m high and 2km wide to contain a 200-280 million m³ storage lake covering 12km².
- Water will also be sourced from the Waimakariri River, 3-5km upstream from its confluence with the Kowai River. This will run in an open canal for 18km before being piped for 3km via a 6m diameter tunnel under the foothills into the storage lake.
- Water will leave the system (for distribution to farms throughout the scheme area) via 10 outlet points along the headrace canal. From there it will be channeled into a network of irrigation channels or pipes, which will mostly run along the side of existing roads.

These distribution channels will look very similar to those used by the 60 year old Rangitata Diversion Race system with earthen, grassed sides typically less than 1m high. The water within them will be about 0.5-1m deep and an average 8-10 wide.

Please note that at the time of writing, designs are still preliminary and details or even concepts may change.

- The volume of water passing through the scheme each year has been determined as being the volume that is required to meet the irrigation needs of the shareholding farms within the scheme area 99% of the time.
- The scheme is designed to meet a maximum demand for irrigation purposes of 36m³/second. This means that if all the shareholding farmers want water, the scheme will use 3 million m³/day at times of peak demand, but average daily water use will be about 1.6 million m³. The storage reservoir could be emptied in about 50 days if necessary, but has sufficient capacity to supply the scheme's average requirements for 150 days.



Image, right: Rangitata Diversion Race (RDR).

- The scheme will only use the water in the storage lake when irrigation needs are high and river flows are low (typically in the later stages of summer). For a lot of the time, the water will leave the rivers and pass through the scheme without entering the storage lake.
- The low flow levels of the rivers are fully protected by the Rakaia's National Water Conservation Order and the Waimakariri River Regional Plan.

Very little water will be taken when rivers approach peak flood levels, as it would mean the scheme has to dispose of large volumes of sediment. This approach preserves the integrity of the braided river systems by allowing the rivers to fully 'flush' and prevent a build up of the gravel that flows down from the mountains.

- The CPW Trust has applied to Environment Canterbury for a resource consent to take up to 40 m³/second from the Waimakariri River and up to 40 m³/second from the Rakaia (a joint application with the Ashburton Community Water Trust of which the CPW scheme will be entitled to half, ie. 20 m³/second).

The actual rate of take will be much less most of the time – the average take from the Waimakariri will be 9 m³/second and 4 m³/second from the Rakaia. The total peak intake from all sources at any one time will not exceed 49 cumecs

It is important to note that:

- both 'takes' are within the statutory limits set by the National Water Conservation Order on the Rakaia River and the Waimakariri River Regional Plan respectively.
- neither 'take' will be continuous and represent the maximum amount of water that the scheme could take at any one time. When either river is in a period of low flow, no water will be taken below the established minimum low flow.

	Waimakariri	Rakaia	Combined take proposed by CPWL
Minimum flow <i>(below which no water can be taken by any irrigator)</i>	41 m ³ /second <i>(set by the Waimakariri River Regional Plan)</i>	90-139 m ³ /second, varies by month <i>(set by the Rakaia's National Water Conservation Order)</i>	
Mean annual flood flow	Up to 1,495 m ³ /second	Up to 2,514 m ³ /second	
Average flow	122 m ³ /second	221 m ³ /second	
Median flow	89 m ³ /second	159 m ³ /second	
Maximum potential 'take' proposed by CPW	40 m ³ /second	20 m ³ /second	
Average 'take' by CPW <i>(over a 12 months)</i>	9 m ³ /second	4 m ³ /second	13 m ³ /second
Combined average annual flow	11,000 million m ³		410 million m ³

BENEFITS OF THE SCHEME

ECan makes several references to water storage and augmentation in the Water Quantity section of its proposed NRRP (Natural Resources Regional Plan), including an objective that, "...available water is allocated in ways that enables communities to maximise their social, economic and cultural wellbeing, and their health and safety". Also, "Where a change that will be caused by augmentation is significant, a net sustainable benefit to the wider community must be demonstrated".

Economic

- With a current estimated construction cost of \$350 million, the proposed CPW scheme will be one of the largest construction projects ever undertaken in the South Island.
- Once the scheme is fully operational, annual direct and indirect regional agricultural output is expected to increase by \$357 million. As a consequence of these output increases, agriculture is estimated to generate 'added value' totaling \$201 million.
- Processing is estimated to generate an additional \$485 million a year, with \$152 million of added value.
- Direct and indirect employment is estimated to increase by around 2,400 jobs (1,000 in agriculture and 1,400 in processing).
- The scheme's total increase in direct and indirect impacts are estimated at \$1.2 billion a year, including \$353 million in added value.
- The CPW scheme's contribution to GDP will be the equivalent of a Rugby World Cup – every year.
- Background:
 - Agriculture contributes \$20 billion worth of export returns per annum into the New Zealand economy – around 17% of GDP. By comparison, the tourism industry earns around \$5 billion per annum. In Canterbury, farm gate agriculture comprises 7% of NZ's GDP.
 - New Zealand is very vulnerable to drought. The 1997-98 drought cost \$1 billion at the farm gate and had a significant impact on the overall performance of the economy, well into 1999. The 2001 drought was less severe but was estimated to have cost farmers \$2.5 million a day in lost production.

In past years, irrigation was mostly about drought protection, however it is now a farm management tool to maximise net farm returns, in drought and non-drought years.
 - Export income from Canterbury's rural sector accounts directly and indirectly for 60-70% of Christchurch's economic activity. Canterbury farmers spend around \$750 million every year on goods and services provided by Christchurch businesses.
 - In the last 15 years, New Zealand's agricultural productivity has increased by almost 4% per annum – approximately four times the rate achieved by the total New Zealand

economy. If the rest of the productive sector could match the productivity level achieved by agriculture, the Government would meet its goal of being in the top ten OECD countries within ten years.

Sustainability

- A key feature of the scheme is the resource consents will be owned by the CPW Trust, an entity established by Christchurch City and Selwyn District Council. The Trust objectives are designed to enhance the environmental, economic and social values of the communities in central Canterbury. This ensures ownership will never pass to overseas or commercial / corporate interests. Importantly, it also ensures that water users cannot act 'inappropriately'.
- A core aspect of the CPW scheme is the concept of 'sustainable development'. This involves meeting the needs of the present generation without compromising the ability of future generations to meet their needs by:
 - protecting water quality
 - restoring degraded waterways
 - pursuing ecological, recreational, cultural and social values.
- Accordingly, CPWL is developing a Sustainable Management Agreement (the 'Agreement') for farms that receive water from the scheme. This is designed to ensure that individual farmers adopt (if they have not already done so) best farming practices in relation to fertiliser application and rates of water use so as to best maintain and enhance healthy groundwater and river / stream systems.

The Agreement will advocate a pro-active and preventative approach to any adverse effects of irrigation and intensification of land use. To be effective, it is expected to cover:

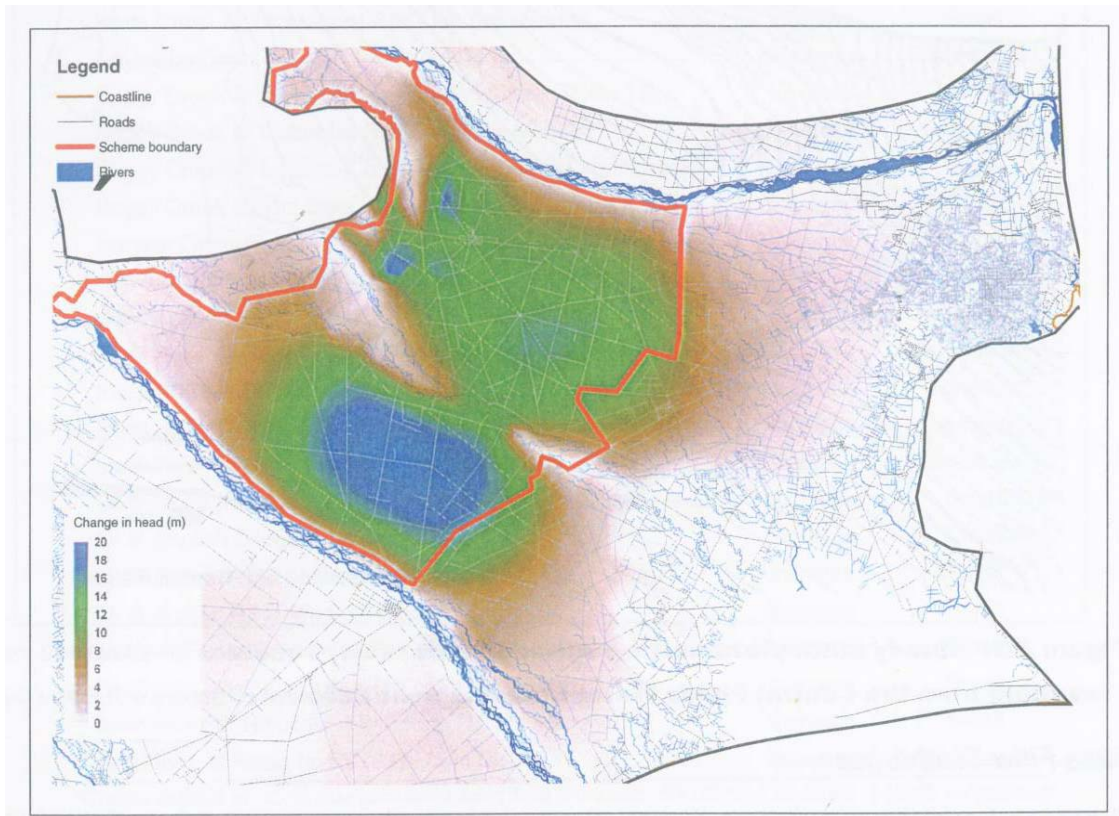
- management of water quality and quantity
- waste and effluent management
- ongoing monitoring and independent auditing of the scheme and the effects of individual farmer's activities

The Agreement is still under development but will be detailed in full at the resource consent hearing.

- CPWL's sustainability code is being developed as part of CPWL's support in a national Sustainable Farming Fund project entitled "Development of an Irrigation Scheme Sustainability Code of Practice".

Environmental benefits

- An estimated 50% of farmers who are Central Plains Water shareholders currently pump water from underground aquifers (some of which are now suffering from over-abstraction). By instead delivering water direct to farmers' gates, the groundwater system will return towards its natural state. It is estimated that some of the recharged aquifers will rise by as much as 20m.



Steady state change in groundwater levels resulting from the CPW scheme

- Irrigated scheme water that is not used by plants, animals or lost via evaporation, will ultimately drain into the groundwater system that flows towards and beneath Te Waihora-Lake Ellesmere, rather than towards Christchurch city.

Modelling studies show that the scheme will result in a small but helpful increase in flow in Christchurch's Avon and Heathcote Rivers. Some of these increased flows will be due to a pressure effect related to the generalised increase in groundwater levels, whereas some may come directly from the scheme (however this will be a very small proportion).

It is also expected that there will be a significant rise in the volume of water flowing in the Selwyn and Irwell Rivers, the upper Hanmer Road Drain, Birdlings Brook and Wakanui Creek. Less significant increases in baseflow are expected in the Avon, Heathcote, Halswell, and LII Rivers; Boggy, Waikekewai, and Harts Creeks; and Tent Burn.

In turn, the increase in these lowland stream flows will provide more water into Te Waihora / Lake Ellesmere.

- Because of the direction of groundwater flow, the main aquifer that Christchurch draws its drinking water from will be unaffected by the scheme. However, the West Melton, Templeton, and Halswell areas may experience small water quality issues with respect to nitrogen concentrations in shallow bores.
- Parts of the scheme will be developed as 'vegetation corridors' that connect pockets of native plants that remain on the central Canterbury Plains. The corridors will encourage the movement of native bird species and therefore, ultimately, a permanent natural

means of increasing native plant life on the plains, from the mountains to the sea. This design feature has attracted positive support from the Department of Conservation.

- In recent years, many Canterbury sheep farms have been developed for more intensive farming practices, particularly dairying. Not only has this increased demand for surface and groundwater abstraction, it has increased the problem of managing water contamination (especially nitrates from fertiliser and animal effluent) of aquifers and streams.

In contrast, the CPW scheme requires farmers to commit to a Sustainable Management Agreement, whereby their farming practices are monitored to ensure they do not over-water or over-fertilise their land. In effect, the environment will be better off with the Central Plains Water scheme than without.

CPWL is also actively supporting a national Sustainable Farming Fund project entitled "Development of an Irrigation Scheme Sustainability Code of Practice".

All water supplied to farms by the CPW scheme will be subject to a levy collected on behalf of the CPW Trust. Called the Environmental Trust Fund and amounting to around \$60,000 a year, the fund will be used to support and encourage various environmental enhancement initiatives (eg. Riparian planting and habitat restoration) within and 'downstream' of the CPW scheme area.

- Technical studies indicate that careful management of irrigation and fertiliser application will, over time, improve the depth and organic content of soil within the scheme area.
- Prior to the development of irrigation on the plains, wind erosion from dryland soils was considered to be a problem of national significance. With the development of irrigation, soils are much more resistant to wind erosion.
- As well as better quality soils providing better productivity, greater organic content creates a natural biological filter to prevent water draining so quickly – this improves nitrogen uptake by plants and minimises the potential for it to leach into groundwater systems.

Earthworms are a good indicator of the organic content and general health of soil. A recent study undertaken by Crop and Food Research at Winchmore Irrigation Station counted earthworms in different soils. While 250 was a typical number of worms in a dry unfertilised square metre of soil, irrigating the same soil would raise the count to around 500 worms per square metre and applying the correct amount of water and fertiliser could raise the worm count again to 800/m².

Recreational and social benefits

- A range of recreational benefits will be incorporated into the ultimate design and operation of the CPW scheme. Final decisions on what will be built will be developed in consultation with local communities and user groups. Some options include:
 - A major off-road mixed walking / cycling track (around much of the storage lake, headrace canal and some water races, depending on farmer access permissions).
 - An artificial white-water kayaking course (would be the closest such course to Christchurch).
 - Flat water kayaking and rowing on the headrace canal and storage lake. The headrace canal also allows for the option of long distance flat water kayak races.

- If fish farming in the headrace canal is feasible, this could result in angling options (as is the case at Tekapo and Pukaki canals).
- A rowing course on the storage lake as well as yachting, windsurfing and kayaking activities.
- Experience in other parts of New Zealand indicates that land use change following the introduction of irrigation schemes commonly leads to changes in farm ownership and farm type (eg. higher value produce). An increased population can have benefits for schools, sports clubs and social services.

Irrigation and associated land uses demand a wider skill base among farmers, farm workers, farming service providers and contractors, rural service providers and small business people.

- The scheme will safeguard the level of water in 'house wells' on which many rural households are reliant for their drinking water. This is because the majority of farmers involved in the CPW scheme will no longer pump water from underground aquifers, allowing downstream groundwater systems to return to higher, more natural levels.

Recent media coverage shows drinking water supplies in rural areas are now seriously affected by irrigation abstraction: "...about two dozen shallow wells in central Canterbury have run dry, leaving people without water to drink or for showers" (The Press, 01/02/06), "I've never seen so many people ringing up saying their well has gone dry ..." (ECan groundwater scientist Russel Sanders reported in The Press 31/01/06)

CENTRAL CANTERBURY – WITH THE SCHEME & WITHOUT

<u>WITHOUT</u> A COMMUNITY IRRIGATION SCHEME	<u>WITH</u> A COMMUNITY IRRIGATION SCHEME
Private ownership of resource consents.	Public ownership of resource consents. (the CPW scheme's consents will be owned by the CPW Trust – a charitable trust established by the Christchurch City and Selwyn District councils).
Individual commercial gain is the key driver. Limited community gain as individual or small groups of farmers that apply to take water from Waimakariri and Rakaia are not required to make a commitment to sustainable community, recreation and environmental benefits.	Public scheme designed for overall community good. Collective approach and economies of scale allow for a wide range of social, cultural, environmental and economic benefits.
Water supply is not very reliable because: <ul style="list-style-type: none"> - options for water storage are minimal - farmers cannot take water from rivers during low flow / drought periods when they need it most 	Water supply is highly reliable because water storage provides water 'in the right place at the right time'. This means: <ul style="list-style-type: none"> - more opportunities for high value farm production. - economic impact of drought significantly lower
Individual farmers continue to apply for resource consents to access groundwater from aquifers.	Significant drop in applications for groundwater consents.
The majority of farmers continue to pump water from underground aquifers. Aquifer levels remain unnaturally low: <ul style="list-style-type: none"> - threat to ongoing supply of drinking water for some 'house wells'. - ongoing degradation of water volumes in lowland streams. 	Farmers receiving water from CPW scheme stop pumping water from underground aquifers. Aquifer levels rise: <ul style="list-style-type: none"> - protects drinking water supplies for rural 'house wells'. - the volume of water in lowland streams gradually restores.

cont'd.....

Potential for farms to be sold and their water rights (to take water from the Waimakariri and Rakaia Rivers) lost to overseas interests.	Water rights owned in perpetuity by the community via the Central Plains Water Trust.
Consent conditions are used to manage environmental effects. Consent authorities must carry out compliance monitoring for all individual consents.	CPWL takes strong advocacy role in support of achieving excellence in environmental management across the scheme. Water users supported and assisted by CPWL to adopt sustainable farm management best practice measures that minimise or remedy any adverse environmental effects. At its own cost, CPWL carries out ongoing monitoring and reporting on environmental performance of individual farms and the scheme as a whole.
No enhancement fund.	Environmental Trust Fund administered by the CPW Trust. Amounting to around \$60,000 a year, the fund will be used to support and encourage various environmental enhancement initiatives (eg. Riparian planting and habitat restoration) within and 'downstream' of the CPW scheme area.

EFFECTS OF THE SCHEME

Birds and fish

- The storage reservoir will produce an ideal environment for birdlife and fish. Sanctuaries are proposed.
- Initial studies indicate that the 'takes' from each river will not have any significant adverse effects on birds and fish.
- Sophisticated fish screening systems will be installed on all intakes to ensure very small fish do not enter the canal system. This protects their natural life cycle, particularly salmon, which return to spawn in the area that they first hatched. Fish screens are routinely used in other schemes that take surface water.
- The scheme will not affect salmon passage up rivers at any time.
- Research indicates that the turbidity of river water is the main trigger prompting salmon to 'run' – the CPW scheme will not affect the turbidity of water in either river.

- Construction of the scheme may affect one salmon spawning area however this will be limited to one spawning season and work will be undertaken in such a way as to minimise impact.
- There will be no negative effect on birds that rely on the river beds as a habitat. Both the Rakaia and Waimakariri Rivers are important habitats for the Wrybill Plover, which is a Category B vulnerable species. According to recent work surveying the decline in Wrybill Plover numbers from 1994-2001, the most likely reason for this decline is predator prey switching as a result of RHD (rabbit haemorrhagic disease, previously called Rabbit Calici Virus). Stoats and ferrets that previously preyed mainly on rabbits, are switching to braided river birds because rabbit numbers have declined drastically after RHD's introduction.

Dam

- The CPW scheme proposes building a 35-55m high, 2km long dam at Waianiwaniwa Valley to form a reservoir.
- The dam will be constructed to international engineering standards. In particular, it will be constructed so that it meets the stringent safety guidelines established by the International Committee of Large Dams, which sets the benchmarks for dam safety throughout the world. The design, construction, operation and monitoring methodology will be peer reviewed by international experts in this field.
- There are no known major earthquake fault lines in the Waianiwaniwa Valley.

A minor fault was found when Waianiwaniwa was put forward as a potential site for what is now the Kate Valley Landfill. This was problematic for that project because leachate could potentially seep into underground water supplies. However the fault in question is not an issue for the CPW scheme because CPW's reservoir will be filled with water not refuse. Not only is this minor fault sited several kilometres from where CPWL proposes building the dam, many dams such as the Clyde Dam are safely constructed on faults.

- All dams in New Zealand are required to be designed to withstand severe earthquakes without breaching. In a severe earthquake, damage to the core of the dam can be controlled in such a way that while leakage may occur, requiring the dam to be emptied quickly, a dam breach is avoided.
- Compared with other dams, the Waianiwaniwa Valley is small compared with the surface area of the reservoir. This means excessive rainfall won't cause problems, as no significant river flows into the valley area, and the outlet structure is large enough to discharge water at a rate higher than the rainfall.

It is not appropriate to draw possible parallels with the Opuha dam collapse, which occurred as a result of heavy rain inland during its construction. In the case of that irrigation scheme, the Opuha River flows into the Opuha reservoir and it has a considerable rainwater catchment. This is not the case with the Waianiwaniwa Valley.

Freshwater quality

- Nutrients are essential for growth. In agriculture and horticulture, farmers use fertilisers to correct soil imbalances and significantly increase productivity. However, if they are not used correctly, they can pollute soil and waterways.
- In recent years, many Canterbury sheep farms have been developed for more intensive farming practices, particularly dairying. Not only has this increased demand for surface and groundwater abstraction, it has increased the problem of managing water contamination (especially nitrates from fertiliser and animal effluent) of aquifers and streams.
- A key component of the CPW scheme requires farmers to commit to a Sustainable Management Agreement (the 'Agreement') whereby their farming practices are monitored to ensure they do not over-water or over-fertilise their land.

The Agreement will actively encourage and assist individual farmers receiving water from the scheme to minimise any effect of their farming operations on water quality by promoting a range of best practices such as:

- optimising fertiliser application rates by matching the supply of nitrogen to demand and ascertaining the soil fertility of different paddocks within an individual farm
- efficient use of water to ensure as little water possible gets through the root zone
- management of riparian zones.

Ultimately, CPWL will have the power to 'turn off the water' supplied to individual farms if they do not achieve the requirements of the Agreement.

In effect, the environment will be better off with the Central Plains Water scheme than without. *For more information see page 11, BENEFITS OF THE SCHEME – SUSTAINABILITY.*

- The level of nitrate in groundwater has been an issue in many parts of Canterbury for some time. Nitrates accumulate in the soil from a range of activities:
 - fertiliser application
 - animal effluent
 - plant material being ploughed back into the soil (where it mineralises as decomposition occurs)
 - old septic tanks
 - factory farming or some form of processing activity
 - nitrates also occur naturally in all groundwater at low levels.

Leaching of nitrates from soil into groundwater occurs when water (from rainfall or irrigation) passes through the soil and takes nitrates with it.

As a general rule, forestry leaches nitrates at a relatively low level while vegetable production, including market gardening, is at the high end of the scale. Cereal cropping, organic farming and pastoral grazing systems (including dairying) are somewhere in between.

- World Health Organisation standards limit nitrate levels in drinking water to 11.3 milligrams of nitrate-nitrogen per litre. This is half the level at which prolonged exposure is known to impact on human health.

While the technical studies are ongoing, initial research indicates the scheme will not cause nitrate levels to go above the required health limits for drinking water in most locations. They may exceed drinking standards in some localities as a consequence of other factors that already exist such as old septic tanks, factory farming or some form of processing activity. In these areas, drinking water will have to be sourced from deeper aquifers.

- Nitrates in unconfined aquifers can also affect aquatic ecosystems in streams fed from such sources. Depending on other factors (such as phosphorus concentration, flow rates and temperature) levels of three or four milligrams per litre can result in increased weed growth in a stream, which might alter it as a habitat for fish and invertebrates.

CONSENTS & DESIGNATIONS

- The scheme must obtain nearly 100 resource consents. These are broadly grouped into two main areas – natural resource related and land use related – and will be considered by Environment Canterbury and Selwyn District Council.
- Environment Canterbury will deliberate on consents concerning how CPWL will ‘take’ water from rivers, divert it into channels, discharge it back into the environment, and the effect of scheme irrigation on groundwater. Selwyn District Council is responsible for resource consents that relate to effects on communities, infrastructure and property. Selwyn is also responsible for building consents (for dam structures and intakes) and any designations over land.
- December 2001: The Christchurch City Council and Selwyn District Council (acting as the Central Plains Water Enhancement Steering Committee) lodged the ‘take’ consent applications for the proposed CPW scheme. These were deemed notifiable by Environment Canterbury but remained ‘parked’ for several years because, 1. the CPW Trust had to form the company (CPWL) and raise share capital to fund the resource consent application phase, and 2. Environment Canterbury asked the CPW Trust to complete its ‘use’ applications so that both ‘take’ and ‘use’ aspects could be considered as one consent package and at a single hearing.
- June 2005: CPWL lodged a ‘take’ consent application for water from the proposed upper Waimakariri intake site.
- November 2005: CPWL lodged its accompanying ‘use’ consent applications and AEE (Assessment of Environmental Effects) report. The AEE covers how the scheme will impact (and mitigate its effects) on flora and fauna, local communities, river and underground water quality and quantity. Other information of relevance to the resource consent hearings are the potential economic and recreational benefits of the scheme.

- November 2005: Minister for the Environment advised that CPWL’s application to become a requiring authority has been approved. Gaining requiring authority status is a normal step in the process for any major infrastructure development proposal where construction may not immediately take place. CPWL is, in effect, seeking to secure the opportunity to use land needed for the scheme once it has gained the necessary resource consents – a process that could take up to two years.

CPWL will only apply to Selwyn District Council for consents for land use (for the scheme components) and designations for those components of the scheme which must be in a set location such as the dam, intakes and headrace canals. Selwyn District Council is required to initiate a submission and hearing process that is just as rigorous and transparent as the more familiar resource consent process. The public can make submissions on the requirement for a designation in exactly the same way as they do on resource consents.

CPW is one of several irrigation schemes approved as requiring authorities in recent years, including the South Canterbury Waterways, Doubtless Bay Water Supply Company and North Otago Water Harvesting and Irrigation Company.

- November 2005 till present: Environment Canterbury and Selwyn District Council are reviewing the suite of consent applications to be certain they are complete and therefore suitable for public notification.
- (future) Notification: Environment Canterbury and Selwyn District Council will jointly and publicly advertise the applications CPWL has lodged and put people on notice that they can make submissions for or against the proposed CPW scheme, within a set timeframe. At the close of the submission period, a hearing date will be set and a hearing panel appointed.
- (future) Consent hearing: The hearing panel will either grant the consents (under certain conditions) or decline them. The panel’s decision is open to appeal to the Environment Court.

HISTORY

Overall project

- 1883: In a paper on Canterbury rural water, G F Ritso wrote:
 “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.”
- 1936: The Malvern County Council, 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) 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.

- May 2000: the Central Plains Water Enhancement Steering Committee, a joint committee of the Christchurch City Council and the Selwyn District Council, was established and funded to assess the feasibility of water enhancement schemes for the Central Plains.

The Steering Committee commissioned a number of reports to investigate:

- The likely environmental, economic and social impact of an extensive water enhancement system in the scheme area;
- Whether such a water enhancement scheme is feasible; and
- Whether such a water enhancement scheme is affordable.

On the basis of the feasibility study and other reports, the Steering Committee concluded that the scheme is feasible and affordable. The Steering Committee, after taking professional advice, was also of the opinion that it should be possible to obtain the resource consents required for the scheme.

- December 2001: Consent application lodged by the Christchurch City Council and Selwyn District Council (acting as the Central Plains Water Enhancement Steering Committee, jointly with the Ashburton Community Water Trust) to take 40 cumecs from each of the Waimakariri and Rakaia Rivers.
- January 2002: Feasibility Study completed. Concluded that a scheme based on water harvesting and storage was feasible and affordable.
- April 2003: Steering committee replaced by the Central Plains Water Trust.
- Sept 2003: Central Plains Water Limited (CPWL) formed.
- December 2004: CPWL issues a prospectus to raise finance to fund the resource consenting process. It is oversubscribed and successfully raises \$4.7 million.
- June 2005: CPWL lodges a 'take' consent application for the upper Waimakariri intake site.
- November 2005: CPWL lodges its 'use' consents application and AEE with Environment Canterbury and Selwyn District Council.
- November 2005: Minister for the Environment advises CPWL that its application to become a requiring authority has been approved.

Consultation

- In 2000 a joint committee was established by Selwyn District and Christchurch City Councils to investigate the opportunity to use water for the benefit of the wider community. As part of an initial feasibility study, the committee undertook extensive consultation with a wide range of stakeholder groups.
- One of the first initiatives by the Central Plains Water Steering Committee was to establish a potential water users group, following six woolshed meetings within the proposed scheme area. Consultation revealed strong interest within the area for the proposed scheme. An independent group later formed, known as the Ritso Society, which has continued to be instrumental in furthering the Central Plains Water scheme.

- Following consultation with other interested stakeholders a consultative working party was established in mid-2000. This included representatives of groups that included potential water users, conservationists, outdoor enthusiasts, township committees, host communities, existing irrigators, tangata whenua and people living to the east of the proposed scheme where aquifer recharge from the scheme could be an issue.
- There were two strands to the consultation – one focused on the interest within the farming community for a community based water enhancement scheme and the principles on which such a scheme should be based. The other sought to identify potential issues and how those issues might be addressed in a sustainable way.
- The consultative working party identified key issues from an environmental, social, economic and cultural perspective. These issues were fed back to the scheme's technical experts and the Steering Committee to assist in decisions on the development of the scheme.
- In 2003 the Central Plains Water Trust sought to raise funds to enable the scheme to apply for the resource consents needed to proceed. This required further consultation with the farming community and involved numerous meetings and focus groups to clarify scheme details, funding options and other preferences.
- Central Plains Water Limited was established in late 2003 as a commercial entity to raise sufficient share capital to obtain the resource consents. In 2003, during the fund raising phase, members of the Central Plains Water Trust met with farmers in the Waianiwaniwa Valley to discuss the scheme and the potential impact it would have on their farms.
- The ongoing technical investigations are addressing valid issues previously identified by key stakeholders. Central Plains Water technical representatives are attempting to mitigate concerns that have arisen as a result of consultation.
- The objective of the consultation is to find a balance between enabling sustainable use of the scheme, while, where possible, avoiding or mitigating any adverse effects of the scheme. Many of the scheme's principles have been influenced by the consultation process, for example:
 - the bottom of the storage dam will not be allowed to dry out to offset potential dust issues and maintain recreational activities
 - the principle of a Farm Management Accord (now termed the Sustainable Management Agreement) that addresses potential water contamination issues
 - the use of gravity to move water where ever possible
 - the establishment of an annual \$60,000 Environmental Trust Fund to support and encourage various environmental enhancement initiatives (eg. Riparian planting and habitat restoration) within and 'downstream' of the CPW scheme area.
- Other opportunities to mitigate the effects of the scheme include:
 - enhancement work at Te Waihora (Lake Ellesmere)
 - introducing wetland areas
 - establishing high environmental standards that require efficient use of water
 - measuring all water takes

- creating opportunities for water based recreation on the reservoir and on other structures associated with the scheme
- Consultation will continue throughout the consent process and there will be ongoing opportunities for Central Plains Water to meet with stakeholders to address issues and concerns prior to the hearing.

FACTS & FICTIONS

Fiction: 40 cumecs is too much water to take out of the rivers.

Facts:

- The minimum flow level of the Waimakariri is fully protected by the Waimakariri Regional River Plan (developed by Environment Canterbury in 2004), while the levels of the Rakaia are protected by a National Water Conservation Order. The CPW scheme will operate in accordance within the provisions of these regulations.
- The 'takes' that CPWL has applied for are not continuous and simply represent the maximum amount of water the scheme could take at one time, when the rivers' flows could support that take. The scheme's annual average take would only be 9 cumecs from the Waimakariri and 4 cumecs from the Rakaia Rivers.

Whenever the Waimakariri and Rakaia do experience low flows, farmers' water supply will be augmented by stored water from the reservoir.

- CPWL has, and continues to consult extensively with Fish & Game on the scheme's potential effects on fishing. Initial technical investigations indicate the CPW scheme is unlikely to affect the number of salmon running up either river.
- If the CPW scheme fails to gain the necessary resource consents to proceed, individual farmers or groups of farmers will continue to apply for water from both rivers. This means that, irrespective of what happens to the CPW scheme, all water available for allocation (up to the limits set by the Rakaia National Water Conservation Order and the Waimakariri River Regional Plan) will ultimately be allocated to individual farmers or small groups of corporate farmers.

What's more, because these private irrigation schemes are smaller, their supporting information does not have to meet such high thresholds as those required of CPW. This was recently evidenced by applications from corporate dairy farmer Synlait for 6 cumecs from the Rakaia and Ngai Tahu's application for 3.6 cumecs from the Waimakariri River.

Fiction: It's not appropriate for a private company to be seeking requiring authority status.

Facts:

- The CPW scheme is not a private scheme – it is a public scheme for community and regional benefit. The consents for the scheme will be owned by the CPW Trust, which is a charitable trust established by Christchurch City Council and Selwyn District Council.
- Many other irrigation schemes have been given approval as requiring authorities in recent years, including the South Canterbury Waterways, Doubtless Bay Water Supply Company and North Otago Water Harvesting and Irrigation Company.
- In line with the public ownership aspect of CPW, the scheme will be specially developed to allow for a range of recreational and enhancements aspects including a major off-road mixed walking / cycling track and an artificial white-water kayaking course on the outlet of the storage lake.

Fiction: CPWL has failed to consult with affected parties.

Facts:

- In the last five years, CPWL has held an estimated 100 meetings with everyone from potential water users, landowners, conservationists, outdoor enthusiasts, township committees, tangata whenua and other landowners who will potentially be affected.

Meetings were first held with landowners in the Waianiwaniwa Valley, which will be flooded by the scheme's proposed water storage reservoir, in August 2001 and continued in 2003 and 2005.
- The proposed site of certain structures cannot be confirmed for some time because more technical works must be completed. In particular, this applies to landowners potentially affected by the location of the distribution races. A preliminary indication of the siting of these was outlined in Central Plains Water's water use resource consent applications, lodged with ECan in November. However their final layout is yet to be confirmed because the more definitive land use consent applications are still being worked on and will be lodged with Selwyn District Council later this year, around April.

Central Plains Water is currently undertaking extensive work to define the locations of distribution races more accurately. This includes acting on initial feedback that suggests, in some areas, it is more appropriate if the races are sited away from main roads and, for example, run at the back of properties or along boundary fences between farms.

Consultation with landowners is an ongoing process that will continue up until the hearing and on through the construction phase.

Fiction: The Waianiwaniwa valley is was unsuitable for a landfill because it was on a fault line, so it's obviously not suitable for a storage lake and dam.

Fact:

- There are no known major earthquake fault lines in the Waianiwaniwa Valley. A minor fault was found when it was put forward as a potential site for what is now the Kate

Valley Landfill. This was problematic for that project because leachate could potentially seep into underground water supplies. However the fault in question is not an issue for the CPW scheme because its reservoir will be filled with water not refuse. Also, this minor fault is situated further up the valley, several kilometres from where CPWL proposes building the dam.

Of note, many dams such as the Clyde Dam are safely constructed on minor faults.

Fiction: There's is no need for such a large scheme. Small scale storage on individual farms is a better option.

Fact:

- In order to provide the same level of irrigation reliability, CPWL's research shows that the costs of creating storage on individual farms is much higher than the central storage reservoir that CPWL proposes to build.

Fiction: Nitrates from dairy farms will end up in Christchurch's drinking water.

Fact:

- The scheme is not expected to affect the quality of Christchurch's drinking water supplies. That's because most of the city's water is drawn from aquifers that are 'recharged' from an area well outside the scheme area (north of Christchurch), from rainwater and drainage from the lower reaches of the Waimakariri River. The slope of the central Canterbury plains means that any excess irrigated water will tend to flow underground to the southeast, towards Lake Ellesmere / Te Waihora, rather than east towards Christchurch.

Fiction: It's inappropriate for the Christchurch City Council to have invested in the development of the scheme plans to help farmers living well beyond the city's boundaries

Fact:

- While some Christchurch ratepayers questioned the merits of their council investing in an irrigation scheme beyond their city's boundaries, City Councillors were well aware that Canterbury's rural sector accounts for 60-70% of Christchurch's economic activity and that Canterbury farmers spend around \$750 million every year on goods and services provided by Christchurch businesses.

Fiction: The proposed dam and storage reservoir represents a danger to Coalgate residents.

Facts:

- The dam will be constructed so that it meets the stringent safety guidelines established by the International Committee of Large Dams, which sets the benchmarks for dam

safety throughout the world. The guidelines will be applied throughout the investigation, design, construction and operation phases.

- The resource consents will not be granted unless the Commissioners are satisfied that community interests will be adequately safeguarded.

Fiction: Canterbury’s groundwater resource is in crisis because of farming activity – the CPW scheme is going to make this situation worse.

Facts:

- The reality is the complete opposite. Because CPW will deliver water to farmers’ gates, the majority of farmers involved in the CPW scheme who currently irrigate from groundwater will no longer pump water from underground aquifers – this will allow downstream groundwater systems to return to higher, more natural levels.

In some parts of the plains, recharged aquifers are estimated to rise by as much as 20m as a direct result of the CPW scheme. This will be particularly beneficial to many rural households who rely on ‘house wells’ for their drinking water. Recent media coverage that “...about two dozen shallow wells in central Canterbury have run dry, leaving people without water to drink or for showers” (The Press, 01/02/06), “I’ve never seen so many people ringing up saying their well has gone dry” (ECan groundwater scientist Russel Sanders reported in The Press 31/01/06).

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