

# IRRIGATION

## NEW ZEALAND

PO Box 3872, Christchurch  
Phone: (03) 3793820  
Fax: (03) 3723520

Newsletter  
September, 2007

Email: [admin@irrigationnz.co.nz](mailto:admin@irrigationnz.co.nz)  
[www.irrigationnz.co.nz](http://www.irrigationnz.co.nz)

## Code launch marks milestone for irrigated agriculture

In an important milestone in the advancement of irrigated agriculture Irrigation New Zealand (INZ) this month launched a Code of Practice and Design Standards aimed at improving water efficiency and sustainability.

Launched by the Minister of Agriculture Jim Anderson in Wellington (*on September 11*) the Code of Practice is a guide to the New Zealand irrigation industry of acceptable levels of irrigation design that will improve the efficiency of irrigation systems in New Zealand.

The key outcomes of the industry adopting the design code of practice will be to the benefit of both rural and urban economies, environments and communities.

Through improved design practices irrigation systems will exhibit improved water resource management, better use of energy sources and more efficient capital and labour cost expenditure.

The code has been developed by irrigation designers, irrigators, owners and operators.

It provides the minimum standard to be attained to meet Irrigation NZ's aim to improve the efficiency and sustainability of use of water, energy, labour and capital in irrigation systems in New Zealand, INZ chief executive Dr Terry Heiler said.

This was in keeping with INZ's leadership position promoting best practice in the New Zealand irrigation industry in the area of water management, water efficiency, the environmental impacts and intensified land use.



*The Code of Practice provides the minimum standard to be attained to meet Irrigation NZ's aim to improve the efficiency and sustainability of use of water, energy, labour and capital in irrigation systems in New Zealand*

"These issues are of equal importance to modern day farming enterprises and other environmental interests," Heiler said.

The Code describes the procedures that irrigation designers must follow to meet the required performance standards.

In parallel to the Design Code of Practice, a Code of Practice for on-farm irrigation evaluation has been developed to provide guidelines for irrigators and others undertaking evaluations of irrigation systems in the field.

It makes recommendations for planning and conducting evaluations and reporting on the performance of irrigation systems and their management.

The evaluation code has been developed with reference to the NZ Code of Practice for Irrigation Design, international practices and stan-

dards.

The main aim of the guideline is to encourage the adoption of standardised evaluation practices that were cost-effective, recommendation driven and encouraged more efficient use of irrigation resources.

The Code of Practice does not, at this time, carry any legal status. Its development had been led by Irrigation New Zealand with input and support from irrigation experts and the irrigation industry. Its adoption and implementation were voluntary.

To build on the Code of Practice the development of a NZQA registered certification programme is well underway with the NZ Certificate of Irrigation Design planned for registration in 2008.

A training provider had been nominated and training packs were being developed to allow an irrigation designer training programme to be offered from early next year.

This would be targeted at both existing and new entrants to the irrigation industry.

The programme would compliment the existing Irrigation Evaluation certification and training programme.

This NZQA registered programme would enable designers to attend irrigation design courses and formally recognise those that meet the unit standards with the industry recognised title "Certified Irrigation designer".

*See page 7 for Code of Practice and Design Standards summary*

It has been very busy times since our last newsletter. I have been away overseas myself and while travelling I took the opportunity to visit a couple of irrigation schemes in Canada and Oregon, USA. See my report on those visits on page 5 of this newsletter.

Our chief executive Terry Heiler hasn't managed to schedule time to scarp to his West Coast retreat for a spot of white baiting, even though he now qualifies for the pension! Hence no whitebait on the agenda at this month's board meeting!

All humour aside – Terry has been very busy and much of his involvement in projects, committees and working groups is the basis of this report.

Terry is out of the country from September 9 – October 4 and we wish him well on that venture in Uzbekistan. (see news flash page 1)

The launch of the Code of Practice and Design Standards in Wellington this month has been a significant step for irrigated agriculture in New Zealand. I won't go into depth on that as it is reported as the cover story of this newsletter and a briefing report of the Code can be found on page 7.

Lowland streams - INZ is pleased that ECan has decided to take more time over the review of consents. The current plan is to hold meetings with consent holders around 10 or so cluster groups starting in October. We understand that a detailed technical update of information will be sent to all consent holders in the next month. The lack of information from ECan to consent holders in the period since the first notification in early July has been unfortunate and has prompted many enquiries to INZ along the lines of "what the hell is going on!" Now that we seem to be on a more sensible timeframe, at least, it will be important for INZ to try and make the next steps sensible also. Appropriate to this we have just finished an alternative to WQN9v3 to estimate seasonal maximum allocations. We intend to present our work to ECan later in September and

then alert all consent holders as to the results so they can use the information in negotiations with ECan if they so wish.

Self Management - I was pleased that we were successful in getting support from the Ministry for Environment and Opuha Dam Ltd for an INZ study into audited self management of the Opihi Catchment. Terry Heiler has kicked this off with meetings with ECan, who are keen supporters of the project, and the South Canterbury Water Enhancement Group. This 12-month work programme is aimed at getting systems developed that allow more community and farmer control over water resources management under the oversight of the regulators. This should give better environmental results and reduce compliance costs.

Fish Screens - INZ has called for a more fundamental study of population dynamics of salmon and an assessment of the degree of exclusion that is appropriate at irrigation intakes. We still have an impasse with F&G and DOC who continue to insist on screens that exclude 100% of salmon fry. We want to test the validity of this position and help get to a situation where sensible and practical screening solutions can be developed that both protect the fishery resource and are workable in New Zealand river situations.

Rates Report - I was heartened to see a recommendation in the Shand report on local body rating that more investment in rural water infrastructure was needed. Another recommendation of the report needs watching – more user pay charges for water management investigations undertaken by regional councils. The key points here are to honestly separate public and private benefits of these investigations, sensible and fair cost sharing, and to independently determine that the investigations are relevant and are being done in a cost-effective manner.

The remainder of the year will clearly be no less busy...

*Graeme Sutton*

## Farm environment awards open

Regional entries for the 2008 Ballance Farm Environment Awards are opening and farmers are being urged to enter this popular event.

Operating in eight regions, the annual awards programme promotes sustainable land management and is organised by the New Zealand Farm Environment Awards (NZFEA) Trust.

Entries for the Bay of Plenty region opened on August 8 and the Waikato and Canterbury regions September 1. Wellington/Wairarapa entries opened on September 3 and Northland

entries start on October 26. Horizons entries open on October 29 and Otago and Southland November 1.

NZFEA general manager David Natzke said anyone considering entering the awards should "definitely give it a go".

"The awards highlight the fact that good environmental and good business management go hand in hand. Many of our previous winners are top of their field as far as farm performance goes, and they are always happy to share their

philosophies and innovations with the wider farming community.

"But this doesn't mean you have to have the best looking farm in the district to enter and the awards cover a wide range of categories."

Entering the contest is very simple, with minimal paperwork required. Information on the awards can be obtained by emailing [info@bfcea.org.nz](mailto:info@bfcea.org.nz) and an entry form can be obtained from [www.bfcea.org.nz](http://www.bfcea.org.nz) or participating regional councils.

## Grants to reduce the cost of Irrigation

The cost of irrigation to the rural community and New Zealand is significant. This concern is amplified when considering rising energy costs and growing concern about climate change. However taking control of energy use enables New Zealand businesses to remain competitive on the world-stage.

The Energy Efficiency and Conservation Authority (EECA) has a variety of resources, training and funding to enable businesses to save on their energy bill.

Cash grants are available for businesses that are prepared to implement energy efficient technologies.

Applications from businesses operating irrigated dairying and arable cropping operations are in fact being actively sought specifically for this programme. This is in recognition of the fact that energy costs for these businesses are likely to be more than 5% of their total business operating costs.

The grants cover up to 40% of the total capital costs of the project, up to a maximum of \$100,000 for each grant. In addition to having the capital support, businesses who implement energy efficient technologies are expected to have lower running costs, increased profits and demonstrate

a commitment to minimising its impact on the environment. Irrigators who become more energy efficient are expected to water more land, have a longer irrigation season and lower pumping costs.

The choice of technology for these projects is assessed on a case by case basis.

In the case of irrigation projects, energy efficient technologies could include, but would not be limited to, pump efficiency technologies, higher performance nozzles and soil moisture testing.

Grants have already been awarded widely to the rural sector. Predominately these have focused on energy efficiencies gained in the dairy shed. For example, the installation of a heat recovery unit in a dairy shed in the Waikato reduced the farm's hot water requirements by 30% and in the process reduced CO2 emissions.

In the case of irrigation one study showed a full irrigation was able to be missed without penalty because moisture monitoring provided confidence to the farmer during a very hot dry period.

For more information about these grants:

Visit <http://www.eecabusiness.govt.nz/eib/>

Call Chris McArthur 09 374 3801

# Thirst for science sparks 'game over' call

The right to farm in New Zealand may have been taken for granted for too long.

Industry leaders question is it time to sit down with the urban population and re-negotiate that right?

New Zealanders don't do a bad job of agriculture. Agriculture is still very important to New Zealand, Canterbury farm consultant Bob Engelbrecht said in his address to the New Zealand Institute of Agricultural and Horticultural Science convention in Christchurch.

Engelbrecht said it was with much concern in his 40 plus years in the farm advisory business that he noted the conflict between urban and rural population was currently the worst ever.

"We (the rural sector) should be very proud of what we do. Rather than let antagonism continue through misinformation and lack of understanding we need to work on better science and no more so than when it comes to water and irrigation," Engelbrecht said.

"The debate over irrigation needs to look harder at the facts," he said.

Irrigation New Zealand chief executive Dr Terry Heiler also calls "game over" on the misconception that is creating antagonism and dividing the rural and urban sectors.

Addressing the recent LexisNexis rural professionals conference in Queenstown Heiler said regulations coming out from central and regional governments were based on little science and a lot of values that were protecting the trout and the salmon with little attention given to social and economic factors.

He described the Sustainable Water Programme of Action (SWPoA) as being action without the direction.

While he supported the initiative and some of



Terry Heiler



Bob Engelbrecht

the ideas in principle he says the changes signaled by the SWPoA were a claw-back of the water issued by regional councils under the Resource Management Act.

New Zealand derives immense economic, social and environmental benefit from irrigated agriculture.

Farmers who irrigate to improve reliability, quantity and quality of production receive the most obvious benefit.

The benefit to the urban population is largely ignored, mainly due to a misunderstanding of the farming environment and the lack of science based fact.

When it comes to irrigation development for the economic benefit of all New Zealand, the public has to wade through a large amount of misinformation to realise an understanding of the benefits and limitations of irrigation development, Heiler said.

Almost all regions in New Zealand would be in to a full water allocation situation within 10 years and in order to move forward it was necessary to build investment in bulk water infrastructure. While acknowledging the up-front costs of building storage were significant, Heiler said the benefits were inter-generational.

"Water storage has been identified as a farming community issue but it is for the good of the country. If we are not going to move forward as a country we are going to stall as a country," he said.

Heiler emphasised that to move forward water and irrigation development projects must be seen as multiple objective interventions for the good of the whole community and be designed to attract wider community support.

Without sustainable development of large scale water infrastructure many regions have hit a wall in terms of maintaining economic primary sector growth and in addressing current environmental and social well-being issues.

The "in the national interest" development opportunities that were now being developed in the energy and transport sectors, with central government involvement, were urgently needed in the rural water sector, Heiler said.

## Farmer support pushes water project forward

Farmer interest has exceeded the expectation of promoters of the proposed Barrhill Chertsey Irrigation (BCI) irrigation scheme.

Expressions of interest for water closed last month at 12cumeecs of interest, higher than the 8cumeecs required for stage one pumping.

"So we are extremely pleased with the outcome," BCI chairman John Wright said.

The majority of interest has come from farmers in the upper Mid Canterbury plains area in the vicinity of the Rangitata Diversion Race (RDR).

Wright said this was to be expected as through the water swap arrangement the water from BCI to farmers would be delivered through the RDR.

BCI has consent to take 17cumeecs (cubic metres of water per second) from the Rakaia River to generate electricity and irrigate an initial 17,500 ha of farmland.

Most of the project must be complete before the consents expire in March 2009.

Electricity Ashburton has joined BCI by proposing to build the infrastructure that would transfer the water from the Rakaia to the Highbank power station tailrace near Methven.

Electricity Ashburton has completed the purchase of one farm needed for the community power generation and irrigation scheme and is in the process of finalising the purchase of a second farm.

The property deals are Electricity Ashburton's part of the deal with BCI in the proposed development but board chairman Eddie Glass made it very clear in his report to the company's annual general meeting last month that Electricity Ashburton was wearing its community hat and had no intention of being a long-term partner.

He said the company saw itself as a catalyst to get the hydro/irrigation project off the ground making it clear the company was not into irrigation development.

Wright said the next stage of the project was to work now with Electricity Ashburton and the Ashburton District Council to make a final decision on the project.

That decision was expected in early November.

Meantime work was continuing on consenting and commercial arrangements.

While he was confident the project was set to proceed Wright said the future was very much dependent on ensuring the commercial arrangements with the likes of RDR, Trustpower, Electricity Ashburton and the Ashburton District Council.

A partnership is proposed with RDR Management Ltd and the Ashburton Lyndhurst Irrigation Society (ALIS) in which Rakaia water would be transferred to the ALIS network, freeing up Rangitata water for other areas. "The clock is ticking but the project has every chance of success," Wright said.

## From the editor's desk...

### Emphasis on sound science and rational thinking

New Zealand's water resources are set to come under increasing pressure in the future following the significant growth of water allocation in the past 20 years.

Pressure on water resources follows pressure on land use as water quantity and water quality are closely linked to the use of the land.

Science and management of water resources and management of land are being vigorously debated.

New Zealand farmers are putting in their best effort to assert best practice methods in recognising the importance of the valuable water resource not only in their modern day farming enterprises but also for the benefit of both the rural and urban economies, environments and communities.

The launch of the Irrigation New Zealand Code of Practice and Design Standards marks an important milestone in the advancement of irrigated agriculture in New Zealand and emphasises the ongoing importance New Zealand irrigators place on promoting best practice adoption of well tested science and appropriate technology into the industry.

INZ has been a leader in bringing sound science, tools with real benefits and rational thinking to the debate encompassing the economic benefit of irrigated agriculture and positive work farmers carry out as custodians of the rural environment.



The misconception that is creating antagonism and dividing the rural and urban sectors is nothing short of frustrating.

The debate over irrigation must look at harder facts.

Water storage has potential to irrigate several hundred thousand more hectares but achieving that storage may be hampered by a lack of political will to make that happen.

Water storage is critical for the nation's future. Impediments to storage should be removed and a better balance of actual and potential effects should be obtained to include positive outcomes.

To pursue the opportunities for water infrastructure investments there are a number of issues that need to be resolved.

Such infrastructure requires up front capital investments often outside of the communities to arrange without support. They are long term with appropriate maintenance and they will operate successfully over periods that cover a number of generations of the communities they serve.

But they have restricted direct-user market

and can be difficult to involve wider beneficiaries in financing the schemes. They generally involve multiple objectives but rely on single interest financing.

They require access to private land for associated infrastructure and that has the ability to present as much of a problem as resource consenting.

To move forward water and irrigation development projects must be seen as multiple objective interventions for the good of the whole community and be designed to attract wider community support.

Ideally the projects need to be community driven in partnership with government, not identified with single interest groups such as irrigation farmers. But without involvement of a strong economic contribution from irrigation development they struggle to be bankable.

Water storage developments are 100 plus year projects and implementation modalities need to reflect the inter-generational issues.

The biggest challenge for INZ is getting the message to the right people in the right places at the right time.

*I encourage all members to contact me directly with information that you would like to see included in your newsletter. I welcome your ideas and look forward to your contributions. Deadline for contributions for the next publication is November 21.*

**Annette Scott**

**INZ Newsletter Editor**

**Phone: (03) 308 4001 or Mobile: 021 908 400**

**Email: [annettescott@xtra.co.nz](mailto:annettescott@xtra.co.nz)**

Every effort is made to ensure complete accuracy of the information contained in this publication. However no responsibility can be accepted for any errors that may occur. A big thank you to all those who contribute information we couldn't do without you.

### Proposed changes to minimum flow in Canterbury rivers

Environment Canterbury is proposing several variations to chapter five (Water Quantity) of the Proposed Natural Resources Regional (NRRP) plan that would see the environmental flow regimes of several Canterbury rivers changed.

These variations deal with the flow regimes of the Hurunui River, and some of its tributaries (Variation 8), the Waihao-Wainono catchment (Variation 9) and the Halswell and LII rivers (Variation 10).

Existing minimum flows have generally been set as a condition on resource consents. They have been reviewed to take into account the overall needs of both in-stream values (as set out in the NRRP) and those of abstractors, mainly irrigators. For each river, an allocation regime providing for differing levels of supply reliability is also included.

Environment Canterbury's environmental flow team leader Ray Maw said the in-stream values included native fish, trout, native

plants, mahinga kai and the natural character and amenities of the rivers.

Environment Canterbury is currently in the process of publicly notifying these changes and submissions will be accepted until October 5, 2007. After the closing of submissions, ECan will publicly notify the availability of a summary of all the decisions requested by submitters and invite further submissions in support of, or opposed to those already made.

All submitters who wish to be heard will be advised of hearing times.

The details of the variations are available on Environment Canterbury's website (front page link), [www.ecan.govt.nz](http://www.ecan.govt.nz) or the following planners can be contacted regarding specific variations:

Variation 8	Herb FAMILTON, 03 371 7186
Variation 9	Jo Stapleton, 03 363 9391
Variation 10	Ray Maw, 03 371 7187

### Judge throws out challenge

The Malvern Hills Protection Society has lost its Environment Court case against the Central Plains Water irrigation scheme.

Environment Court Judge Jeff Smith ruled the legal challenge was "frivolous, vexatious and an abuse of process" that leaves the society open to legal cost claims from opposing parties. Malvern Hills is fighting to stop the \$350 million irrigation scheme, which aims to irrigate 60,000 hectares of farmland between the Waimakiriri and Rakaia Rivers.

The challenge was opposed by Central Plains Water, Environment Canterbury, Selwyn District Council, Ashburton Community Water Trust and the Minister for the Environment. The society was challenging the requiring authority status granted by the government to allow CPW to designate land for the irrigation project.

**While in Canada visiting my younger daughter, I took the opportunity to visit a couple of Irrigation schemes in Canada, one being in Alberta, the other in Oregon, USA.**

**Alberta (Canada):**



*One of many irrigation reservoirs, also a popular recreation spot, within the St Mary Irrigation scheme Alberta*

Irrigation of the Alberta Prairie began back in the late 1890's. Today 600,000 productive hectares of land, mostly within 13 irrigation districts in the southern part of the province, are receiving water through irrigation. Millions of litres of irrigation water are also being used to support the growth of Alberta's livestock and food processing industries.

Directly and indirectly, irrigation adds about 35,000 jobs and more than \$940 million dollars a year to the provincial economy. (Year 2000 figures)

While in Alberta I was hosted by Dale Miller and Don Kidd (a Kiwi) of UMA engineering Ltd and Lloyd Trick of MSO from California.

I have come away with a lot of information and an idea that it would be a great place to visit with an INZ tour group as I have found some very knowledgeable people who can share their knowledge with us.

It was good to see the benefit irrigation has played in their communities over a long period of time (over 100 years) when the commitment is made by far-sighted people.

That's a challenge for us here in NZ.

Alberta has had strong commitment from their Provincial Government in a rehabilitation programme to rebuild aging structures. The Alberta Provincial Government fund rehabilitation of off-farm structures by 75% with the irrigation districts paying 25%. Studies have shown that the community receives 75% of the economic benefit while irrigators receive 25% of the benefit.

An Irrigation district operates under the Irrigation District Act, similar to our Local Body Act, where each irrigator gets one vote to elect Governance Boards who manage each Irrigation district.

The 13 irrigation districts range in size from 427ha to the large St Mary Irrigation district of 138,712ha. I visited the St Mary and Taber Irrigation Districts. St Mary has 1,719km of distribution systems, which are fed from spring snow melting in the Rockies and spring precipitation, re-channeled and stored in many reservoirs located across the prairie and later put to use in the more arid parts of the province where it is most needed. In the St Mary Irrigation District, for example, water is drawn from the Belly, Waterton and St Mary Rivers. Nine large and six small reservoirs store water for use during and beyond the crop sowing season.



*Farmers fish screen - Hood River Irrigation Oregon, USA*

The water is distributed through a grid of main and lateral canals and pipelines to 154,000ha of crops and to supply many thousands of live-stock. In addition the works of the St Mary River Irrigation district convey water to several municipalities and industrial operations.

**Oregon (USA):**

As part of our involvement in the fish screen study being conducted by INZ, Fish and Game, ECan and INZ chief executive Terry Heiler came across a fish screen that might be useful in our situation here in NZ.

Given that Oregon is not far from where I was I took the opportunity to visit the Farmers' Conservation Alliance (FCA) in Hood River, Oregon. This organisation was set up by the farmer irrigators to develop, patent and then promote the fish screen to the 150,000 water diversions throughout the north west.

An extract from information received from FCA states:

"Fish, farmers and water have always formed an unhappy trinity. To irrigate, farmers need river water. But fish get sucked into irrigation systems. So the state mandates that farmers use screens to keep that from happening. But debris from the river gets stuck in the screen. So a lot of time and money is spent cleaning them. - \$70,000 a year by the Farmer's Irrigation District in Hood River alone. Ten years ago, two farmers in the district came up with what would prove to be a brilliant idea: Instead of sucking water through a vertically oriented screen, let the water run over a horizontal screen. Fish and debris flow over the screen, water moves down and then into the irrigation system.

Now that the design phase is complete, the nonprofit agency FCA has been formed to take on the task of marketing the screen, with all profits being reinvested into community programs that benefit fish and farmers.

As of now, six screens have been installed in three states. The implications are vast. The screens could be used anywhere that fish, farmers and water intersect." (May 2007)

Further investigation is necessary to establish if this type of screen can be adapted to NZ conditions, but it looks promising.

*Graeme Sutton*

## Central Plains consents hearing deferred

Environment Canterbury has agreed to defer Central Plains Water Trust's irrigation and dam project hearing until February 2008 at the request of Central Plains Water Trust. The Trust is proposing to build an irrigation scheme for the area between the Waimakariri and Rakaia rivers and a storage dam in the Waianiwi Valley in the Malvern Hills, near Coalgate. Multiple consent applications to Environment Canterbury and the Selwyn District Council relate to the taking, using and discharging of water from the two rivers.

# Overarching principles for development of freshwater policy

*Final Version as presented to Government by the Primary Sector Reference Group*

The following are the overarching principles the Primary Sector (through the MAF-convened Primary Sector Reference Group) would like to see guiding the Sustainable Water Programme of Action and incorporated in the development of a National Policy Statement on freshwater management.

Each principle is presented in italics, in some instances preceded by an explanatory note.

## Overarching Principles

**1. Balancing Desired Outcomes-** *Decisions on water management should be made on the basis of an evaluation of the full range of economic, social, cultural and environmental consequences that will result, taking into account the economic, social, cultural and environmental outcomes sought by the local community, tangata whenua and the national community.*

When making water management decisions differing economic, social, cultural and environmental outcomes will be sought by different groups. The desired outcomes of local communities, tangata whenua and the wider New Zealand community may differ. Water allocation decisions must seek to deliver net social, economic, cultural and environmental benefits for the local and national communities while recognising the impacts on those who bear the costs of implementing these decisions.

**2. Partnership/Collaborative Approach -** *All groups who have a role in or will be impacted upon by water management decisions should have the opportunity to be involved in an informed, collaborative decision making process from the earliest time possible. The goal of this approach is to ensure water management outcomes are agreed and achieved in the manner most appropriate to the specific situation.*

**3. Catchment-based Solutions -** *Water management decisions should be made on the basis of the particular characteristics of the catchment or catchments involved. These characteristics include, but are not limited to;*  
*hydrology,*  
*agreed water management outcomes, and*  
*the economic, social, cultural and environmental outcomes sought by the local community, tangata whenua and the national community.*

*Decisions should allow water users the opportunity to achieve objectives in the manner most appropriate to the circumstances.*

Every catchment has different systems, demands, availability, and community aspirations surrounding that water both within and across catchments. Every catchment should be managed in a way that suits its specific characteristics. Water management should be based on a whole-of-catchment approach. Once catchment objectives are agreed, land and water users should be given the opportunity to ensure their impacts on



quantity and quality are minimised, remedied or mitigated to achieve these objectives in the manner appropriate to the circumstance

**4. Derogation of Use Rights and Equity-** *Where an explicit or implicit entitlement (e.g. a property right acquired on purchase of property, by way of a historical use right, or a permit) to make use of or store water or rainfall is derogated, the impact on those whose entitlement is affected should be recognised through appropriate compensation. The nature of this compensation could include direct payment, remedial measures, assistance, or phasing in of new requirements. The degree and extent of any compensation should take into account impacts on existing investments resulting from the change in entitlement.*

*Actions taken to mitigate or remedy the cumulative environmental impacts of past land management practices must consider inter-generational equity and recognise the lag time of physical and biological systems.*

**5. Use of Science in Decision Making-** *Water management decisions should be informed by the best available peer reviewed science. Where the science is either lacking or not widely agreed upon the decision making process should;*  
 - *take this into account, especially with regard to the extent of the consequences of the decision on those involved,*  
 - *be flexible to take on changes in knowledge, and*  
 - *be partnered with a process to gather the required information/science.*

**6. Management Tools and Infrastructure-** *When identifying suitable mechanisms to achieve agreed water management outcomes all available management tools should be considered. These may include the development of infrastructure that allows the storage of water to manage time based issues, or that allows water to be moved within or between catchments to address geographical issues.*

## Code of Practice and Design Standards - Briefing

Rapid irrigation development has taken place in New Zealand, particularly towards the end of the 20th century, with increasing levels of investment in irrigation systems and irrigation research being made. In general, irrigation has been highly successful and has driven agricultural expansion in the drier areas, improving and sustaining the general well-being of rural communities – something that would not have been possible without irrigation. However, some irrigation systems have underperformed in economic terms, and independent irrigation audits have highlighted shortcomings in irrigation system design and management. Reasons for this include:

- Unrealistic expectations by the owners at the system appraisal stage
- Capital cost over-runs;
- Substandard design and installation;
- Poor irrigation system management and service provisions;
- Poor understanding of client priorities and needs.

In addition, water regulators (Regional Councils), government agencies, the agricultural community and the general public have become more aware of potential adverse effects of irrigation on water quantity and quality. Increasing pressure is being placed on irrigation owners to lift the level of economic and environmental performance.

Where failures of irrigation systems occur, the cost can be high, with significant production and economic consequences of failure. Environmental failures of irrigation systems could also have very detrimental effects on the sustainability of irrigated agriculture. Poor environmental performance could lead to loss of water supply. Failure to demonstrate environmental responsibility could lead to loss of local and international markets for produce.

Because there are no performance standards of codes of practice for irrigation system design in New Zealand, Irrigation New Zealand, as part of its charter to promote economically and environmentally sustainable irrigation, has taken a proactive step and initiated the development of irrigation system design performance standards and a code of practice. Development of the code has been financially supported by MAF Sustainable Farming Fund.

### Purpose of Standards

Irrigation New Zealand's aim is to improve the efficiency and sustainability of use of water, energy, labour and capital in irrigation systems in New Zealand. To meet this aim with respect to irrigation design and a code of practice, four key developments have to be completed as follows:

1. Key performance indicators (KPI's) for irrigation systems and minimum acceptable standards for the KPI's.
2. An Irrigation Design Code of practice, that, with the KPI's, describes the minimum acceptable design practices for the irrigation industry.
3. An industry recognised designer certification programme.
4. NZQA recognised unit standards for the training of irrigation designers to the standard required to achieve the standing of Certified Irrigation Designer.

An irrigation system design that is completed in compliance with the Irrigation Design Code of Practice will, among other things:

- Explicitly state what KPI values will be achieved using this design, if the specified equipment is installed correctly.
- Give sufficient details on what to measure and where, throughout the irrigation system, for the purchaser or a third party to verify that the system is delivering the KPI values designed for – and paid for.

### Context of Design Code of Practice

The Irrigation Design Code of Practice describes the procedures that irrigation designers must follow to meet the required performance standards. It uses the KPI's to focus the design process of planning, design, implementation and operation of an irrigation system on outcomes that will meet a specified level of performance. To determine whether the performance standards have been met, an evaluation process will be required, to compare the specified design performance standards with the values actually achieved in the field. This evaluation process will measure outputs to enable the actual KPI's to be calculated. Without tools to assess actual system performance irrigators and other stakeholders are not able to determine or benchmark performance.

In parallel to the Design Code of Practice, a Code of Practice for On-Farm Irrigation Evaluation has been developed to provide guidelines for irrigators and others undertaking evaluations of irrigation systems in the field. It makes recommendations for planning and conducting evaluations and reporting on the performance of irrigation systems and their management.

The Evaluation Code has been developed with reference to the NZ Code of Practice for Irrigation Design, international practices and standards. The main aim of the guidelines is to encourage adoption of standardised evaluation practices that are cost-effective, recommendation driven and encourage more efficient use of irrigation resources. Its focus is on water application efficiency, but other key performance indicators are addressed.

The Code of Practice does not, at this time, carry any legal status. Its development has been led by Irrigation New Zealand Inc, with input and support from irrigation experts and the irrigation industry. Its adoption and implementation are voluntary. Standards and guidelines from other Codes of Practice that are referenced within the Code are overseen by the relevant issuing authority. The International Organisation for Standardisation (ISO) has responsibility for the International Standards published under their name. The code applies only to the design of irrigation systems. It does not cover irrigation equipment manufacturing or quality standards

### How should the Code of Practice be used?

The document includes what designers must aim to achieve, why they must achieve it, when and where should it be achieved, and how can they make it happen. Specific technical data is provided to help in this respect.

The Codes of Practice section includes the design process section, provides general design approaches and what should and shouldn't be done.

The Design Standards section is grouped into relevant sections to make it easy for designers to look up a specific standard without going through the whole document.

The Design Performance section lists the outputs expected for the design so that designers have a structured output on which to base their designs. Purchasers know what performance their system is supposed to deliver and the relevant indicators can be calculated during a design evaluation.

As far as possible the expected standards are real, achievable and measurable or assessable limits.

## Farmer initiative launches into electromagnetic meters

Canterbury Water Meter directors Gary Wilson and Ross Polson began importing SeaMetrics electromagnetic meters after extensive research of the various types of water meters and the pair is convinced that the electromagnetic meters are superior to other types of water meters.

The first few water meters were imported on behalf of farmers but following a visit by Wilson to SeaMetrics in Seattle, USA, a more formal relationship has been formed.

SeaMetrics has been manufacturing water meters and data loggers since 1990 and Wilson was particularly impressed with several features of the SeaMetrics water meters.

The meters have been internationally tested and are fully compliant with Environment Canterbury requirements.

Canterbury Water Meters is importing the SeaMetrics AG2000 models which are supplied in pipe sizes of 100, 150, 200 and 250 mm. These sizes will cover the majority of irrigation and cowshed water takes.

The meter comes with a built in pulse output for data logging or telemetry.

SeaMetrics also manufacture data loggers with the ability to store 12 months of irrigation data.

Canterbury Water Meters Limited is a young business which has evolved due to the expected compliance of irrigation water meters.

The "Proposed National Environmental Standard" (for Water Measuring Devices) as written by the Ministry for the Environment, indicates that enforcement is likely to begin in 2008.



*Water metering policy prompted specialist water meter business*



*SeaMetrics electromagnetic meter – internationally tested and Environment Canterbury compliant*

Wilson and Polson believe a specialist water meter company will be attractive to the market.

They believe the market at present has a relatively low understanding of irrigation water metering and the various aspects of the different types of meters and data loggers.

To date the company has installed water meters in both underground water take systems and also pumping systems using irrigation ponds (irrigation schemes) as their water source.

Canterbury Water Meters has enjoyed an excellent support system from SeaMetrics USA and also their Australian distributors.

Canterbury Water Meters personnel have an excellent knowledge of their product and are happy to talk to farmers who are thinking about water meters.

SeaMetrics give a 2 year guarantee of their product.

Bernard Davidson has recently been appointed as sales and marketing manager to help position the company to provide Canterbury farmers with a high quality product at a competitive price.

Canterbury Water Meters has the ability too organise the installation of the water meters, data loggers and telemetry systems.

The business has been accepted as a card supplier to Ashburton Trading Society (ATS) and looks forward to working with ATS members throughout Canterbury.

Further information can be obtained at [www.seametrics.com](http://www.seametrics.com) or by ringing Gary Wilson 0274 582 114 or Bernard Davidson 0274 346 226.

## NRRP Canterbury Hearings

At a recent Natural Resources Regional Plan (NRRP) hearing on water augmentation policy a working group (Water Resources Working Group) was set up to enhance the effectiveness of hearing submissions on those parts of the NRRP which have the potential to hinder the development of water augmentation/storage projects. As well as Federated Farmers and Irrigation New Zealand, membership of the working group includes most district councils in the region, the Ashburton Community Water Trust, RDR Management Ltd, Irrigator Forum, TrustPower Ltd, Hurunui Community Water Development Project Working Group, and Waimakariri Irrigation Company. The hearing in July was directly relevant to the development of

water augmentation projects. Ashburton mayor Bede O'Malley presented evidence on behalf of the Water Resources Working Group. This was followed by evidence from members of the working group in their capacities as individual submitters, including Rupert Curd and myself on behalf of the Combined Canterbury Provinces of FFNZ. We received a good hearing, and I think the coordinated approach, from a substantial number of interested organisations, had a strong impact.

Issues covered included:

- Transfer of water between water bodies
- Effects on existing abstractors

- Flow management from augmentation/storage schemes
- Role of ECan in facilitation of water augmentation/storage projects
- The need to demonstrate benefits before augmentation can proceed – need a balanced, broad-perspective approach when considering benefits
- Water quality in storage lakes and downstream water bodies
- Effective and efficient use of water

*Lionel Hume – INZ Board member, Federated Farmers policy analyst*

## Promoting efficient, profitable, sustainable irrigation - PEPSI seeks monitor farmers

### Introduction:

Efficient and effective irrigation depends on having regularly updated information on soil water content, the rate of soil water depletion, and the ability to estimate when the next irrigation will be required and how much water to apply.

Farmers who use irrigation scheduling services or their own monitoring equipment consistently report higher yields, better quality and lower water use than they achieved without the information.

Such farmers probably number less than 15% of those holding consents to take water for irrigation.

Recent technological developments make it possible for farmers to monitor, in real-time, soil moisture content and the rate of soil water depletion.

The cost of doing so, either by installing and operating their own equipment or by using a service provider, is now low compared to the financial benefits of improving irrigation efficiency. There is now a significant gap between what is readily achievable, at a realistic cost, and what the majority of farmers understand is achievable.

The overall aim of the Promoting Efficient Profitable Sustainable Irrigation (PEPSI) project is to raise farmer awareness of and knowledge about the monitoring tools available for improving irrigation efficiency and how to use them effectively.

The benefits to farmers of adopting these tools will be greater profitability and reduced risk of failing to complying with consent conditions that limit seasonal water use.

### Project Objective:

To promote improved irrigation efficiency and profitability by providing farmers with the know-how needed to acquire and use real-time information on soil water deficits and the rate of soil water depletion, and by providing internet access to "best practice" irrigation manage-



*Efficient and effective irrigation depends on measuring soil water content*

ment information.

The use of measured soil moisture levels in irrigation decision making is one of the keys to improving profitability and reducing environmental impact. Routine measurement of soil moisture levels is provided by irrigation scheduling services (neutron probe based services), some regional councils and at several suppliers of environmental monitoring equipment. Some sources of real-time soil moisture information provide web access to data but the uptake of such services is not great.

### Project Plan:

Main aims are to increase the number of farms using real-time soil moisture monitoring systems.

This will be achieved by:

- Preparing eight success story articles suitable for use by the media about the benefits of soil moisture monitoring.
- Supplying articles to rural newspapers and sector magazines
- Preparing a brochure which includes basic instructions and a simple tutorial on how to use real-time soil moisture monitoring. Available in hardcopy and on web.

- Promoting real-time soil moisture monitoring to potential advocates and partners.

- Direct marketing to irrigation equipment suppliers and soil moisture sensor suppliers, Promoting a series of Irrigation Management Training Courses and Workshops in Otago and Southland.

### Summary:

Efficient use of irrigation water is crucial to making optimum use of water in drought prone areas.

Over recent years various MAF funded projects have provided practical methods for improving irrigation efficiency. They make it clear that most progress can be gained when continuous

soil moisture data is available to guide irrigation decision making.

Projects such as regional strategic water studies are sizing storage reservoirs needed to better match supply and demand. The storage size estimates assume irrigation will not occur when it is not needed, that is, that best-practice irrigation is widely implemented.

Real-time soil moisture data will help avoid over irrigation and premature depletion of storage reservoirs (including groundwater), thereby maximising benefits from these capital intensive water resource development projects.

The potential for improving irrigation management through making use of real-time soil moisture and irrigation management information has been demonstrated by leading farmers. However this potential for water savings and increased profitability will remain largely unrealised until real-time soil moisture monitoring is used widely.

This project will promote uptake through a combination of workshop/training courses and promotion.

*Farmers interested in taking part in this programme should contact Ian Brown at Ian Brown Consulting - Phone: (03) 338 5532 Email: [ian@ibconsulting.co.nz](mailto:ian@ibconsulting.co.nz)*

## Canterbury groundwater allocation limits

Submissions on Variation 4 of Canterbury's NRRP closed on August 3. Its main purpose is to change Schedule WQN4 of the plan, to include specific groundwater allocation limits. Until now schedule WQN4 has contained methods for calculating groundwater allocation limits based on land-surface recharge. Environment Canterbury's estimated allocation limits have been have been tabled separately from the plan on their

website. The purpose of the variation is to place specific groundwater allocation limits for each groundwater zone in Schedule WQN4. Environment Canterbury state that this will give more certainty to consent holders and consent applicants. One disadvantage is that it will be more difficult to change the groundwater allocation limits in the light of new information - changes will require a plan variation. Federated Farmers of

NZ and Irrigation New Zealand have both submitted on Variation 4.

Submission points included: Groundwater allocation limits better tabled outside the plan so that they can be more readily updated in the light of new information. Groundwater allocation limits based on recharge, using ECan's methodology, are too conservative. Double counting (in both the surface and groundwater allocation

blocks) of stream depletion effects in intermittent and spring-fed streams should only be done where the flows in such streams are counted as groundwater recharge. Restrictions and consent reviews should not be based on numbers in the new Schedule WQN4, which is not considered to be sufficiently reliable for this purpose.

**Lionel Hume – INZ Board Member, Federated Farmers Policy Analyst**

# Micro-sprinkler orchard irrigation performance

**Clean your filters, check your pressures, check your sprinklers. Know what pressures and flows should be...**

Two suspended mini-sprinkler irrigation systems on pip and stone fruit orchards have recently been evaluated. The results were variable and highlighted a few issues that warranted attention.

The evaluations indicated that with some simple changes the systems could irrigate crops effectively and efficiently.

The evaluations were part of a series being conducted under a Sustainable Farming Fund Project supported by Hawke's Bay Regional Council, Pipfruit NZ and Summerfruit NZ. The project investigated the performance of a range of irrigation system types used on apple and stonefruit orchards in Hawke's Bay.

Reports from other system types will follow in coming months. The findings are likely to be relevant to other regions where orchards are using similar irrigation systems.

## Why evaluate?

The purpose of an on-orchard evaluation is to assess current performance, identify issues detracting from best performance and to propose actions that can improve performance. Performance includes evenness of watering, adequacy of watering, and efficiency of water and energy use.

Evenness of watering is important if each plant is to receive the same (correct) amount of irrigation. It depends on having the correct combination of sprinkler or emitter performance, spacing and run times.

Adequacy of watering considers whether each plant gets enough water and if enough of the potential root volume is irrigated. If the system can apply water evenly, adequacy depends mainly on scheduling decisions and the system's capacity to 'get around' the whole area fast enough.

Efficient water use is determined through estimation of losses. These are predominantly related to uneven watering and excessive irrigation run times. Minor losses result from system leakages or off-target applications.

Energy efficiency is dependent firstly on watering efficiency – there is no benefit from pumping water that is not used by the crop.

The second factor relates largely to system design issues – are the pipelines correctly sized to minimise friction losses at reasonable capital cost? And thirdly, has the right pump and motor combination been selected to drive the whole



*Sprinkler performance was responsible for about one quarter of the watering variation*

system? Sadly, many studies have shown this is not the case – oversized pump units are common.

## What did we find?

The potential application efficiency was lower than can be achieved by such systems. It is reasonable to expect over 85% of water applied to be available to the crop when using micro-irrigation. On the day we tested, the potential application efficiency of these systems was about 60%.

The main reason for lack of performance was lack of uniformity, i.e. uneven application. As noted, evenness depends on several factors, so what was going on here?

Orchard 1's irrigation system is nine years old. The water supply is reasonably clean, and a tubular screen filter is cleaned regularly.

The Orchard 2 irrigation system is similar in age and water quality to Orchard 1. A disk ring filter is installed but was not clean when we checked the system. A quick clean and the difference reduced pressure losses from 195kPa loss to 60kPa loss. This represents a very significant energy saving, and is likely to be affecting system performance as well. Better cleaning would reduce this still further.

## Sprinkler performance

Sprinkler performance was responsible for about a quarter of the watering variation in Orchard 1 and over half the variation in Orchard 2.

We selected areas we thought likely to be the cleanest, dirtiest and somewhere in between.

The clean area had very even flows, with a little more variation creeping into the average area. By contrast, the dirty area showed a lot of variation with some sprinklers obviously

blocked and the whole area running at a lower output rate. The reason for the overall low output is mainly a lack of pressure getting into that area.

Orchard 1 had 'flow regulated' sprinklers. These were designed to keep a steady flow so long as the pressure was within a certain band. We tested the flows of a group of sprinklers at different pressures and found flow changed considerably. It is possible that the diaphragms have aged and no longer have the flexibility needed to regulate flow.

The clean area had more variability than Orchard 1 but was still within acceptable levels. The dirty area showed more variation, and the flows were much higher than in the

clean area. The flows in the average area showed two quite different flow regimes. Some were similar to the clean area, and others similar to the dirty area.

The system design (apparently) specified 'anti-misting' bases on the sprinklers. These use pressure reducing plates whose small orifice causes a reduction in flow. The bigger orifices in the sprinkler nozzles produce larger droplets at the lower pressure.

Somewhat typically over time many of the anti-mist bases have been lost. The results reflect two different nozzle combinations.

## Pressure performance

We tested the pressures in laterals at six points in a number of sub-blocks on each orchard. And we measured how flow varies as pressure varies to determine sprinkler pressure flow characteristics. By combining these we were able to calculate what flows should be at each sample point.

Pressure variation was the cause of about two fifths of the variation found in Orchard 1, and one sixth in Orchard 2.

In thirteen sub-blocks on Orchard 1 we found inlet pressures ranged from 95–360 kPa. Within blocks some points had pressures as low as 55kPa. It seems certain that pressure is available but probable that pressure regulation at block take-offs needs some maintenance.

Big differences between the first and last sprinklers on a lateral indicated high pressure losses along a lateral. This could be due to elevation changes, blockages or leaks, or undersized lateral tubing.

Continued on next page..

## Unequal plant spacing

The third contributor to uneven watering is variable plant and sprinkler spacing. The water use from an orchard with full canopy is pretty much the same, regardless of the number of plants.

One hectare of closely planted small trees will use very much the same volume of water as a hectare of larger trees planted further apart. In both cases, around 50m<sup>3</sup>/ha of irrigation will replace 5mm of evapotranspiration losses.

It is common for orchard tree and row spacing to vary between varieties and rootstocks. If the system is set up with one sprinkler per tree, there will be different

numbers of sprinklers in a hectare of irrigation. If all the sprinklers are the same, the flow per hour going on to the different areas will also be different.

To avoid some plants getting too much irrigation, and others not enough, the areas with different spacing should be irrigated for different durations.

In both orchards different spacing would cause almost one third of the non-uniformity of watering if all blocks were irrigated for the same length of time. But by adjusting the irriga-



*Variable plant and sprinkler spacing is a significant contributor to uneven watering*

tion duration appropriately this can virtually be eliminated.

### Conclusions

The irrigation performance on both orchards can be significantly increased quite easily. A few simple adjustments to systems and their management will make a big difference.

In the case of Orchard 1 the first task is to set the pressures going into each block to the same level. With pressures corrected the flow from individual sprinklers should be within accept-

able limits. The second thing to do is schedule irrigation for each block according to its sprinkler spacing and flows.

On Orchard 2 the first task is to clean the filter and to ensure the sprinklers have the correct bases. It may not matter too much if they have anti-misters or not so long as they are all the same in any particular block. The second task is to set block pressures to be even. While the irrigation system does not have pressure regulators it is possible to adjust the pressure at the solenoids on the block off-takes.

The third task is to adjust the watering time in each block to take account of the different sprinkler spacing.

In all cases, it is essential to know what the system and block pressures and flows should be when the system is operating correctly. Any deviation indicates something is not right and needs to be investigated. Get a water meter, get pressure points and gauges and get a logbook to record your results.

*Article published with the assistance of The ORCHARDIST and Page Bloomer Associates*

## Changes to groundwater allocation limits

Environment Canterbury has made changes to some of its groundwater zones. This has resulted from the need to incorporate new groundwater allocation limits into its proposed Natural Resources Regional Plan (NRRP).

This affects the further allocation of groundwater in many places, but should not affect anyone with an existing consent to take groundwater.

Some groundwater zone boundaries have been altered to align with the latest information on geology, water catchment (ie the rainfall which replenishes groundwater) and recharge areas. Where a zone boundary has been altered, the availability of water in those altered zones will also have changed.

The following is the proposed - submissions have now closed

**Mid Canterbury** - the Mayfield-Hinds groundwater zone has increased in area, increasing water availability. This corresponds with a reduction in the area and allocation limit for the neighbouring Valetta zone. A review has been carried out for the Selwyn-Waimakariri zone leading to a reduction in the allocation limit previously estimated for this zone.

**South of Timaru** - the boundaries for all zones have been redefined and of the seven South Canterbury zones, water is still available for allocation in five. Three new zones have been created from the former Waihao-Wainono zone. The new Pareora zone has increased in area but the amount of water available is less - there is sufficient water for existing consent-holders and for pending applications. Beyond that, it is considered fully allocated.

Allocation limits for the former Waitaki, Hakatamea and MacKenzie groundwater zones are no longer relevant. Water allocation in those areas will be determined according to the Waitaki Catchment Water Allocation Regional Plan. Part of the old Waitaki groundwater zone falls outside the Waitaki catchment boundary and has formed the new Whitney Creek groundwater allocation zone.

Environment Canterbury's website has been updated to show the exact nature of the changes to groundwater zone boundaries and to allocation limits. See:

<http://www.ecan.govt.nz/Our+Environment/Water/Groundwater/Groundwater+Allocation/Latest-Groundwater-Allocation.htm>

# Association News & Updates

## 2007 AGM – Ashburton, October

**Milestone for irrigated agriculture** - NZ Irrigation Code of Practice and Design Standards – Officially launched by the Minister of Agriculture Hon Jim Anderton in Wellington on September 11.

**South Island roll out of NZ Irrigation Code of Practice and Design Standards, combined with INZ 2007 AGM - October ? - Ashburton**

**Didymo** – The government has approved funding of \$13.3 million over the next four years for a long-term management programme for didymo. INZ will have representation on the steering committee for didymo management.

**NRRP** – INZ has formally submitted on WQN9 and Variation 4, fixed allocation limits, and supported a joint submission from local government on water storage exclusions.

**Audited Self Management** – Chief executive Terry Heiler has signed the contract for the project and meetings held with ECan to discuss their role and contribution. ECan has provided a dedicated resource care staff member to assist INZ in the project. Meeting also held with the South Canterbury Water Enhancement Group to gain support for the project from a local level. Inaugural report due December 31.

**Lowland streams** - The current plan is to hold meetings with consent holders around 10 or so cluster groups starting in October. INZ understands that a detailed technical update of information will be sent to all consent holders in the next month.

**Pipes and open channel systems** – A major piece of work supported by the SFF and the industry has been completed and will be available on the INZ website in the near future. This investigation provides the basis for determining the economic and other pros and cons of piped versus open channel distribution systems.

**NZ Hydrological Society** – Water and Land 2007 conference November 20-23, Rotorua

**Irrigation Manual** – The pdf version of the manual is now on the web [www.irrigationnz.co.nz](http://www.irrigationnz.co.nz) .

**Drip Feeds** – These continue to be produced on a regular basis. The purpose of the Drip Feed is to keep members updated with industry developments and issues. Drip Feeds can be accessed on the website. Scheme members – wishing to receive the Drip Feed need to supply INZ with an email address as scheme members are not individually recorded in the membership data.

**Communications** - It is clear that efficient and timely communications with members continues to be critical. We need an email address from ALL members who can get access. Get on to [www.irrigationnz.co.nz](http://www.irrigationnz.co.nz) and register all of your details.

**Website** – News, Key Water Issues, Newsletters, Drip Feeds and INZ updates are regularly posted on the site. With a large and growing membership INZ is promoting its website as an integral means of communication. [www.irrigationnz.co.nz](http://www.irrigationnz.co.nz).

## INZ Executive Board contact details

Name	Work Phone	Home	Fax	Mobile	Email	
<b>Chief Executive</b> Terry Heiler	03 3478365		03 3479280	021 388 867	heiler@xtra.co.nz	Executive
<b>Chairman</b> Graeme Sutton	03 5441981	03 5441981	03 5441982	0274 449673	graeme.sutton@xtra.co.nz	Executive
<b>Vice Chairman</b> John Donkers	03 6937438	03 6937505	03 6937458	0274 397108	dfms@netaccess.co.nz	Executive
Peter Scott	03 6147447	03 6147447	03 6148299	0274 916413	scottpj@xtra.co.nz	Executive
Lionel Hume	03 3078154			0274 394211	lhume@fedfarm.org.nz	Executive
Mark Slee		03 3037147		027 6327305	slee@xtra.co.nz	Executive
Stephen McNally			04 9138531	027 278 3675	stephen.mcnally@opus.co.nz	Board
Ian McIndoe	03 3253782	03 3478532	03 3253781	021 478532	i.mcindoe@aqualinc.co.nz	Board
Dave Attewell	03 6883383	03 6862772	03 6881187	0274 322259	dave@attewell.co.nz	Board
Dan Bloomer	06 8356800	06 8356800	06 8356800	021 356801	dan@pagebloomer.co.nz	Board
Hugh Ritchie	06 8568279	06 8568279	06 8568056	0274 441224	hughrit@xtra.co.nz	Board
Phil McKendry	03 3021712	03 3021712	03 3021712	027 6724022	pjmckendry@xtra.co.nz	Board
Sue Scott		03 4492 768		027 272 3148	siscott@xtra.co.nz	Board
<b>Administration</b> Pat Brown	03 379 3820		03 372 3520		admin@irrigationnz.co.nz	Admin
<b>Newsletter Editor</b> Annette Scott	03 308 4001			021 908 400	annettescott@xtra.co.nz	Editor

[www.irrigationnz.co.nz](http://www.irrigationnz.co.nz)