

**Centre pivot  
and lateral move  
feature**

**Irrigation Australia  
training  
goes virtual**

**VRI upgrades  
provide water and  
energy savings**

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REPORT IDENTIFIES A WAY FORWARD FOR MDB  
CHICKPEA YIELDS BOOSTED BY SUBSURFACE IRRIGATION  
PLANNING AND COMMUNICATION KEYS TO SUCCESSFUL PROJECT

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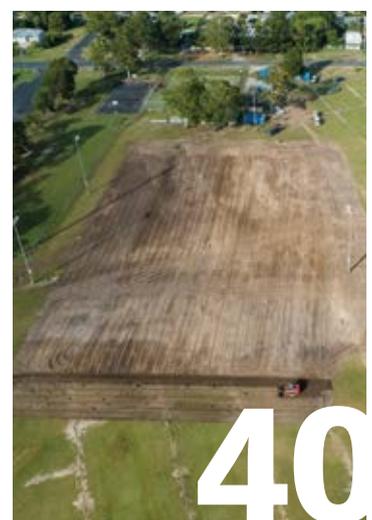
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**ON THE FRONT COVER:**  
A recent installation at Iluka on the north coast of New South Wales presented some technical challenges for Think Water Northern Rivers, as described in Contractors' Corner (pages 40 to 42). Site project manager from Synergy Resource Management, Greg Linsley-Noakes, checks a newly installed sprinkler. Photo: Jayne Rothwell



# Virtual Webinar Training Courses

Due to the current COVID-19 situation and the recent changes to working arrangements and travel restrictions for all Australians, Irrigation Australia has adapted to the challenging circumstances and we will now be offering Nationally Accredited training courses via a Virtual Video Conferencing Platform.

This means you can complete training whilst at work or in the comfort of your own home! We will be delivering the classroom components via Virtual Video conferencing; as if we were physically in the classroom. Students will be required to have access to a computer or tablet fitted with a camera and microphone.

You will be able to interact with your trainer and other students on your screen and be guided through the assessments and activities. The trainers will demonstrate practical exercises and then you may be required to replicate the same activity in your home or work environment and record what you do with a video recording device (mobile phone) etc.

For some of our training courses, students will still be required to attend face-to-face training to carry out the relevant assessments to complete the final practical components of some competencies (dates yet to be determined following government advice).

## Study for the new “Irrigation Trade”

We will be offering some competencies for the new “Certificate III in Irrigation Technology AHC32419” (Trade Level) training course through this new platform.

### Online Training Courses

1. Certificate III in Irrigation Technology (AHC32419)\*
2. Certificate IV in Irrigation Management (AHC41119)\*
3. Irrigation Pumps & Systems | \$820 NOW \$750
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7. Introduction to Irrigation 'Agriculture' | \$820 NOW \$750
8. NEW - Principles of Irrigation (Online Only) | \$99

On completion of the course, students will receive a Certificate of Completion

\*Students will be required to attend face-to-face training to complete the practical components of the course. Practical assessments will be held in each state at a future date.

To register your interest in any of the above courses call Kahla McKinless on 0430 002 524, or Geoff Harvey on 0418 888 876 or email us at [training@irrigation.org.au](mailto:training@irrigation.org.au)

### UPCOMING TRAINING COURSES DATES

[www.irrigationaustralia.com.au/training](http://www.irrigationaustralia.com.au/training)



## CHAIRMAN'S MESSAGE

While almost everyone will have experienced some negative impact of the COVID-19 pandemic, even in these challenging times we can find some positives. One of these is adaptability.

On a global scale, we have seen car manufacturers such as Ford, Tesla and GM adapt rapidly in response to need, making ventilators for hospitals. On a more local scale, we've seen companies such as distillers adapt their production to address the shortage of hand sanitiser. These responses demonstrate that organisations are not always permanently structured around predictable, repeatable outcomes, but can in fact be very adaptable in the face of significant need.

The same is true of our industry, where adaptability has had to be embraced for business to continue, even in a modified fashion, including:

- the use of video conferencing to replace face-to-face meetings
- irrigation businesses managing social distancing and upgraded hygiene practices
- working with split teams of office and field crews
- dealing with inter- and intrastate and international border restrictions
- working much more than normal from home or mobile offices.

Another positive outcome arising from these times is that the importance of the Australian agricultural sector to the social and economic wellbeing of all Australians has been reinforced, as farmers have proven their capacity to maintain supply in the face of massive challenges.

The team at Irrigation Australia has certainly demonstrated their adaptability over the past two months. As many members would be aware, face-to-face training is a key service that members seek from their industry organisation. Responding to restrictions imposed because of the COVID-19 pandemic, the Irrigation Australia team have rapidly converted as much training as possible to virtual, online delivery. We've been very pleased to see the take up of training opportunities during this time.

Irrigation 2020 - our world-scale conference originally scheduled for September this year – has also had to adapt to the COVID-19 situation. We are now able to look forward to this event occurring in Sydney in July 2021. This should be a fantastic opportunity for the Australian and international irrigation industry to come together in one place under much happier (and healthier) circumstances.

These are challenging times for everyone, and your Irrigation Australia board is very appreciative of the government stimulus packages, which provide short-term relief from the economic impact of the pandemic. We look forward to a return to more normal business operating conditions later in 2020.

We are approaching the time when a significant number of Irrigation Australia memberships are due for renewal. We have endeavoured to minimise the impact of the renewal by offering quarterly payment arrangements. In these difficult economic times, the future of your

association depends on your support more than ever before.

Finally, on behalf of the board and industry we extend our sincere thanks to director Peter Weaver, who has secured new employment outside the water industry and has thus resigned from the Irrigation Australia Board. Peter brought his extensive water industry and management experience to the board; we thank him for his contribution and wish him well in the future.

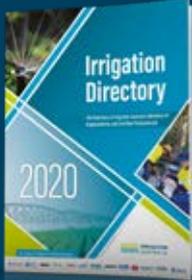
**Andrew Ogden**  
Chairman



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# WELCOME



## FROM THE CEO

Welcome to this first digital edition of the Journal. While the decision to publish both *Irrigation Australia* Journal and *The Overflow* in a digital format was a direct result of COVID-19, it does bring a number of benefits for both our readers and advertisers, including:

- greater audience reach – our circulation will increase each quarter by several thousand readers, both individuals and in organisations, which is good news and provides better value for our advertisers
- convenience – both publications can now be read on PCs, tablets and phones.

We hope you enjoy the new format!

### COVID-19

COVID-19 is a word that wasn't in our vocabulary a few short months ago and is something that we never saw coming.

There is no doubt that the past few weeks have been some of the toughest Irrigation Australia has faced from a business and social point of view. These challenges are insignificant, however, when compared to the heartbreaking loss of life and economic damage caused by this wretched virus in almost every country.

As an organisation we are very mindful that some of our members are experiencing far greater problems than us and our thoughts are with them. We have modified our business membership categories to allow for quarterly payments if required, and we encourage any members who are experiencing financial hardship as a result of the impact of the virus to contact us to discuss ways of maintaining their membership.

A decision was made in March to postpone our 2020 conference and exhibition to next year, an outcome that everyone involved in this event since 2016 was very disappointed with. We were fortunate to secure alternative dates in July next year at the same venue and the work on organising it will continue in earnest from later this year.

We are entering a period where many memberships will be due for renewal and, now more than ever before, we will depend on your continued support. Management and your board remain passionate about our important industry and your support enables us to continue to provide leadership, training and industry programs. Some examples of how Irrigation Australia has been working on your behalf in recent months include:

- the establishment of the new Irrigation Technician trade
- communications with the National Cabinet to ensure members keep uppermost in their minds that the irrigation industry is essential to Australia's economy
- conversion of our training suite to virtual online delivery to accommodate current social distancing measures thus permitting members to upskill from the comfort of their home or office and allowing students to keep their training up to date
- transforming our serial publications to digital format, ensuring easy access for all members and the wider industry so they are able to keep abreast of the latest trends and technologies in the irrigation industry. While these are challenging times,

as an organisation we look forward to better times ahead and some positive announcements in due course.

### Like to provide feedback or ask a question?

It is important that communication is a two-way process and we invite any member who wants to provide an opinion piece, feedback or ask a question to submit a Letter to the Editor. Publication is at the discretion of the editor but we welcome contributions and will provide answers to technical questions from our member experts. Contact details for our editor are at the back of the Journal.

Finally, and most importantly, Irrigation Australia remains open for business and ready to help you with any irrigation related matters that arise. Stay safe!

**Bryan Ward**

CEO

# NEW Rotor Rain<sup>®</sup> Plus



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## PROGRAM INVESTIGATES THE INNOVATIVE USES OF IRRIGATION

### SNAPSHOT

- Since 2017, SA Water has been trialling sensors and smart software at Adelaide High School as a way of demonstrating water savings.
- The system was a manual one in the first two years where a manager entered days to water based on a seven-day weather forecast and information from the soil sensors
- In the first year of the trial, water use at the school decreased by 15 per cent.
- The trial is also showing the local community that green space can be maintained without applying a lot of water.
- SA Water is also testing irrigated green space as a way of mitigating heat effects at Adelaide Airport.

The aim of SA Water's Liveability program is to promote liveability in urban areas by improving outdoor and open spaces and, at the same, time ensuring water use efficiency.

Three years ago, SA Water began a trial with Adelaide High School to improve water use efficiency on its ovals and demonstrate to the community that conservative irrigation can maintain turf quality. One oval at the school is classed as being premium as far as turf standards are concerned, one is classed as sub premium, where turf is of high quality, while turf on the other two is not managed to reach these higher standards.

The original project focused on the use of a smart water meter, soil moisture probe and a link to the SWAN Systems' irrigation scheduling software. This was an effective irrigation solution, but still required manual intervention to set the irrigation control system to deliver the scheduling outputs from the SWAN software. In early 2020 an Aquamonix automated irrigation control panel was installed to enable the SWAN Systems' software outputs to be automatically programmed into the irrigation control system and turn the irrigation equipment on and off according to the schedule. The sub-premium oval is controlled by the system, however, the irrigation schedule information can be used to inform the irrigation requirements for the other three ovals at the school.

SWAN Systems is an irrigation and nutrient management solution that informs turf managers when to apply water and nutrients to their ovals, and how much to apply to maintain required turf quality. It is provided to users as a cloud-based Software as a Service (SaaS) solution. For this trial, the focus was on optimising water use by providing information to the

user to enable them to apply the right amount of water at the right time, reducing water waste that can occur through over-irrigation.

Once the account was created, soil and agronomic characteristics were defined, virtual ovals mapped, and data feeds from the soil moisture probe, smart water meter, weather stations and satellite data established. This data, combined with local weather forecasts (obtained from Bureau of Meteorology forecast points) and predicted turf water needs, was processed using proprietary smart irrigation algorithms which determined how much water the turf required for the coming week.

As well as improving water use efficiency, Greg Ingleton, SA Water's business development manager for environmental opportunities, explained that an important part of the trial was to demonstrate to the local community that the quality of green space and the benefits this provides to the liveability of the community could be maintained without using too much water.

"This is an important message because there is still the temptation to use more water than is necessary in both residential applications and open green space," he said.

### The proof

In the first two years of the high school trial, the system was a manual one where the school's outdoor manager manually entered days to water using SWAN Systems' recommendations. These were based on a seven-day weather forecast and information from the soil sensors.



Image file of SWAN Systems dashboard screenshot over Adelaide High School cricket pitch. The coloured shapes overlaid on each oval represents the soil moisture level, and green is in the target moisture zone. The green icons with ticks on each oval represent the relative turf health from NDVI.

Cricket pitch on the oval where sensors were installed.



The IPOS (Irrigated Public Open Space) code of practice and guidelines, which were developed by SA Water in conjunction with the turf management sector and adopted by a number of local councils in South Australia, were used to develop an irrigation target based on maintaining a particular standard of turf quality.

This system proved its value in the first year, when the school saw water use drop by 15 per cent. According to Greg, it is common to see similar or much greater decreases in water use on public open space in trials initiated through the Liveability program.

“This indicates that there is considerable scope for more water savings without sacrificing quality,” he said.

The new Irrigation Plans Module in SWAN Systems formulates an optimum seven-day irrigation plan which takes into account a range of variables including the amount of water available each day, capacity of local infrastructure, soil moisture target for each park, and one-off special irrigation requirements. In addition, SWAN Systems is now able to work in concert with the Aquamonix irrigation controller. By working together, turf quality and soil moisture can now be monitored and managed remotely.

### Temperature an important part of liveability

As well as the benefits of green space through irrigation, another benefit of water use that SA Water has been investigating, in conjunction with Adelaide Airport, is the ability to reduce air temperature at the airport through efficient and effective irrigation.

Recycled water from SA Water’s nearby reuse scheme was applied twice a week at night to 4 ha of lucerne growing 600 m south of the airport’s runway to create a cooling effect.

A key finding was that the smart use of water to maintain soil moisture and vegetation health can reduce average ambient temperatures by more than 3°C on warm days. It can also potentially lower heat-influenced costs like air conditioning and aircraft performance.

“The extensive hard surfaces and cleared land around airports means they can often become sources of increased heat, which impacts both terminal and airside operations.

“In warmer, less dense air, planes must travel faster down the runway to produce the lift needed for take-off. When a runway lacks the distance required to reach these speeds, a plane’s weight must be lowered, or the aircraft needs to use more fuel, impacting commercial aspects of an airline,” Greg said.

Another benefit it identified was that the space can produce revenue-generating food crops – evolving historical land management practices. And SA Water is investigating the ability to create carbon credits from growing the crops, demonstrating carbon sequestration whereby the plants absorb CO<sub>2</sub> and use it as fuel for growth by locking it in the soil.

### The bottom line

An important message from these trials is that by taking advantage of developments in irrigation monitoring and decision support technology, we can apply it in urban landscapes to not only enhance the liveability and useability of green spaces but also to improve water use efficiency.

As well, the Adelaide Airport trial shows that irrigation can be used as a tool to manage the local environment to provide benefits such as heat mitigation and lower operating costs.



## VRI UPGRADES PROVIDE WATER AND ENERGY SAVINGS

### SNAPSHOT

- Since 2011, the Pye Group has gradually been upgrading its 56 centre pivots to VRI
- The process is not complete but the savings in water use and energy are justifying the investment
- EM and elevations surveys are used to identify variations in soils allowing for variable irrigation application rates to be programmed
- The biggest benefit is that the Pye Group is minimising waterlogging and runoff, which is a major contributor to both crop quality and sustainability.

The Mallee region in South Australia has long been renowned for potato production. A name that is associated with the industry and region is the Pye family, who established their vegetable growing enterprise in 1990. From small beginnings, the Pye family has developed the business so that it is now one of Australia's largest growers and packers of potatoes, carrots and onions. In 2009, the Pye Group from New Zealand, which had expanded into Australia in the 1990s and established Parilla Premium Potatoes, completed the acquisition of Zerella Holdings.

In 2011, the group began to convert its 56 centre pivots in the Mallee to variable rate irrigation (VRI). They convert two or three machines a year, which is an expensive exercise but one where the benefits are outweighing the costs.

In this article, Jaco Pauer, Irrigation Manager with the Pye Group, describes the challenges in doing this and the benefits in water and energy savings.

### Dune and swale landscape

The Pye Group grows carrots, potatoes and onions in the Mallee region, in the south-east of South Australia and at Virginia, near Adelaide. In the Mallee region it grows 1950 ha of potatoes, 425 ha of onions and 400 ha of carrots, which are irrigated by 56 centre pivots.

The crops are grown in sandy soils in a dune and swale landscape. Most of the pivots are situated in paddocks with a combination of high dunes of deep, free-draining sand, and flats and hollows of heavier soils comprising loam or clay or both.

This variation in elevation and soil type leads to challenges with irrigation application rates, scheduling and weather events. Crops growing in the lighter, free-draining sands typically require more water than those in the lower, heavy flats, a feature of which are waterlogged soils and boggy hollows. Irrigating at the same rate across the area results in lost crop because it is too boggy to harvest, and because of poorer quality produce in a wide area around the wet spot.

The aim of the Pye Group is to grow quality premium produce, which meant they had to rethink how they irrigated with their centre pivots to ensure optimum quality.

### Start with the soil

Because the soils vary so much, that is where the group started its investigations when upgrading the centre pivots.



Jaco Pauer, Irrigation Manager with the Pye Group, is overseeing the gradual conversion of its centre pivots to variable rate irrigation.



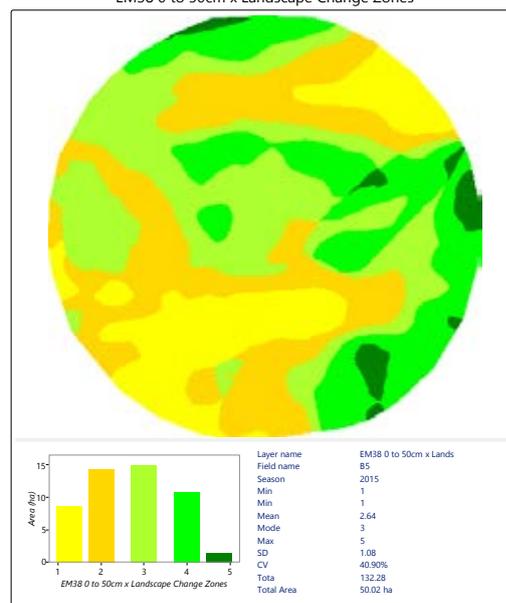
Upgrading centre pivots with variable rate irrigation technology has seen water use efficiency improve and energy costs decrease on the Pye Group's Mallee property.

The first step is to map the soils using Electromagnetic Induction (EM38) technology. This identifies conductive (heavier) soils and less conductive (sandier) ones. The EM maps are merged with elevation maps, which gives a starting point for a prescribed irrigation map. The map consists of five or six zones, each of which are assigned a different irrigation rate. Zone 1 (sand) has the highest application rate and Zone 6 (clay), the lowest. This irrigation map is then uploaded to the pivot panel.

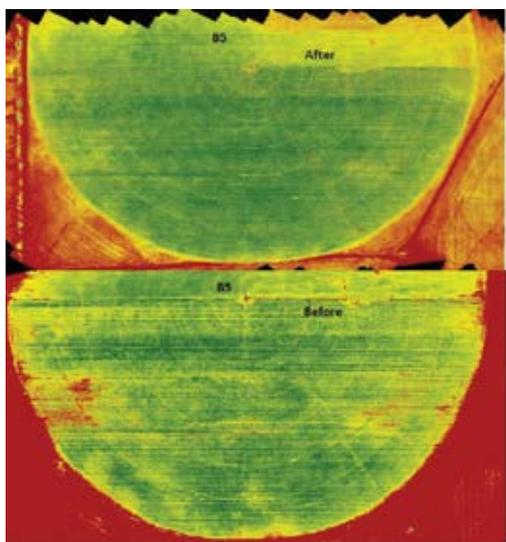
As a complement to the irrigation map, plant health is monitored using a fixed-wing drone with a Normalised Difference Vegetation Index (NDVI) camera. The data and imagery are processed in-house and can identify issues such as plants that are affected by over- or underwatering and other stress-related problems. This allows irrigation requirements to be monitored and application rates tweaked each day using the panel on the centre pivot, a computer or a mobile device.

This system is intensive in that it requires a lot more ground truthing and crop health monitoring but the results in producing premium vegetables speak for themselves.

EM38 0 to 50cm x Landscape Change Zones



Soils in each area irrigated by centre pivot are mapped using EM38 technology. This is then combined with information about landscape elevation and a map is generated that identifies zones based on soil types. This irrigation map is used to determine variable irrigation rates.



An NDVI image showing much more even plant growth after mapping and irrigation using VRI.

## VRI technology

The old traditional pivots apply the same volume of water in a straight line. Upgrading machines with VRI means that application rates can be adjusted along the rig based on monitoring information, providing water savings of between 20 and 30 per cent.

The centre pivots are manufactured by Lindsay Zimmatic and installed by Hall Irrigation, based in Lameroo. The VRI uses FieldNET remote irrigation management and scheduling technology, which provides the flexibility to get real-time information and to make changes on the go. The VRI has helped improve water use efficiency by only applying the volume of water needed for each zone.

The VRI complements the Pye Group's flagship potato variety, "Spud Lite", which has 25 per cent less carbs than the average potato and has a 20 to 30 per cent shorter growing period.

## About the system

Underground water provides the supply for the centre pivots.

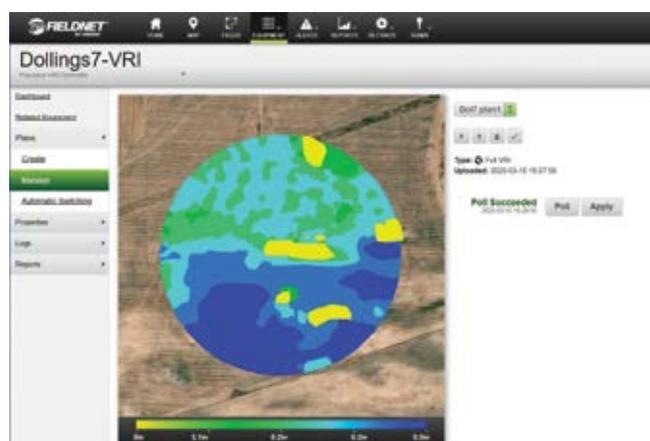
The water is pumped using turbine pumps powered by 300 hp diesel engines. The pumpsets are standalone, with one bore supplying one centre pivot. The main pipe system is designed so that it interlinks with other bores, providing a backup in case of emergency or when one pump is down because of a breakdown or maintenance.

At start up, the centre pivot is programmed to send a signal to start the pump, which then ramps slowly to a pre-set line pressure. The pump will maintain that line pressure by ramping slowly up or down.

With the VRI, the nozzles are closing and opening all the time, so it is crucial to set the system up with the right parameters to ensure the pump does not blow a mainline.

The centre pivots are controlled by irrigation schedules set using the FieldNET system. It is a web-based program that is used to control, program, monitor and set alerts on each centre pivot. It is a powerful management tool that incorporates a dashboard showing what is happening on pivot panel in real time. The pivot panel can be viewed and programmed from anywhere, and functions such as application rates, dry or wet and VRI on or off can be controlled remotely.

As well as using this technology, crop managers and agronomists are in the field every day checking moisture and plant health.



The dashboard of the controller shows what is happening in real time as the pivot is irrigating.

## The bottom line

The figures say it all, with significant savings in both water and energy.

Water use has dropped by between 20 and 30 per cent and it is now being used much more efficiently because the right amount is being applied where it is needed. The savings also extend to diesel use, which is reduced because of pumps ramping up and down to meet demand.

The system also allows for intensive management. With paddocks being irrigated every day, application can be turned off where potatoes have already been dug, representing another water saving. And after rain, all irrigation can be turned off on the heavy and affected areas to dry them out.

While these savings are significant, according to Jaco, the biggest benefit is that the Pye Group is minimising waterlogging and runoff, which is a major contributor to both crop quality and sustainability. With such significant benefits, it is little wonder that the plan is for all pivots eventually to be upgraded and VRI ready.

**Acknowledgment.** Thanks to Jaco Pauer for providing technical information.

Anne Currey, Irrigation Australia

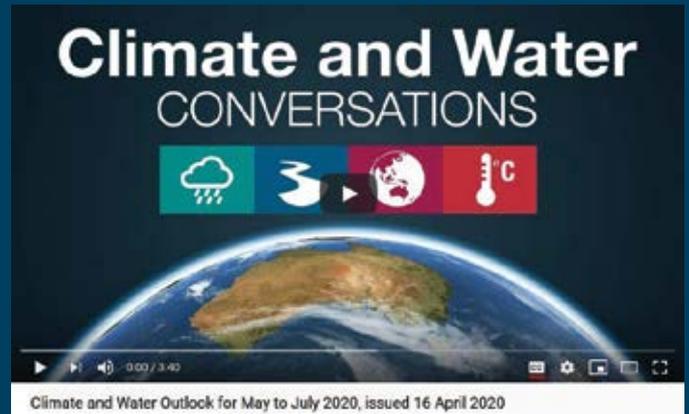


# BOM CLIMATE OUTLOOK FOR MAY TO JULY

In April, the Bureau of Meteorology released its climate outlook for May to July. In summary:

- Early May is looking drier for some parts, with the week of 4 to 10 May likely to be drier than average for the north-east quarter of Australia, and much of central Australia.
- For May to July overall, wetter than average conditions are likely for most of Australia. The exception is parts of the tropical north, along the eastern seaboard and into southern Tasmania, where there are roughly equal chances of being wetter or drier than average.
- May to July days are likely to be warmer than average across northern and eastern Australia. Elsewhere, May to July days have roughly equal chances of being warmer or cooler than average.
- Nights for May to July are highly likely to be warmer than average nationwide.
- A warmer than average eastern Indian Ocean is currently the main influence on Australia's climate, increasing moisture feeding into weather systems as they sweep across the country.

You can watch the outlook for May to July in this YouTube update by the bureau.



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## South Australian Planning Code – greenspaces, irrigation and rainwater harvesting

### SNAPSHOT

- South Australia has released a draft planning and design code, which recognises the role of green infrastructure and water sensitive urban design in creating cooler, more liveable and economically efficient neighbourhoods
- Elements of the code have implications for the irrigation industry
- Green infrastructure can help reduce temperatures, which contributes to personal comfort and, importantly, has been shown to reduce mortality rates in elderly people
- Rainwater harvesting recognised for stormwater and water sensitive urban design benefits.

South Australia has a long history of world leading innovation. The recent publication of the draft [South Australian Planning and Design Code](#) is a subtle revolution that sets a lot of precedents, some of which will have an impact on irrigation professionals.

The new code, a single planning tool for the whole of South Australia, focusses on using good design to deliver high functioning spaces.

It explicitly recognises the role of green infrastructure and water sensitive urban design in creating cooler, more liveable

and economically efficient neighbourhoods. The background papers note linkages with green spaces, 20 per cent increased real estate values in treed streets and higher absenteeism in workplaces not connected with nature.

There has been much discussion about and research on these topics in the last decade, however, policy and regulatory responses have been mixed and inconsistent. The code is an important precedent in setting benchmarks for new development and building a new city designed for the challenges of the new century.

### The benefits of green infrastructure

Green infrastructure is the network of green places and water systems delivering multiple benefits to urban communities. This network includes parks, backyards, wetlands, street trees, roof gardens and green walls. There is an emphasis on trees and tree canopy in the design code, in part because they are significant issues for the urban community.

Green infrastructure has a role not only in improving economic value but also reducing temperatures. In heavily tree-lined streets, temperatures be reduced by at least 8°C. Green infrastructure can reduce temperatures in moderately tree-lined streets by 2.8°C in local areas, while temperatures in areas cooled by irrigation can be 1.7°C lower.

These temperature-mitigating effects of green infrastructure are not just about human comfort. Data from studies in Victoria show that the mortality rate of elderly citizens significantly increases when average temperature



South Australia's draft planning and design code focusses on using good design to deliver high functioning spaces and recognises the role of green infrastructure. Photo: BeyondImages

rises above key thresholds. Tree-lined streets and cool spaces literally save lives.

This is an important consideration for all urban areas, especially in the context of our changing climate, e.g. in Adelaide the number of hot days over 35°C each year is projected to dramatically increase to up to 47 days by 2070.

The implications for open spaces in planning, green spaces in development, irrigation and drainage are significant and raise questions about where the water will come from.

### Rainwater harvesting recognised for water sensitive urban design benefits

The draft code recognises the long association between rainwater harvesting and South Australia in entirely new ways. Background papers discuss how infill development can generate 2.5 times more stormwater runoff than the existing stormwater infrastructure was designed to manage. The risks for local flooding and degradation of local waterways and receiving environments are significant.

Rainwater harvesting is considered a deemed-to-comply response for water sensitive urban design. Modelling and practical experience in other states show that a rainwater tank connected to toilets, hot water or laundry plus a permeable



Street trees and irrigation are important ways of reducing temperatures in summer. *Photo: mastersky*

pavement treatment of the driveway is an effective stormwater management response and will be accepted by town planners without the need for a stormwater management plan. This streamlines the application process and reduces developer costs.

*Michael Smit, Technical and Sustainability Manager, Kingspan Water and Energy*

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## Mystery around fall in Storm King Dam level

### SNAPSHOT

- Southern Downs Regional Council used tanker trucks to maintain water supply after Stanthorpe's water supply dam falls to critical level in January
- In the almost 70-year history of the dam this is the first time this has happened
- One explanation for the drop in water running into the dam is a change in the behaviour of the water catchment
- Other regional towns have reported unusual water shortages during the drought
- Capturing more rainwater could be part of the solution

Late last year, Kingspan Rhino received an order for two tanks of a million litres (1 ML) each at the Storm King Dam, near Stanthorpe in southern Queensland. The tanks were an urgent order so the Southern Downs Regional Council could cart life-giving supplies of water into the tanks and continue to supply the local water treatment plant at Stanthorpe.

Stanthorpe was relatively well prepared for drought. It had a subsidy for private rainwater tanks, active leakage management, a high level of recycled water for irrigation and extreme level water restrictions ready to go. The expert advice was that the dam had a probability of water supply shortfall of one in 1300 years.

Despite this preparedness, around 13 January 2020 Storm King Dam fell to a 'critical' level and council started the huge task of carting 1.3 million litres of water a day in trucks from Connolly Dam to Storm King Dam, a round trip of 130 km. This is the first time water has been carted to Storm King Dam, despite its almost 70 years of operation and despite the expert prediction making it seem very unlikely.

The State government footed the \$800,000 monthly bill of water carting, which cost around \$20.51 a kL. With water treatment and distribution, the delivery cost is likely to be over \$25/kL. This could set a new benchmark for the cost of water security and the benefit of demand management measures.

### WHY DID DAM LEVELS DROP SO DRAMATICALLY?

What happened at the dam for water levels to go to critical? It is hard to know.

One possibility is that there has been a step change in the behaviour of the water catchment supplying Storm King Dam. A relatively small increase in temperature over several years has increased evaporation and reduced soil moisture so that streamflow is not just reduced, rather it stops altogether. This is very different to simply reduced rainfall. This behaviour, first documented by Coombes and Barry in 2008<sup>1</sup>, followed by Sharma et al in 2020<sup>2</sup>, could mean a dramatic reduction in runoff from small rain events, which are more common and regular than large ones. The combination of reduced rainfall, reduced runoff and increased evaporation could mean that local creeks stop running and dams evaporate into the sky.



In January this year, Stanthorpe's water supply dam fell to a critical level.

## CAPTURING RAINWATER ONE OF A RANGE OF SOLUTIONS

There is general agreement that we need a diverse range of solutions that are resilient to short-term shocks and long-term challenges including population growth and climate change. Options should include demand management, water efficient appliances, rainwater harvesting, surface storage, recycled water, desalination and stormwater harvesting based on independent cost-benefit analysis.

The work by Coombes and Barry also identified something interesting. Because a roof is an impermeable surface, rainwater cannot soak in, so roofs are much more efficient than dam catchments at capturing rainwater. As temperatures increase, rainwater harvesting can continue to catch even small rain events, while it might take 150 mm of rain before the creeks will flow again. Stanthorpe received well above average rainfall in January and February of 136 mm and 144 mm, but it was not enough to refill the dam. The trucks were still carting 1.3 million litres a day in April. If every house in Stanthorpe had a rainwater tank, they might have captured 51 million litres just in 2020 at far less cost than many other water supply options.

Rainwater harvesting is not a silver bullet that will fix all water security problems, but it is an important part of a diverse range of solutions for resilient communities. Southern Downs Regional Council has the option to reintroduce compulsory rainwater harvesting on all new dwellings in Stanthorpe.

Stanthorpe is not alone. We have heard reports of other small towns and even large regional centres across western NSW and southern Queensland facing unusual water shortages. The question is whether there is something going on here that we have not seen before.

### References

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2. University of New South Wales. (2020, January 23). Dwindling inflows into catchment areas: A water supply disaster in the making? Retrieved from <https://phys.org/>: <https://phys.org/news/2020-01-dwindling-inflows-catchment-areas-disaster.html>

*Michael Smit, Technical and Sustainability Manager, Kingspan Water and Energy*

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# RAINWATER HARVESTING

## Rainwater harvesting underpins sustainability target

The Kingspan Group has implemented a sustainability program that includes an ambitious commitment of harvesting 100 million litres of rainwater from all their buildings every year by 2030.

The new Yatala Kingspan Water and Energy factory at the Gold Coast in Queensland manufactures steel rainwater tanks for Queensland and Northern NSW, employing 20 people on a large industrial site.

Stuart Heldon who manages the Water and Energy business unit in Australia said that rainwater harvesting will help meet a number of objectives.

**Testing before delivery.** All tanks are tested before delivery, which uses a lot of water. Test water is recirculated, but about 10 L a tank is lost.

**Provision of green space.** To supply green spaces for factory staff, an outdoor lunch room with landscaped lawn and trees that are irrigated using tank water.

**Mitigating heat.** The site has a lot of concrete and steel, so the landscaped area has been increased to reduce the heat island effect. Dense planting is used as a natural air conditioner helping to reduce heat gain. Dripline has been installed to deliver water directly to the root zone of the landscape plants, while turf areas are irrigated using sprinklers

**Reducing stormwater runoff.** The site is in the catchment for Moreton Bay, close to the Albert River. Rainwater harvesting

reduces the volume of stormwater coming from the site. It also reduces peak flow and flooding, reduces pollutants into local way and improves the flow regime, which all goes to protect local habitat.

An 80,000 L tank was installed at the rear of the Yatala site and connected to the tank testing production water and the irrigation system. The tank is fed by rainwater runoff from the 2100 m<sup>2</sup> roof. At the front of the site, a 10,000 L tank was installed to provide water to the toilets using a submerged pump and a utility water back up.

An advantage in developing a greenfield site was that sustainability measures, including water harvesting, landscaping and solar panels, could be planned before the building was completed.

Kingspan is also monitoring water use on the new site and expects to use the following volumes of water annually, most of which should be rainwater.

- 38,000 L for process use and tank testing
- 115,000 L for toilet flushing
- 672,000 L for landscape irrigation.

One thing is obvious when it rains, and that is everyone smiles at the thought of the water coming down from the sky and gurgling into the big steel tanks.

*Michael Smit, Technical and Sustainability Manager*



Trees and lawn surrounding an outdoor lunchroom are irrigated using tank water.

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## Regular checking and maintenance: the keys to an efficient system

Regularly checks and maintenance are essential to the efficient operation of any irrigation system, and sprinklers on centre pivots and linear move machines are no exception. This article by Nelson Irrigation describes some simple checks and tests that can be done to ensure that a system performs to its peak capacity.

### SNAPSHOT

- System application uniformity of 85 per cent is considered the minimum acceptable level
- Common issues that affect uniformity are: plugged or malfunctioning pressure regulators, worn or plugged sprinkler nozzles and improper installation of the sprinkler package nozzle sizes on centre pivots
- A good strategy against worn nozzles and malfunctioning pressure regulators is to replace the sprinkler package every five to ten years depending on water quality and hours of use
- A flowmeter is a very useful tool for monitoring how well a centre pivot system is operating
- Regular monitoring and maintenance underpin the efficiency and uniformity of centre pivot and linear mover systems

- improper installation of the sprinkler package nozzle sizes on centre pivots.

Of these, only a plugged sprinkler nozzle or regulator is easy to identify when the system is operating. While the other issues are not always easy to identify by observing the system when it is operating, some signs will indicate the source of a problem.

### HOW TO CHECK FOR PROBLEMS

**Plugged or malfunctioning pressure regulators.** While malfunctioning pressure regulators can be hard to identify visually, some emit water through the sides of the regulator when they fail structurally, and this is something that can be seen with a careful inspection.

A malfunctioning regulator can result in sprinkler pressure that is too high. A sign that may indicate a malfunctioning pressure regulator operating above its nominal rating is a sprinkler emitting a fine spray or faster rotation speed relative to adjacent sprinklers. If a regulator is operating below its nominal rating, sprinklers will produce larger droplets and slower rotation speed.

**Checking pressure regulators in the field.** A pitot tube attached to a pressure gauge can be used to field check pressure regulator operation. Pressure measurements are taken by placing the pitot tube directly into the flow jet exiting the nozzle so that the open end of the tube is perpendicular to the flow jet. The pitot tube should be small to minimise flow interference. Pressures generally should be within 14 kPa (2 psi) of the regulator pressure rating. Measured nozzle pressures should be checked against the sprinkler chart.

**Pipeline pressure** on the machine should be monitored throughout the year. The best site for a permanent pressure gauge is at the distal end of the centre pivot or linear move system. When pressure regulators are used, pipeline pressure should be maintained at least 34 kPa (5 psi) higher than the regulator nominal rating. For example, a machine with 103 kPa (15 psi) regulators should always have at least 138 kPa (20 psi) of pressure at the end of the machine. The best time to check the pressure is when the end gun is on or the end of the centre pivot is at its highest point in the

### WHEN TO CHECK THE SYSTEM

Centre pivot and linear move irrigation systems can achieve uniformities and efficiencies of between 90 and 95 per cent, with values of 85 per cent generally considered the minimum acceptable level before a system needs updating or repair.

If a regular check shows that this minimum level isn't being met, then it is time to take a closer look at what the problem is and to fix it.

### COMMON ISSUES

Worn or malfunctioning equipment and improper design and installation are the most common factors that affect irrigation uniformity.

The main aim in maintaining a centre pivot or linear move irrigation system is to retain the design flow rate from each sprinkler. To do this, the design pressure and nozzle size at each sprinkler must be maintained.

Common issues that affect uniformity are:

- plugged or malfunctioning pressure regulators
- worn or plugged sprinkler nozzles



Randomly selecting up to 20 sprinklers and checking flow rate measurement using is a recommended way for judging the condition of a sprinkler package. *Photo: Peter Smith*

field or both. This will ensure proper pressure throughout the machine and the rest of the field. If the system is not pressure regulated, check that the end pressure matches the computer-generated sprinkler chart.

**Worn or plugged sprinkler nozzles.** During the irrigation season, the operator should intermittently observe sprinkler performance. The best time to do this is either early or late in the day when the sun is low. Differences between sprinklers are easier to identify in this light. Some growers will install a new sprinkler/regulator assembly on their system and visually inspect for differences between the new and existing components. Care must be taken that pressure ratings and nozzle sizes are the same.

Where the sprinkler is readily accessible, flow rate measurements from between 10 and 20 randomly selected sprinklers can be used to judge the condition of the sprinkler package. Flow rate measurements can be made using a large graduated container and a stopwatch.

1. Place the container to encompass the sprinkler and capture flow for a specific time measured with the stopwatch (make sure the container is big enough to capture the whole output from the sprinkler).
2. Calculate sprinkler flow rate from these two measurements (volume and time) and compare it to the design flow rate value for the nozzle size and pressure from the manufacturer's sprinkler chart. The flow rate for a sprinkler differing by more than  $\pm 10$  per cent indicates a problem.

If you find one or more sprinklers with flow rates greater than  $\pm 10$  per cent of the nominal flow rate, the next step is to randomly select and test a second set of between 10 and 20 randomly selected sprinklers.

If more sprinklers are found to have flow rates greater than  $\pm 10$  per cent of the nominal flow rate, the cause should be identified and corrected.

Potential causes to consider are as follows:

- lower flow rate: plugging in the nozzle or plugging upstream of the regulator, a "stuck" regulator or low system operating pressure
- higher flow rate: a malfunctioning pressure regulator or worn nozzle.

A good strategy against worn nozzles and malfunctioning pressure regulators is to replace the sprinkler package every five to ten years depending on water quality and hours of use.

An accepted rule of thumb is to consider replacing sprinkler packages every 10,000 hours.

## HANDY TOOLS AND CHECKS

A flowmeter is a very useful tool for monitoring how well a centre pivot system is operating.

By monitoring a flowmeter, you can check that the flow output of sprinklers, regulators and end guns matches the sprinkler chart. Changing pressures and flow rates during the irrigation season could indicate problems with a sprinkler package and a need for maintenance or replacement.

Sprinkler height above the canopy can affect uniformity, along with the spacing and wetted radius of the sprinkler nozzles. In general, sprinkler height should be about 1 m above the plant canopy to ensure good irrigation uniformity, although sometimes this is not possible with taller crops such as corn. Extra attention is needed to ensure proper overlap and runoff control in these cases.

In most cases, excellent uniformity can be expected when sprinkler spacing does not exceed between 50 and 75 per cent of the wetted radius. It is important to ensure that drops hang straight (vertically) off the pivot pipe. This will allow for maximum coverage for the full rotation of the sprinkler.

Pop-up sprinklers are worth considering where tall crops are being irrigated in areas with heavy soils, high flow rates, and rougher terrain.

## THE BOTTOM LINE

The sprinkler package is no different than every other piece of machinery on a farm in that it needs consistent monitoring, maintenance and replacement. Without it, production efficiency will be reduced and water and nutrients will not be efficiently and uniformly applied to the root zone.

**Acknowledgment.** Thanks to Nelson Australia for this article [www.nelsonirrigation.com.au](http://www.nelsonirrigation.com.au)

# CENTRE PIVOT AND LATERAL MOVE

## Pre-season checks avoid breakdowns

Routine checking and maintenance are keys to ensuring any equipment is in good working order and will operate efficiently, and this is no less the case for centre pivot and linear move irrigators. This pre-season checklist, developed by the Hunter Starting Smarter Irrigation Project, is a handy guide to where to start and what to pay attention to when getting a machine ready for the irrigation season.

Simple checks to correct issues from the previous season or that have occurred while the system has been idle will result in more efficient water and energy use and avoid mid-season break downs. A close inspection will also identify items for updating in maintenance checklists and will help detect problems before they become costly disasters.

### WHAT DO I NEED TO CHECK?

**Pumps and pipes.** All pressurised irrigation systems need to have a pump that is carefully selected to the system's duty, is operating efficiently and is well maintained. If the pump is not performing efficiently, the irrigation system won't either.

Ensure the pipe sizes are adequate, especially the suction pipe, ensure the foot valve and strainer are not blocked, check inside the pump for partial or full blockages, ensure the operating pressure and flow are according to specifications, and have the efficiency checked at regular intervals.

**Gauges and meters.** To check your system properly before and during the season, it is essential to have appropriate gauges and meters. These include a pressure gauge and flow meter at the pump, pressure gauges on either side of the filter, a pressure gauge at the centre (centre pivots) or cart (linear moves), and perhaps another flow meter and a pressure gauge on an outer emitter just above the pressure regulator.

### System on and off checks

The checklists identify the common items to guide your site-specific system checks. It is always best to do these checks with a second person. The extra labour costs will certainly be returned when your system is having fewer breakdowns, using less energy, and correctly applying water over the coming season.

**Acknowledgment.** This checklist is from the [Hunter Starting Smarter Irrigation website](#).



Routine checking and maintenance are important in ensuring that centre pivot and linear move irrigators continue to operate efficiently.  
*Photo: Peter Smith*

SYSTEM "OFF" CHECKS	
Component	Check
Safety	<input type="checkbox"/> Electrical isolator switch is tagged/locked
Pump	<input type="checkbox"/> Clean inside and out, flow meter and pressure gauge serviceable
	<input type="checkbox"/> Belt drive is tight
Filtration	<input type="checkbox"/> Rings/screens clean, intact
	<input type="checkbox"/> Pressure gauges in good condition
Pivot point (CP)	<input type="checkbox"/> Lubrication, grease
Cart (LM)	<input type="checkbox"/> All checks completed
Drag hose (LM)	<input type="checkbox"/> Hose condition, fittings secure
Towers	<input type="checkbox"/> Micro-switches, cable and rod connections
	<input type="checkbox"/> Wheel bolts, tyre condition and pressure
	<input type="checkbox"/> Gearboxes, drive shafts, U joints for wear, lubricate as required
Riser pipe and spans	<input type="checkbox"/> Boots – tighten bands if necessary
	<input type="checkbox"/> Flanges
End gun, corners	<input type="checkbox"/> Connections
	<input type="checkbox"/> Wiring and hydraulic lines
	<input type="checkbox"/> Booster pump operable
Sprinklers	<input type="checkbox"/> Every sprinkler against nozzle chart for correct size, wear, damage, blockages
	<input type="checkbox"/> Regulators for wear or damage
	<input type="checkbox"/> Droppers for wear or damage, replace as necessary
Control unit	<input type="checkbox"/> Electronic controls and battery charge; insects
Prepare to start	<input type="checkbox"/> Ensure nothing is parked in front of the irrigator

SYSTEM "ON" CHECKS	
Component	Check
Pump	<input type="checkbox"/> Pressure and flow as specified
Pivot point	<input type="checkbox"/> For leaks, movement
Riser pipe and spans	<input type="checkbox"/> For leaks along spans and at towers
	<input type="checkbox"/> Flanges – call service company if flanges leaking
Towers	<input type="checkbox"/> Motors, gear box and drive shaft operation for noise or vibration
Sprinklers	<input type="checkbox"/> Each sprinkler is turning correctly and cage not damaged
	<input type="checkbox"/> Each sprinkler is throwing level, not at angle
	<input type="checkbox"/> Droppers hanging straight, leaks
End gun, corners	<input type="checkbox"/> Connections
	<input type="checkbox"/> Operation, especially pressure
	<input type="checkbox"/> Gun angles are correct, turn on and off at right locations
	<input type="checkbox"/> Corner arm sprinklers turn on and off correctly
System pressure	<input type="checkbox"/> Inlet pressure gauge with alternative – replace if necessary
	<input type="checkbox"/> Inlet pressure is correct
	<input type="checkbox"/> End pressure – above pressure regulator at end dropper (at least 5 psi or higher)
Other	<input type="checkbox"/>
	<input type="checkbox"/>

Checked by: \_\_\_\_\_ Date: \_\_\_\_\_

### Before turning on the machine

- ✓ Reduce the likelihood of implements and machinery striking the irrigator by identifying them e.g. with a reflective signage.
- ✓ Walk the irrigator track before turning on the system to check for obstacles, e.g. fallen trees or branches, failed fences, implements left behind, and any changes to paddock surface.
- ✓ Walk the system with new employees before they operate the machine for the first time and have all operators read the operating instructions before start-up.

- ✓ Include management of the wheel tracks in the farm maintenance program. Wheel ruts significantly increase the load and the wear on the drive train and can slow a section of the irrigator down, affecting irrigator alignment.
- ✓ Consider soil moisture monitoring and weather forecasting options. Linking soil moisture monitoring with weather forecasts and using a simple water balance tool such as a scheduling diary allows operators to better gauge when to start-up and take advantage of rainfall to save time (irrigation days) and money (pumping costs). An efficient irrigation system is only as good as the scheduling of irrigation.

## REPORT IDENTIFIES A WAY FORWARD FOR MURRAY-DARLING BASIN

After eight 'town hall' meetings across the Basin, attended by about 1,000 people, interviews with 80 people and 345 submissions, in March this year, Interim Inspector-General of the Murray–Darling Basin and former head of the Australian Federal Police, Mick Keelty, handed his [report on the impact of lower inflows on water shared under the Murray-Darling Basin Agreement](#) to Minister for Water Keith Pitt.

Mr Keelty was asked by the Australian Government to examine:

1. The impact of changing distributions of inflows to the southern Basin on state shares under the Murray–Darling Basin Agreement
2. Any consequential impacts on state water shares resulting from the reserves required under the Murray–Darling Basin Agreement, including how these interact with state water allocation policies.

Proving the adage that you can't please all of the people all of the time, reactions in the southern irrigation community and beyond were mixed, in part because there was some expectation that one recommendation would be that irrigators receive a larger share of water.

- changing inflows to the Murray
- water-sharing arrangements
- conveyance and delivery
- water for the environment
- leadership, communication and water literacy.

**Recommendation 1.** The MDBA should undertake further analysis of the causes of reduced inflows from the northern Basin and the extent to which this is affecting State water shares.

While the Murray-Darling Basin is characterised by highly variable inflow from year to year, the report described in detail how the median inflow of water in the system in 2000s has decreased significantly to be about half that of the previous century. It also identified that drier years occur more often than previous (see figures).

The main reason for reduced water availability is these reduced inflows in the last 20 years, and "there is little anyone can do to influence when and how much it rains".

Acknowledging concerns voiced by irrigators in the southern basin that river management is at least partly responsible for reduced inflows from the Darling River into the Murray, the report recommended that the causes of reduced inflow from the northern basin be further investigated. Some of the issues of concern as reported to the review were water theft, compliance, extraction rules and floodplain harvesting.

**Recommendation 2.** To increase trust in and transparency about water-sharing, the MDBA should provide clear and easily accessible information about Special Accounting measures, including the circumstances under which they are used to determine State allocations.

**Recommendation 3.** The MDBA should clearly communicate the results of its examination of underuse of allocations and compare them with the submissions made to this Inquiry so that accurate feedback can be provided to the community.

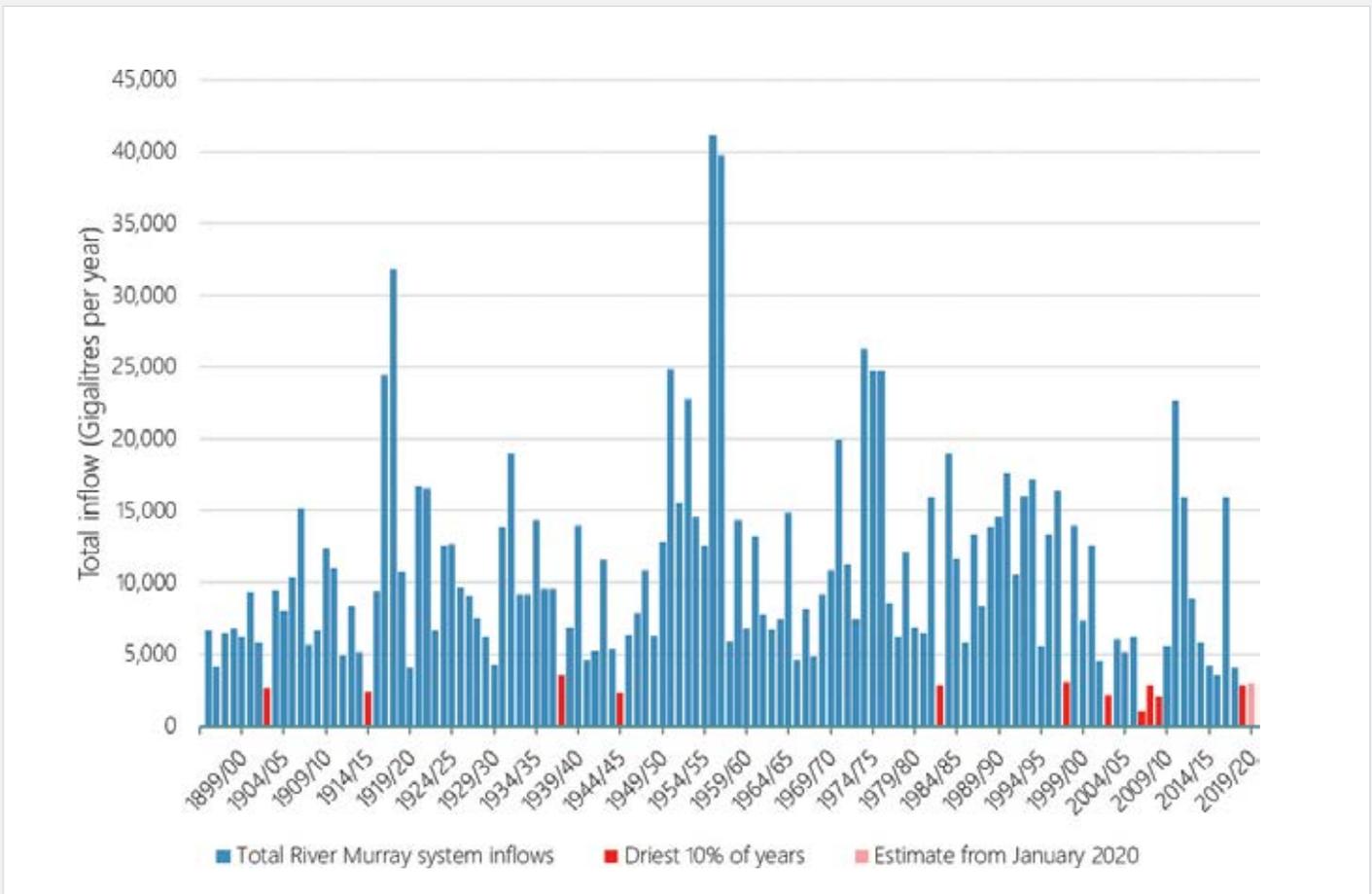
Consistent themes throughout the report are poor communication and perceived lack of transparency in decision making contributing to a lack of trust in how water in the Murray-Darling Basin is managed.

Adding to this are a lack of understanding of the complexities of water management and how responsibilities are shared by the states, individually and through the Murray-Darling Basin Authority (MDBA). This lack of understanding is



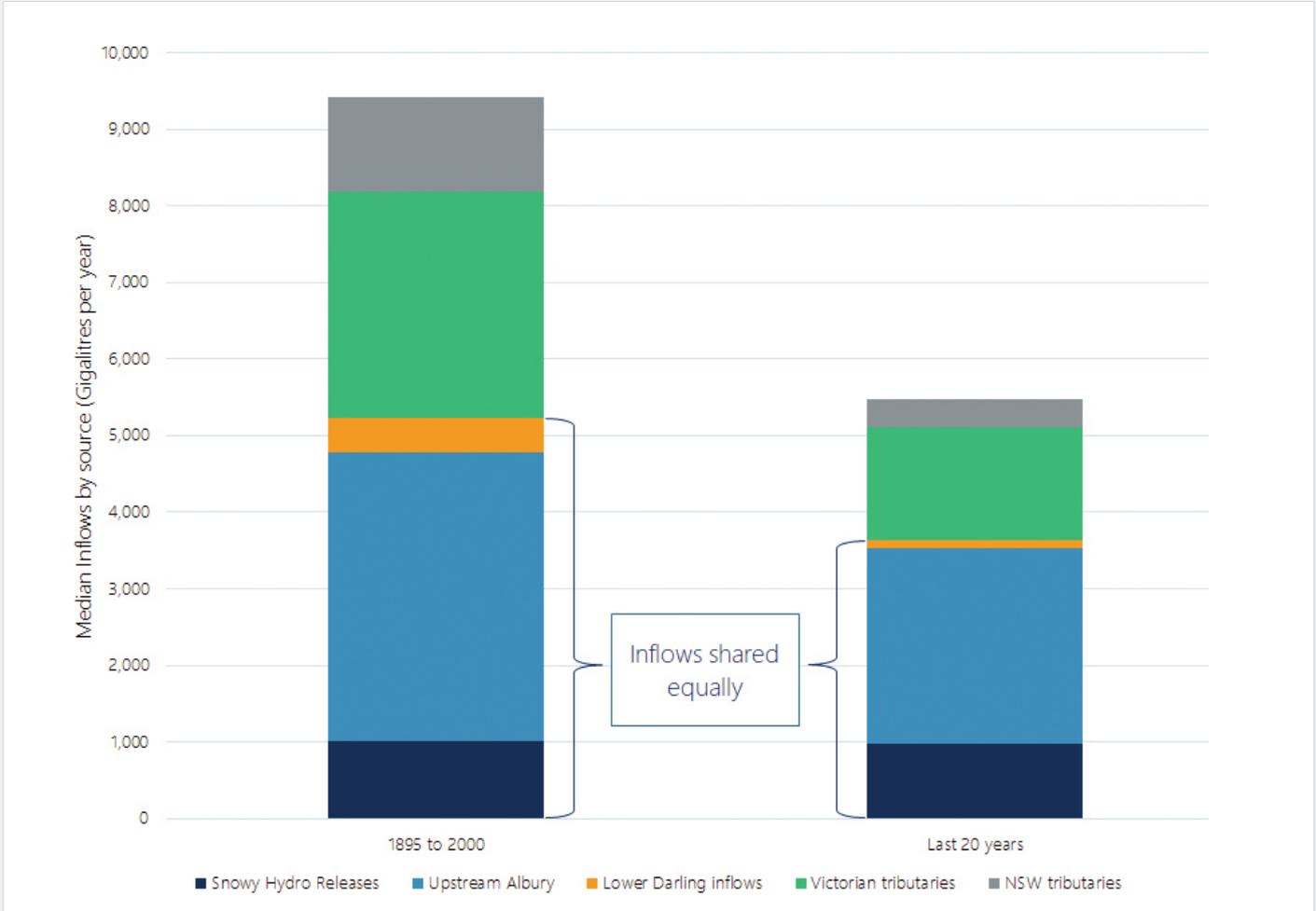
### Recommendations

The report contains five key recommendations, all of which have been accepted by Minister Pitt. These recommendations follow on from the five major themes that were identified during the community consultations, as follows:



**FIGURE 1. TOTAL RIVER MURRAY INFLOWS, 1895 TO 2020.**

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by MDBA.



**FIGURE 2. CHANGE IN RIVER MURRAY SYSTEM INFLOWS RELATIVE TO PRE 2000.**

Source: Interim Inspector-General of Murray–Darling Basin Water Resources, based on data provided by MDBA.



# THE BIG ISSUE

complicated by different approaches by each state to water sharing and how entitlements are allocated.

In Victoria and South Australia more conservative allocation policies are followed than in New South Wales, allowing them to have more water to allocate to water users in dry times. As well, historical decisions to do with the allocation of entitlements, e.g. high security compared with general and low security entitlements, have added to the complexity of the issue and concerns about share of allocation.

In the context of reduced inflows recently into the system, the report suggests that “there is a high likelihood that historical expectations of reliability are no longer accurate because climatic conditions have changed”.

Related to the issue of transparency, were consistent concerns about the volume of conveyance water and operational losses, and the impacts of downstream development and environmental water deliveries on river operations. The views expressed were summed up as “Some people feel that river operators are not operating the system efficiently, while others are concerned that there is a lack of accountability for river operators”.

In a similar vein, concerns were also expressed about environmental water, with a common perception being that the rules for environmental water holdings being different to those for consumptive uses. In fact, environmental water holdings are made up of the same types of entitlements as held by irrigators.

Mr Keelty recognises that these concerns, while at times based on misconceptions or not having access to relevant information, are legitimate ones and that they must be investigated to ensure confidence in the future by irrigators in river management and decision making.

**Recommendation 4.** The Basin Officials Committee (BOC) should consider implementing a single authoritative platform that combines information currently available on the various Commonwealth and state websites, to provide higher levels of transparency and trust and to improve water literacy.

**Recommendation 5.** The BOC should consider ways through which States and agencies could work together across their respective jurisdictions to include water literacy in high school and higher education curriculums, including VET, in regional areas.

The last two recommendations reflect on leadership, communication and water literacy. As the report identifies:

“Fuelled by uncertainty, misinformation, misperceptions or misappropriation of available information, the public debate around Basin management has become increasingly toxic. It is creating division between the Basin States and even within communities themselves.”

The report calls for a “more unified Basin-wide position and plan of action for Basin Plan implementation...to improve leadership in the Basin and address the current crisis in confidence.”

This will require:

- strengthening governance and oversight of Basin Plan implementation for the future
- improving communication of and accountability for past review outcomes
- having a single “point of truth” on Basin management
- improving confidence in the science underpinning water management in the Basin, for example by demonstrating independence
- increasing water literacy.

## No going back

While there are many issues and concerns with how water in the Basin is shared and managed, Steve Whan, CEO of the National Irrigators Council, provides a realistic assessment when he says “the report tells us there is no new water – no miracle cure for a tortuous, and hard-to-understand, interstate water sharing process”.

“It makes it clear that misunderstanding, and mistrust, are rife when it comes to Basin water management. We all need to make a much bigger effort to dispel myths and conduct legitimate debate on common facts,” he said.

According to Mr Whan, mistrust of the Plan and Basin management can be placed within a broader context that is common to many western democracies today of lack of trust in government, agencies and leaders.

“Building a better understanding and shared knowledge will not (and should not) take away difficult debate and different views, but it might help to make those discussions more productive. To that extent, NIC welcomes the commitment Minister Pitt and the Government have made to implementation.

“Water management is always going to be difficult; it is a finite resource and the capacity to pay for water – and then earn an income from it – is dependent on market prices and supply. The Basin Plan is the world’s most ambitious river recovery plan, and this report, combined with the independent social and economic panel, highlights just how hard it is,” he said.

One thing Mr Whan makes clear - and is the subtext in the Keelty report - is that there is no going back and starting on this process again. The more than 40 reports that have been published on the Murray-Darling Basin and water management in the last few years have clearly identified the issues – and many of the solutions. The keys will be leadership and a willingness to work together.

In the words of Mick Keelty, “there is an opportunity for all parties to demonstrate greater unity and leadership, which will be essential if future challenges are to be met successfully”.

Anne Currey, Irrigation Australia



## CHICKPEA YIELDS BOOSTED BY SUBSURFACE DRIP IRRIGATION

### SNAPSHOT

- Predictions of higher demand for protein derived from pulse crops like chickpeas have prompted a review of the potential for irrigation
- An option being investigated is oxygation (aerated subsurface drip) where atmospheric air is mixed with irrigation water using a venturi and delivered via a surface or subsurface drip irrigation system
- Analysis of yields comparing irrigated (oxygated) and dryland chickpeas in central Queensland revealed that they were between 10 and 27 per cent higher under subsurface drip

Growing adoption of chickpeas in broadacre cropping rotations has prompted researchers to re-evaluate aerated subsurface drip irrigation (oxygation), with a new data analysis showing it can boost yields by up to 27 per cent.

While subsurface drip irrigation has previously been considered as too expensive to be a viable option for inclusion in many Australian production systems, higher yields and booming global demand for plant-based protein may change the economic equation.

By 2050, global demand for protein from pulse crops like chickpeas is predicted to rise by 30 per cent – or 289 million t – prompting agronomists to revisit earlier evaluations of methods, such as subsurface irrigation, as a means of boosting production.



CQUniversity's Associate Professor Surya Bhattarai is a member of a research team that has identified higher chickpea yields resulting from aerated subsurface irrigation.

### Higher yields with oxygation

CQUniversity and Queensland Department of Agriculture and Fisheries (DAF) researchers have analysed data gathered during a 2006-07 crop trial, revealing that those areas irrigated with aerated sub-surface drip irrigation (oxygation) had yields between 10 and 27 per cent higher than conventionally irrigated plots.

Their report concluded that these results “provide evidence that oxygation has the potential to contribute to increased chickpea yield and water-use efficiencies on a broadacre irrigated scale”. This increased yield and improvement in water-use efficiency has the potential to improve the profitability of cotton-chickpea farming systems.

The results were detailed in a research paper published in scientific journal, *Agricultural Water Management*, by DAF's Dr Lance Pendergast and CQUniversity's Associate Professor Surya Bhattarai and Adjunct Professor David Midmore.

### Chickpeas susceptible to waterlogging

The key factor in the improved performance of irrigated chickpeas was the ability of subsurface irrigation systems to add oxygen to the soil, which helped them overcome their susceptibility to waterlogging.

As the research reported, “Chickpea is particularly susceptible to waterlogging and consequently requires great care of root zone aeration at crucial stages of plant development, e.g. flowering, to avoid incurring yield penalties through inappropriate irrigation management that saturate the rhizosphere. Use of aerated water irrigation to overcome hypoxia (lack of oxygen) in the rhizosphere was therefore evaluated.”

The trial data was gathered at a property near Emerald, Central Queensland, with self-mulching, black vertisol soils, and sown to the chickpea variety Moti Desi.

The oxygated trial plots yielded between 2.05 and 3.24 t/ha compared to the long-term national average of just 1.13 t/ha.

From these results, which were consistent with those for cotton on the same site, further justification was provided for the capital investment required for oxygated subsurface drip irrigation systems.

### Do the figures first

With chickpea becoming an increasingly important part of crop rotations – national chickpea production has been expanding at a rate of 21,000 ha a year since 2000 – the researchers recommended industry now undertake a full cost:benefit analysis to re-evaluate the economics of incorporating subsurface drip irrigation into cropping systems.

**Note.** Article supplied by Central Queensland University.



## REVIEW REPORT AND PROSECUTIONS BUILD COMPLIANCE CONFIDENCE



Enforcing water law is the keystone of water resource management. Policy, science and top-level agreements between states are critical drivers of successful water governance, but without uniform enforcement of specific laws at local level, consensus on how to share water between stakeholders has no chance of longevity.

In response to increasing social and political unrest and against the background of extended drought, in late 2019 the Commonwealth water minister commissioned the Interim Inspector-General of Murray-Darling Basin Water, M J Keelty AO, to investigate the impact of changing inflows to the southern Basin on state shares under the Murray-Darling Basin Agreement and impacts on state water shares resulting from reserves required under the Murray-Darling Basin Agreement.

The Keelty Review heard irrigators' concerns across the southern basin, and made recommendations designed to increase understanding and confidence in the system of water sharing agreed between the states.

The report has examined and corrected some common contentions in the Basin Plan 'debate', pointing to the role of misinformation and inconsistency in website information as sources of misunderstandings, along with low levels of water literacy generally.

### Legitimation crisis

At the local level, the legitimacy of rules governing water is grounded in concerns about fairness as much as it is in fear and anger surrounding water loss. Part of water literacy is understanding water compliance and its enforcement.

Confidence in compliance increases when people feel the law applies equally to all, including in the policing and prosecution of infringements. Compliance also increases when people know there is a high probability of an offence being detected and prosecuted, accompanied by a penalty.

### Water law enforcement

In New South Wales, water law is mainly enforced by the Natural Resources Access Regulator (NRAR), in conjunction with WaterNSW. NRAR's main objectives are to:

- to ensure effective, efficient, transparent and accountable compliance and enforcement measures for the natural resources management legislation

- to maintain public confidence in the enforcement of the natural resources management legislation. NRAR does this mainly by investigating and enforcing contraventions of the Water Management Act 2000.

### NRAR scorecard

To report its activities, NRAR maintains a register of enforcement action, published on its [website](#).

Regarding penalties, the register distinguishes between directions, penalty infringement notices and prosecutions.

The identities of people issued with infringement notices and directions are not included in the published register; for prosecutions, names and details of convictions and sentencing are.

The register shows that since 2017 a range of offences have been detected, with penalties imposed, arising from contraventions of water access licensing requirements and contraventions of water use or works approvals - or the absence of required approvals.

### Offences under the Water Management Act

The distinction between licences and approvals offences reflects the structure of the Water Management Act. Consistent with the unbundling of water entitlements from landholdings - a requirement under the National Water Principles - this translates legally into a distinction between the right to access water and the obligation to use approved water management works when doing so.

The act sets out offences in relation to water access licences, as well as providing offences for infringements of approval requirements. Other offences under the act derive from these basic provisions and for related or incidental matters; for example, controlled activities, such as activities near a water course.

Given the act's comprehensive nature and size, a proficient level of water literacy is required for a water user to identify compliance requirements.

Similarly, from an enforcement perspective, it is necessary for NRAR to examine in detail what often may be complex local landholding, land use and licensing histories and purposes, as well as historical layers of infrastructure and works on the land, in deciding whether to pursue regulatory action.

### Guiding case

These challenges were faced by the parties and the Land and Environment Court in recent prosecution proceedings in *WaterNSW v Harris (No 3)* [2020] NSWLEC 18.

The court's decision, handed down on 19 March 2020, includes a useful account of the scheme of the Act, set out by the court in reaching its conclusions.

The facts of the case found by the court included activities constituting infringement of section 91G(2) of the WM Act by the defendants, irrigators who were alleged to have taken water without lawful permission. Amongst other things, section 91G provides that if any term or condition of an approval is contravened by any person, each holder of the approval is guilty of an offence.

On the facts of the case, the defendants had used water supply works to pump water when the flow in the Darling River at the Bourke gauge was less than 4,894 ML/day. The works approval did not include approval to operate the works when daily water flow was less than this, so that by operating them the defendants had contravened a term or condition of an approval, constituting an offence.

The defendants' answer to this was that the restriction on their right to access water under low flow conditions was a non-binding legal anomaly, which had arisen when approvals associated with the land had been incorporated subsequently into their new access licence under the incoming Water Management Act. As part of an approval

associated with the land under the act's predecessor legislation, the restriction was never meant to be included in the new access licence.

The defence was unsuccessful, with the court holding that while the defendants' access licence was distinguishable from water management works approvals associated with the land, compliance with approvals was nevertheless a condition of the licence applicable if the licence was relied upon to access the water source under the relevant water plan.

In giving reasons for its decision in the Harris case, the court has provided a valuable outline of the legislative scheme of the New South Wales Water Management Act, which will undoubtedly contribute significantly to increasing water literacy in New South Wales, and be a precedent to which irrigators and their advisors, as well as NRAR and the courts, will have regard in future water compliance matters.

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## NASA RELEASES GLOBAL SOIL MOISTURE AND GROUNDWATER MAPS

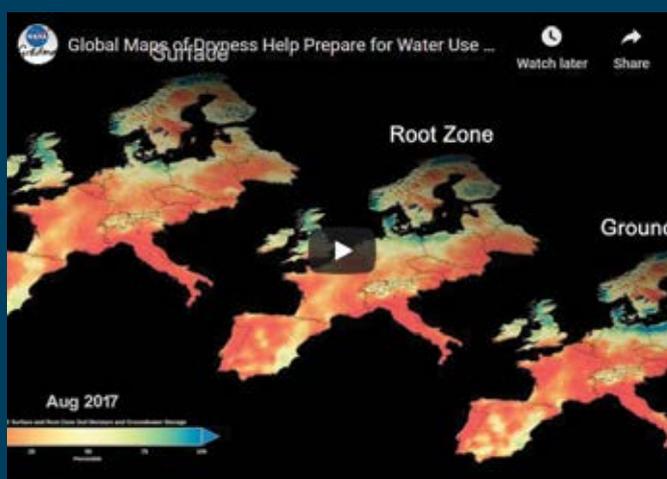
NASA researchers have developed new satellite-based, weekly global maps of soil moisture and groundwater wetness conditions.

While the maps have been available in the US since 2017, extending them globally will provide a way of monitoring water supplies, managing water security and identifying how quickly groundwater supplies recover from drought. The new tool will be extremely valuable to farmers, water managers and policy makers.

NASA staff and researchers from the University of Nebraska-Lincoln, who developed the new tool, used data from the Gravity Recovery and Climate Experiment Follow On (GRACE-FO) satellites. These satellites, which were launched in 2019, orbit the Earth to map its gravitational field. Variations in the gravitational field can reveal the shifting of mass, such as the global flow of water and ice, thus enable changes in water at different depths to be modelled and identified.

Time-varying maps of water distribution at the soil surface, root zone and shallow groundwater can be viewed in the form of weekly global maps.

Watch the YouTube video



Using measurements from two satellite missions assimilated into a computer model, researchers have created global maps of terrestrial water around the planet. Music credit: "Lines of Enquiry" from Universal Production Music Credit: NASA's Goddard Space Flight Center/Scientific Visualization Studio. Note, there is a brief reference to Australia at 2m:10s.



# IRRIGATION AUSTRALIA NEWS

## MEMBERSHIP

Irrigation Australia is here to provide members with **innovation, creativity and leadership.**

We also understand that restrictions around COVID-19 have had a severe impact on many individuals and businesses, so we have altered the membership model to incorporate more flexibility around payment of membership fees. Corporate members can opt to pay either quarterly or annually.

As well, if a member is experiencing hardship, we will consider extending their membership for an additional period to assist them during the pandemic, with a view to payment at the end of this extended time.

## FIND AN IRRIGATION SPECIALIST

If you are looking for an irrigation specialist, then the Irrigation Australia website is your one-stop-shop. Just type in a postcode and irrigation professionals listed in the area will be shown, along with their contact details.



## MEMBER SERVICES – YOUR FEEDBACK NEEDED

A subcommittee of the National Board has been reviewing the services we provide to our various membership categories. If you have any suggestions for new benefits or services you would like to receive within your membership, please email Tracy Martin with your thoughts [tracy.martin@irrigation.org.au](mailto:tracy.martin@irrigation.org.au).

Services and benefits already provided by Irrigation Australia are listed below:

- An unlimited number of staff can be linked to the membership to receive member services and applicable member discounts
- Significant discounts for you and your staff to attend training provided by Irrigation Australia
- Significant discounts on the certification disciplines, i.e. Meter Validator, Certified Irrigation Designer and Certified Irrigation Professional
- Significant discounts on attending or exhibiting at Irrigation Australia conferences and tradeshows
- Business listing in the search engine on the Irrigation Australia website
- Copy of the annual Irrigation Directory providing a free listing of our members - irrigation retailers, installers, consultants, certified irrigation professionals, suppliers and manufacturers
- Digital copy of the quarterly national magazine ***Irrigation Australia Journal***
- Digital copy of the WA regional quarterly magazine ***The Overflow***
- Invitations to member events (which will be delivered via video during the pandemic crisis)
- Monthly ***Irrinews*** emailed to keep you abreast of current trends and technologies in the industry
- Access to member-only area on the Irrigation Australia website and our library of documents including *Irrigation System Design Guidelines* and *Domestic Irrigation Installation Guidelines* (simply log in to download)
- eKnowledge area on our website providing members with access to a vast range of technical, research and conference papers in our electronic library and FAQs
- Discounts on publications and merchandise

## Membership benefits available to you are

### 1. Irrigation Journal Copies

Receive four copies of the only national Irrigation Journal per annum. Each journal contains valuable industry information about new projects, technologies and techniques for Agriculture, Landscape & Domestic Irrigation



### 2. National Irrigation Directory

Receive a **printed copy** of the only national and comprehensive Irrigation Directory. Find details about irrigation shops, manufacturers, installers, contractors, certified professionals and more.



### 3. Training Discounts

Receive significant member discounts on nationally accredited irrigation training and qualifications delivered by Irrigation Australia in major cities and regional towns.



### 4. Certification Discounts

Receive significant member discounts on the joining fee and renewal fee to the Certification Program administered by Irrigation Australia.

Certification is a voluntary, national program of industry recognition. Certification adds instant credibility with customers, increases job opportunities and demonstrates your commitment to efficient water management. Visit our website to learn more [www.irrigationaustralia.com.au](http://www.irrigationaustralia.com.au)

### 5. Conference & Tradeshow Discounts

Member discounts on attending and exhibiting at the Irrigation Australia Biennial International Conference & Exhibition.



### 6. Members Only Portal

Gain access to the members only portal on the Irrigation Australia website. Through the portal you can manage your Irrigation Australia membership, access members only documents, presentations and other materials.



## eKnowledge

### 7. Access to eKnowledge

Irrigation Australia eKnowledge repository has vast resources of technical papers, conference papers, Irrigation Journals and FAQ's available only for Members.

### 8. Discounts on Publications and Merchandise

Irrigation Australia offers a wide range of books, eBooks and other merchandise through its online store. Members receive significant discounts on materials.

### 9. Invitations to Regional Meetings & Events

Irrigation Australia hosts a number of regional meetings, events and site visits across Australia. This is a great opportunity for members and industry colleagues to come together to discuss new challenges, technologies and network.



### 10. Monthly Electronic IrriNews Newsletter

Receive our monthly Irrigation Newsletter with the latest information on upcoming training, events as well as new products, information and industry news.



### 11. International Representation

Be part of the global irrigation community and gain access to international contacts via the Irrigation membership of the International Commission on Irrigation and Drainage (ICID).



### 12. Discounts on Waterwise endorsement

Receive significant member discounts on the Waterwise endorsement programs, relevant for domestic irrigation contractors, installers, landscapers and retailers. Benefit from Waterwise marketing and merchandise to promote yourself as a Waterwise irrigation professional to the community.



See [www.waterwiseprograms.com.au](http://www.waterwiseprograms.com.au) for more information.

## Additional Membership Benefits

(EXCLUDES PRIMARY PRODUCERS, INDIVIDUALS & RETIRED MEMBERSHIP CATEGORY)

### 13. Free Listing in the National Irrigation Directory

List your business or organisation for free in the National Irrigation Directory with printed copies reaching the wider irrigation industry.



### 14. Free Online Job Listing

List your upcoming job vacancies on Irrigation Australia's online job board which attracts significant targeted views every month.



### 15. Free Listing on Irrigation Australia's Website

List your business on Irrigation Australia's Website Directory which attracts significant page views every month.



### 16. Journal Advertisement Discounts

Receive significant discounts on advertising in the Irrigation Journal. Circulation is more than 2000 copies per quarter.





## REGIONAL ROUNDUP

What's going on in the regions and with membership by Tracy Martin, Irrigation Australia's National Membership and Regions Manager.



### South-East Queensland

Members in the South-East Queensland region met via teleconferencing in April to work through a range of issues that were raised at the previous meeting.

### Western Australia

The regional committee met via teleconference in mid-March.

In a successful application of video conferencing technology, the Waterwise Programs were launched to the Bunbury region via video in April. The launch consisted of a PowerPoint presentation recorded with a voiceover and created as a video. A link was sent to all people who had registered to attend, and Irrigation Australia is following up with these people to discuss the program and answer any queries.

### Melbourne – Urban

The Melbourne urban committee met in February and will continue to meet on the third Tuesday of every month in 2020 via teleconference.

The Waterwise Programs have had a slow uptake by the industry in the region, nevertheless, the associated digital marketing promoting these businesses is in full swing and receiving high numbers of views. These promotions not only educate the community in waterwise efficient practices, but also drive end users to the Waterwise Irrigation Design Shops.

Whilst social distancing may affect the annual Melbourne Regional Committee Field Day, the Committee are still working on delivering a field day later in the year. We will keep you posted on the details when they are available.

### South Australia

The regional committee is in the process of organising meetings using teleconference facilities and is investigating holding events using video technology.

### Sydney

The committee will now re-focus its activities to cover other areas of services to our members such as events, councils and training now that the pressure has reduced on water restrictions.

## IAL BOARD DIRECTORS

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**CONFERENCE  
AND EXHIBITION  
POSTPONED**



**INTERNATIONAL  
CONFERENCE & EXHIBITION**

As result of the COVID-19 pandemic and restrictions on travel and large gatherings of people, Irrigation Australia Conference and Exhibition along with the International Commission on Irrigation and Drainage 24th Congress and 71st International Executive Council Meeting have been postponed and will now be held 6 to 12 July 2021.

## UP CLOSE

We get up close to Alan Michelson from Glenelg Irrigation in Adelaide and talk to him about his work and perspectives on keeping up to date with irrigation technology and practice.

### **IA. What is your role in Glenelg Irrigation and how long have you worked in the irrigation industry?**

**Alan.** I am the owner of Glenelg Irrigation. Most of my work is in South Australia, generally in the metropolitan areas. I do pretty much everything from meeting with clients, site visits and surveys, design and general consultancy work in the irrigation industry. I have a couple of people who can assist when there is a high workload.

Irrigation has always been a part of my working life. When I first left school, I worked on the family farm where we installed about 50 ha of irrigation. A few years later I started working on golf courses and eventually became a superintendent. Irrigation is a major part of golf course maintenance and as I tended to move around, I received a great exposure to many different irrigation systems. I then specialised as an irrigation manager for six years and started the CID process during this time. This led me to where I am now as an independent irrigation consultant in my own business.

### **IA. What are the main jobs you work on?**

**Alan.** Most of my work is for local government, either directly or through working with landscape architects. A small amount is for developers and private golf clubs.

The projects I am involved in range from small landscape areas to multiple sports fields, golf courses and real estate developments.

### **IA. Why do you think having a CID is an important certification and how has it benefited you?**

**Alan.** It has benefited me in two main ways. Firstly, preparing for the certifications (landscape commercial and landscape golf) has helped me get a better understanding of the theory of design. Secondly, it does get the attention of potential clients, especially in local government, and indicates you have a good understanding of requirements when designing an irrigation system.

### **IA. How do you keep up to date with developments in the industry?**

**Alan.** I catch up with regularly with industry reps, who are a great source of knowledge, not only of their own products, but of what is happening in the industry.



As far as education is concerned, I usually do one or two training courses a year, attend the national Irrigation Australia conference and regional Irrigation Australia events as well as some Australia Golf Course Superintendents events.

Golf course superintendents must be very good with irrigation management as it is extremely important in their line of work, so I find them a great source of information as well. I also use the internet for information and feedback of products, and YouTube for instructional videos.

### **IA. What do you think will be the biggest challenge for the industry in the next couple of years?**

**Alan.** Product selection, especially when it comes to central control systems. It's extremely important to get this correct. As advances in technology are providing us with numerous options at present, I think decision making in this area should include an independent irrigation consultant and even an IT expert/consultant (to investigate internet security and backup).

Climate change and possible future rises in the cost of irrigation water will also continue to affect how we irrigate, products we use and education in the use of technology to improve outcomes.

### **IA. What was the last book you read and where will your next holiday be?**

**Alan.** The last book I read was *The Mirror and the Light* by Hilary Mantel, which is the third book in the Thomas Cromwell series.

Our next holiday will be to Kangaroo Island. I haven't been over there for some time and they were hit very hard by the bushfires during the summer.



## PETER TALKS METERS



After seven months in the role of Metering Governance Officer, I now have a much better idea of the issues involved in metering and validation of metering installations. There is a lot going on, with different jurisdictions implementing policy

in their own way, refinements and changes to the rules. Adding to a changing policy landscape, we have also had severe drought, ravaging bushfires and a pandemic. With all this going on, my message is that there is a lot to understand but good progress is being made.

**State and territory implementation.** National standards for non-urban metering are continuing to be implemented across Australia, although the pace has slowed due to the recent drought and now the widespread restrictions imposed because of coronavirus.



The NSW government set back its roll out dates by 12 months for most installations (see Table 1). This has eased the immediate pressure on irrigators, but it has not removed the requirement for upgrading most meter installations.

For more information go to the [Irrigation Australia website](#).

**TABLE 1. REVISED DATES FOR ROLL OUT OF METERS IN NSW.**

Stage	Works covered	Roll-out date	
		Original	New
-	<b>All new and replacement meters need to comply with the new standards</b>	1 April 2019	
1	<b>Large works all NSW regions:</b> Surface water pumps 500 mm or larger	1 December 2019	1 December 2020
2	<b>Inland northern region:</b> All remaining works that require a meter	1 December 2020	1 December 2021
3	<b>Inland southern region:</b> All remaining works that require a meter	1 December 2021	1 December 2022
4	<b>Coastal region:</b> remaining works that require a meter –Coastal regions	1 December 2023	1 December 2023

Key dates for the other states have not changed.



Queensland Interim Water Meter Standard for Non-Urban Metering applies to new meter installations from 1 August 2019.



In South Australia from 1 July 2019, new or replacement water meters used for licensed purposes must comply with the National Metering Standards and statewide metering requirements.



In Western Australia requirements are in the process of being introduced over a five-year period (see Table 2).

**TABLE 2. SCHEDULE FOR THE INTRODUCTION OF METERS IN WESTERN AUSTRALIA.**

Annual entitlement	Effective date
500,000 kL or more	from 31 March 2018
50,000 to 499,000 kL	from 31 December 2018
10,000 to 49,999 kL in the Gnangara groundwater plan area	from 31 December 2019
10,000 to 49,999 kL in all other areas	from 31 December 2020



Victoria released the [Victorian Non-Urban Water Metering Policy](#) in March 2020 which replaces Victoria's Non-urban Metering Policy (2014) and its statewide implementation plan (2009).

**TABLE 3. SCHEDULE FOR COMPLIANCE WITH METER POLICY IN VICTORIA.**

Action	Date for compliance
Apply requirements for metering in the policy	From date Minister approves policy
Metering and telemetry of high risk take	All high-risk take is to have AS4747 meters and telemetry from date Minister approves policy
Replace non-compliant meters (meters that comply with neither an interim standard nor AS4747)	June 2025
Automated reporting of water take	June 2025

**Code of Conduct and Complaints Procedure.** A Code of Conduct and Complaints Procedure specific to CMIs was drafted at the request of several state jurisdictions for tighter governance over the performance of CMIs. After much discussion, a single pair of documents satisfying New South Wales, Queensland and South Australian authorities was developed. All CMIs are required to sign up to these documents and progress has been good with over 70 per cent having done so at the end of April.



**REMINDER to CMIs.** Your certification will not be renewed unless you have signed up to both documents.

**Enquiries.** I am receiving a growing number of enquiries from CMIs and from farmers. Mostly they are seeking clarification of specific requirements, either legislatively or technically. While I have been able to answer most of these enquiries, some needed to be referred to the state bodies or meter suppliers, and a small number of these have not met with clear responses. This reflects the developing nature of this issue and the developing understanding of non-urban metering by everyone involved.

Several requests were received from state department officers to follow up incomplete or improperly prepared validation certificates. Most CMIs involved were pleased to receive a friendly call to help sort out issues rather than an official approach from a regulatory officer. Generally, the issues were resolved by working through some of the many and sometimes confusing aspects for completing a validation certificate and/or by informing the CMI of recent changes and developments.

**Training course.** Based on the enquiries and state updates, some changes have been made to the [Meter Validation and Installation training course](#). The most significant of these are more detail on the underlying flow dynamics in closed pipes and open channels, flow disturbance types, more content from National Measurement Institute documents NMI M-10

and M-11, clearer linkages of the AS4747 with NMI documents, the certificate of approval and the manufacturers' installation guidelines, and dedicated sections for the installation of meters in closed conduits and open channels.

Before the coronavirus pandemic, we also added a third day to our CMI training course. This extra day allowed for presentations from pattern approved rural water meter manufacturers, followed by the students installing a rural water meter on a model installation rig that Irrigation Australia has developed. As a result, students walk away having completed everything necessary to be certified.

With the introduction of social distancing, we can now deliver most of the CMI training course using the Irrigation Australia virtual training platform, something that has worked well so far during these challenging times.

**Pattern approved meter list.** More meters have recently been added to the list of Pattern Approved water meters. [Get the updated list](#) from the Irrigation Australia website.



NSW DPIE is soon to release a list of approved data loggers for fitting to all meters installed after 1 April 2019. Irrigation Australia has informed all CMIs via email that, in lieu of face-to-face meetings, virtual training workshops on the data loggers and related telemetry

will be convened by NSW DPIE with Irrigation Australia. The email included a request for those with expertise in this area who would like to be part of a reference group and assist other CMIs with installing this equipment to let us know. This is open to all CMIs, not only those active in NSW, as Irrigation Australia expects that similar equipment will be required in other jurisdictions down the track.

### Information

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*Peter Smith, Metering Governance Officer, Irrigation Australia*

Check out Irrigation Australia's social media feeds.



[www.facebook.com/irrigationaustralia](http://www.facebook.com/irrigationaustralia)



[www.instagram.com/irrigationaustralia](http://www.instagram.com/irrigationaustralia)



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[www.linkedin.com/company/irrigation-australia-limited](http://www.linkedin.com/company/irrigation-australia-limited)



[www.youtube.com/user/IrrigAust](http://www.youtube.com/user/IrrigAust)

## SNAPSHOT

- NSW metering technology upgrades rolling out
- Desal water makes up supply shortfall for Melbourne
- Water Efficiency Program funding
- Queensland freezes irrigation water prices
- Less water available for SA irrigators

## NSW METERING TECHNOLOGY UPGRADES ROLLING OUT

In April 2020, the NSW government announced that its high-tech water metering telemetry system, which includes a data acquisition service (DAS) is close to operational.

According to Aaron Walker from the government's Water Renewal Taskforce, with the cloud-based telemetry system being rolled out, water users can arrange for qualified people to install telemetry equipment, such as local intelligence devices (LIDs). A [webpage](#) has been developed to update users, installers and manufacturers on the rollout of the system and the DAS.

The telemetry equipment enables the secure transmission of water extraction data from water users to the NSW Department of Planning, Industry and Environment. The government hopes that using LIDs that can record and transmit water take data in real-time will help support [floodplain harvesting measurement rules](#).

The new system will collect and store data received from LIDs and pass it on to the Natural Resources Access Regulator, WaterNSW and the Department of Planning, Industry and Environment-Water. Water users will also be able to access their information via a private online dashboard.

This information will be used for compliance and enforcement when new metering rules come into force.

### Installation deadlines

**1 December 2020.** Landholders, with surface water pumps 500 mm and above.

**Regional rollout date.** All other metered surface water works (except pumps less than 200 mm).



## DESAL WATER MAKES UP SUPPLY SHORTFALL FOR MELBOURNE

The Victorian Government has ordered 125 GL of water from the desalination plant for Melbourne for next financial year to secure water supplies in the face of population growth, climate change and falling rainfall.

The decision was made based on factors including current water storage conditions, projected water demands, possible future climate conditions and the balance between managing security of supply and minimising customer impacts.

Although 2020 started wetter than average, rainfall in 2019 was 5 per cent lower than the 30-year average across Melbourne's four major catchments. Over the last five years, Melbourne has used around 68 GL more water each year than flows into its catchments naturally.

Desalinated water has made up the difference – supplying more than 190 GL into Melbourne's supply system since the plant was turned on in 2016-17. Without water from the plant, Melbourne's storages would be 10.8 per cent lower than the 61.2 per cent capacity they were at in April.

## WATER EFFICIENCY PROGRAM FUNDING

The Water Efficiency Program, which provides funding to upgrade water infrastructure in the Murray-Darling Basin, has \$1.5 billion available to improve water efficiency and deliver 450 GL of water for the environment by 2024.

Anyone who has had water rights for at least three years in the Murray-Darling Basin can apply. Eligible projects must have neutral or positive socio-economic outcomes.

The funding is provided under five projects streams:

- Urban water efficiency e.g. stormwater capture and recycling
- Industrial water efficiency e.g. plant upgrades
- Off farm e.g. dams and water storage and upgraded channel systems
- Metering e.g. installing meters and upgrading meters to comply with the Australian standard
- On farm e.g. replacing open channels with pipes and installing drop systems.

**Information.** For information go to the [Department of Agriculture, Water and the Environment website](#).

## QUEENSLAND FREEZES IRRIGATION WATER PRICES

Queensland irrigators will see their irrigation water prices remain the same or fall next year as a result of the Queensland Government freezing prices for 12 months.

Natural Resources Minister Dr Anthony Lynham said government would absorb dam safety costs as part of ongoing measures to support Queensland business and industry through the COVID-19 crisis.

The decision means that irrigators will, on average, be roughly \$400 a year better off in 2020-21 than this year.

The independent QCA recommended irrigation water prices for irrigators over the next four years from 1 July 2020 to 30 June 2024. The prices are to contribute towards the cost of supplying water to the state's 35 irrigation schemes supplying 6400 farmers from (Mareeba in Far North Queensland, west to Cunnamulla and south to Yelarbon).

The Government will:

- absorb price increases in 2020-21 recommended by the Queensland Competition Authority
- pass on any price decreases recommended by the Queensland Competition Authority
- subsidise \$42 million worth of dam safety upgrades across the state over the next few years rather than ask irrigators to contribute towards them.

## LESS WATER AVAILABLE FOR SA IRRIGATORS

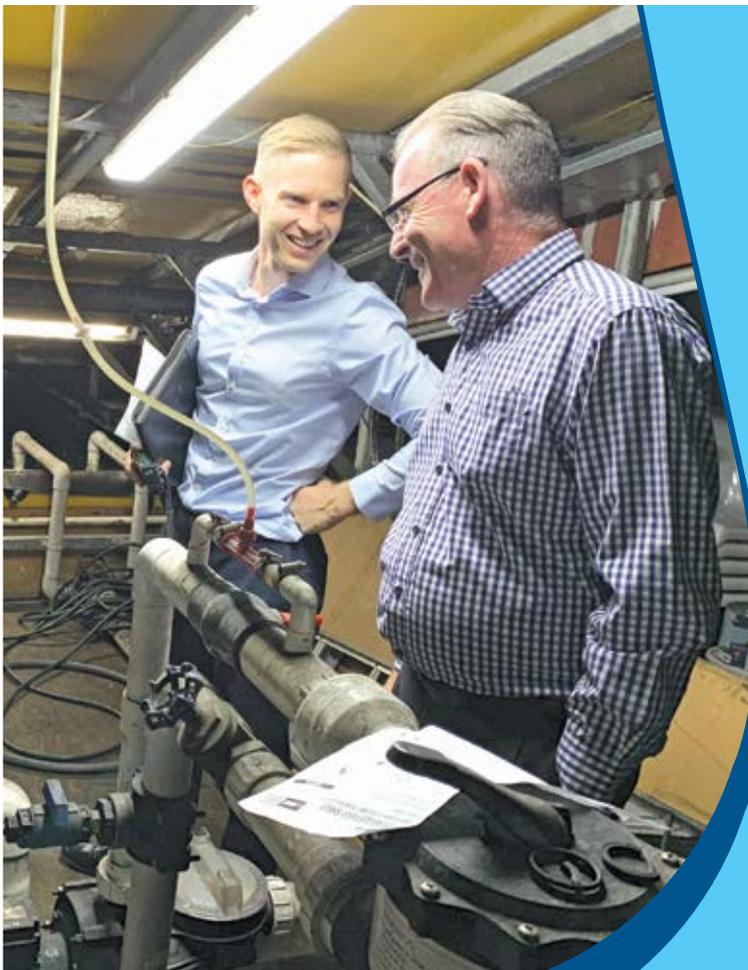
The South Australian Government has announced a projected minimum opening water allocation of 2 per cent for the 2020-21 water year and urged SA River Murray irrigators to plan for low water availability.

This low allocation is the result of dry conditions across the Murray-Darling Basin, caused by water flows being about one-third of the long-term average. To illustrate this, the volume in Murray-Darling Basin Authority controlled storages (2,726GL) at the end of March this year was much below the end of March figure from last year (3,282GL), and significantly below the long-term average end of March figure of 5,505 GL.

The government emphasised that this projected minimum is a conservative one and that the actual opening allocation could change if conditions improve. The actual allocation will be announced in two months, on 15 June.

As well, the government has changed the rules around carryover, which will allow irrigators to carryover any eligible unused allocations across multiple years, up to an entitlement volume of 20 per cent.

**Information.** For more information, about the 2020-21 irrigation season in South Australia, you can view a [webinar](#) recorded 8 April.



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## IRRIGATION AUSTRALIA TRAINING GOES VIRTUAL

In February, Irrigation Australia announced that it would be taking the theory aspects of its training online via their virtual training platform, because of restrictions on gatherings put in place as a result of the COVID-19 outbreak. We spoke with Geoff Harvey about the move to online and its progress.

**IA. Is Irrigation Australia continuing to offer all its courses or has it pared down its online offerings?**

**Geoff.** Irrigation Australia can offer the theory component of all its courses through its virtual classroom. This has taken a bit of organisation as there is more work to do before each course, e.g. preparing notes and questions and contacting students beforehand to answer any questions they might have about the process and to test the technology. All classroom assessments are either sent to the students beforehand or done on our Moodle platform live during the Virtual training.

**IA. You are offering the theory components of courses. How will you present and assess the practical components?**

**Geoff.** Where a course has practical components, we are planning to assess students at a central location, possibly



Virtual classroom sessions are supported by resources and questions and activities.

after October if the situation allows, or early next year. We do have other options for doing these assessments as well – one is students videoing themselves completing an assessment task while the other is students completing an assessment task over a video call using Facetime or similar software.

**IA. What format do the courses take online?**

**Geoff.** The courses are presented in a virtual classroom where students can participate by answering and asking questions using either the microphone or a chat box. The sessions are usually four hours long, and we are incorporating plenty of variety in terms of activities so people don't get bored, e.g. there might be a presentation by the course presenter on a subject and an opportunity for questions, then students might be given questions to answer or a task to complete, just as we do when training face to face in the classroom.



Personalised, one-on-one assistance can be provided through video conferencing software.



Geoff Harvey says that Irrigation Australia's virtual classroom provides another, valuable, option for presenting professional development activities.

We use Zoom for the virtual online classroom. There have been issues recently about Zoom's security, mainly around people being able to drop in on sessions, or "Zoombombing". Students are invited to each virtual training session via an email link and then we permit each student to participate so that we control who is part of the training session. Our virtual training sessions are password protected so we believe that our sessions are secure, and will not be subject to breaches like that.

**IA. You have already presented several online courses? What has the feedback been about them?**

**Geoff.** Feedback from most participants has been positive. It is a new mode of learning, and a lot of people are nervous about the process and using the technology to start with, but we are finding that they become comfortable with it pretty quickly.

Some people have been a bit worried about using the technology,

which is why we contact everyone a few days before the course begins so we can go over the process and test the internet speeds etc. This quickly identifies any problems.

This practice proved its worth recently for a student who was doing course. His internet at home was so poor that he took his computer into a nearby town and joined the virtual classroom while he was sitting in the local park.

One advantage for people who are geographically remote is that they can attend classes without the expense of travel or being away from their workplace. This is an advantage for Irrigation Australia too as we will be able to offer the same course to people wherever they are rather than have them all come to a central location.

**IA. When social distancing is over, will Irrigation Australia continue to offer online as an option or return to classroom activities?**

**Geoff.** The virtual classroom certainly gives us another option for presenting professional development activities. We have learned a lot, and quickly, because we had to get this up and running in such a short amount of time. We are now happy with the system we have put in place and will certainly be using it in the future. In fact, this has been the incentive for us to do something about Virtual online training that we had been intending to do.

Of course, we will go back to presenting courses in a physical classroom when we are able to. For some courses such as the Certificate III in Irrigation Technology, having students together in a classroom or in the field doing practical exercises for some components is essential.

The good thing about establishing our virtual classroom is that it gives Irrigation Australia and industry members more options for professional development.



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# PROFESSIONAL DEVELOPMENT

## ONLINE COURSE DELIVERS FOR KIERAN



Kieran Drage, Philmac territory manager for Perth and the north-west, recently completed an Irrigation Pumps and Systems course through Irrigation Australia’s virtual classroom. The course was held for Western Australian participants and facilitated by Irrigation Australia trainer, Paul Wilmot.

We spoke with Kieran about the experience.

He explained that the course was designed to give people working in the irrigation industry a greater understanding of pumps, the pump selection process and how to apply it in real case scenarios.

Kieran said he has completed several online training modules before but nothing as large as this course.

The original course, which was delivered in the classroom, was designed to be held over two days, but taking it online meant it had to be modified to three half days. Topics covered included pump components, how to select and manage pumps, reading flow resistance charts, pressure loss through to trouble shooting and installs. The assessment process involves completing some review questions and a practical assignment.

While the specifics on pump selection and maintenance are probably not something he would use in his current job, Kieran explained that the course did give him a much greater understanding of hydraulics and how this relates to his end user customers.

“It was a great opportunity to improve my overall skill set in the Irrigation Industry and this will improve how I can relate to my customer base moving forward,” he added.

One of the things that made the course a positive experience for Kieran had to do with the sophistication and improvement in online technology.

“The ability to communicate face to face with people all over the state was a definite advantage.

“We could stop the presentation at any stage to clarify some information or ask a question and the entire group could respond. The facilitator could share his screen with the group and forward any specific information required. The Power Point presentations were also made available to access after the course had concluded to support us with our assessments. A knowledgeable presenter also made it a positive experience,” he said.

What he did miss was the not going into the field for some practical experience.

“With my current roll I don’t work hands-on with pumps so was looking forward to putting some of the classroom work into practice. This probably affected me more than the rest of the group who work with pumps daily,” Kieran said.

All in all, Kieran said that the Irrigation Australia team did a “fantastic job”, especially considering it was the first course held through the virtual classroom.

“The course was modified to suit a virtual environment and I would absolutely recommend any people interested to give it a go. The more courses that are completed the better they will become,” he said.

## PROFESSIONAL DEVELOPMENT CALENDAR

Irrigation Australia’s range of nationally accredited courses and qualifications are designed to provide you with the right skills and knowledge to pursue a career in the irrigation industry. All sessions are delivered over half days and accessible from the convenience of your own office or home no matter where you live. Take a look at the topics being delivered over the coming months.

JUNE	2 – 4 June	Urban Irrigation Design
	11 – 12 June	Commercial Irrigation Design
	24 – 26 June	Certified Meter Installer and Validator
JULY	1 - 2 July	Basics in Wiring and Electrical Troubleshooting
	22 – 24 July	Irrigation Efficiency
	28 – 29 July	Irrigation Pumps and Systems

Read about Irrigation Australia courses and [register your interest](#) on the Irrigation Australia website.

**Certificate III in Irrigation Technology (Trade level).** This qualification reflects the skills and knowledge required to become an irrigation installer, operator, retailer or technician for residential, commercial or agricultural industries. The course provides an in-depth irrigation training program assessed against nationally recognised competencies towards Certificate III in Irrigation Technology AHC32419 (Trade Level). It also engages subject matter experts for specialised topics such as hydraulics, troubleshooting and basic irrigation design.

Register your interest for the July 2020 course [here](#).

**Certificate IV in Irrigation Management.** This qualification reflects the technical and supervisory skills and knowledge required by people to operate as supervisors and specialists in the irrigation industry. It applies to irrigation installation site managers and managers of irrigation systems in irrigation servicing, horticulture and agriculture.

Register your interest for the July 2020 course [here](#)



## ICID 24TH INTERNATIONAL CONGRESS AND THE IRRIGATION AUSTRALIA CONFERENCE & EXHIBITION SYDNEY 2021

While preparations for the combined ICID International Congress and Irrigation Australia Conference and Exhibition were going full steam ahead, recent events have overtaken the planning. As a result of the COVID-19 pandemic and restrictions on travel and public gatherings, the organising committee, in consultation with ICID head office, had to postpone the event. It will now be held from 6 to 12 July 2021.

The pandemic has disrupted plans for many other international events and unfortunately ours fell into the same cluster. We still are still preparing for a highly successful conference, congress and exhibition and are planning a series of webinars and distance meetings, which may better suit some of the potential visitors.

While the date has changed, the event stays the same. The ICID 24th International Congress and 71st International Executive Council Meeting are combined with the biennial Irrigation Australia Conference and Exhibition, and delegates who register for one event can attend both. Both events will be held at the International Convention Centre in Darling Harbour, Sydney and there will be a fun night for all at the Outback Spectacular conference dinner.

A feature of the program is a special symposium on *Integrated approaches to irrigation management in future*. The symposium will discuss how climate change is directly affecting water availability in many parts of the world. These effects, which include extreme events like floods, droughts and higher temperatures, such as have been seen this summer in Australia, are not easily managed and represent a threat to agriculture along with water and food security. In this context, improved management of water resources in agriculture will be critical to addressing climate uncertainties as a way of mitigating the impacts of and adapting to the changing climatic conditions for improved water and food security.

Another feature of the congress is a special session on *Developing the future tools for managing uncertainty in irrigation management*. This promises to be a lively and interesting session that will focus on institutional arrangements, system modelling and crop agronomy and social adaptation.

For information about Irrigation Australia 2021 Conference and Exhibition and the ICID Congress, go to <https://www.icid2021.com.au/>



**24<sup>th</sup> ICID**  
INTERNATIONAL  
CONGRESS  
71<sup>st</sup> IEC MEETING  
06-12 JULY 2021



## IACID AUSTRALIA NATIONAL COMMITTEE

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## IMPORTANT DATES

DATE	PLACE	DETAILS
1 – 7 December 2020	Marrakech, Morocco	<b>5th African Regional Conference on Irrigation and Drainage (ARCID)</b> . Theme is sustainable Management of irrigation for improved resilience of agriculture in Africa. W: <a href="http://5arcid.ma/">http://5arcid.ma/</a>
6 - 12 July 2021	Sydney, Australia	<b>24th ICID International Congress and 71st IEC Meeting</b> . For more info E: <a href="mailto:info@irrigation.org.au">info@irrigation.org.au</a> , W: <a href="http://www.icid2020.com.au">http://www.icid2020.com.au</a>
TBA	Agadir, Morocco	10th International Micro Irrigation Conference (10MIC)

Momir Vranes, Irrigation Australia Board member and Chair, IACID



## PLANNING AND COMMUNICATION KEYS TO SUCCESSFUL PROJECT

In April, Think Water Northern Rivers commissioned an irrigation system they had installed on the Ken Leeson Oval at Iluka on the north coast of New South Wales on behalf of Synergy Resource Management Pty Ltd. The oval, located on crown land, is controlled and managed by Clarence Valley Council. Installing the irrigation system was the second stage of a recycled water and irrigation project, the first stage of which involved Think Water Northern Rivers designing and installing an irrigation system on the local golf course.

Lee Rothwell who, along with co-director Jayne Rothwell, owns and manages Think Water Northern Rivers, describes the project, including a few of the more unusual aspects that had to be considered when designing and installing the irrigation system.

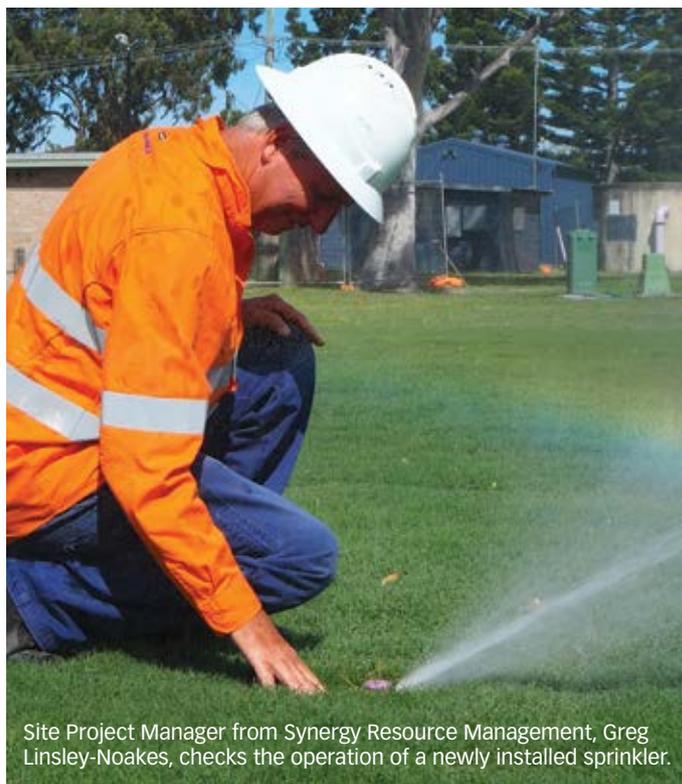
### SNAPSHOT

- An irrigation installation at Iluka on the New South Wales north coast included some unusual issues to manage, illustrating the importance of planning, technical expertise and communication
- Recycled water is the irrigation water source
- The location of the sports field in a residential area and on a sand-based substrate presented challenges in levelling and reshaping and time available to install the system
- The irrigation system was automated and can be integrated with more sophisticated software in future. Includes hydraulic valve-in-head sprinklers
- Bushfires, floods and COVID-19 added to the complexity of managing the project to completion so it could be delivered on time

### Water source

The primary water source for irrigating both the golf course and the oval is recycled water, which is supplied from the recently upgraded sewage treatment plant (STP). The recycled water is currently supplemented by potable water from the town water supply. The council expects that population growth in Iluka in the next few years will mean that the backup supply from the town's potable source will not be needed to supplement the irrigation supply. This increase in recycled water generated was allowed for when the sewage treatment infrastructure was upgraded.

One of the features of Iluka is that the coastal landscape where it is situated is extremely flat, so a pressurised sewage collection system was installed to efficiently transport waste to treatment plant.



Site Project Manager from Synergy Resource Management, Greg Linsley-Noakes, checks the operation of a newly installed sprinkler.

"A pressure sewer system has a small pump well with a submersible grinder pump servicing each property," said Lee. "The collection wells connect to a pressure sewer reticulation network, which transports the untreated wastewater to the sewage treatment plant."

The tertiary treated recycled water produced by the STP is the primary water source for the irrigation system on the golf course and oval. Following treatment, it is stored in a covered pond at the sewage treatment plant and transferred back to the two concrete tanks (located on their respective irrigation sites) to meet irrigation demand.



Sprinklers and filtration system being tested during commissioning and hand over of the newly installed irrigation system.

Any surplus recycled water produced by the STP that cannot be stored either at the STP or in the Irrigation storage tanks can be fed into an environmental release system main that runs from the treatment plant to the river. The environmental release in the river only operates on an outgoing tide to ensure that recycled water can only be transported out to sea and not upriver.

Since the Iluka sewerage system was commissioned in September 2015, the only time the environmental release has operated is for monthly testing. All other recycled water has been irrigated.

### The site

The sports field is in a residential area, which presented some challenges for the works required. An important issue was that the works brief included significant laser levelling and re-shaping of the field, with up to 400 mm of topsoil being removed. In some areas dust issues and wind erosion were a concern.

As the field was mainly a sand-based substrate, Think Water worked with the principal contractor to minimise the amount of time the field would be stripped of vegetation. To this end mainlines and laterals were installed before stripping turf and laser levelling. To achieve the specified minimum 450 mm final depth of coverage over the pipework, each sprinkler position was surveyed and marked with cut and fill levels documented. Trenching was completed based on final finished grade ensuring minimum cover of 450 mm was achieved after final levelling. Sprinklers were fitted after levelling and before the fields were re-turfed.

The field's proximity to other sporting facilities and entertainment venues also meant that foot traffic was going to be an issue both in terms of potential disruption

and safety. To overcome this potential hazard, the entire field was cordoned off using security fencing for the duration of the installation.

The site was identified as having significant aboriginal cultural heritage so it was important to work with the principal contractor and local council to meet compliance criteria to ensure that nothing of cultural significance was disturbed.

### The irrigation system

Like most councils, Clarence Valley is keen to be able to remotely manage the irrigation systems it is responsible for. Being a rural council, this means having a control system that networks irrigation systems in a variety of towns and townships, from Grafton in the south to Iluka 80 km to the north.

To achieve the long-term goal of central control with remote management, Think Water Northern Rivers installed a Hunter ACC2 controller to manage the automation. This allows the system to run 'stand alone' as well as readily integrating with Hunter Integrated Management and Monitoring Software (IMMS 3.0), which is planned for the future.

This will give the council total remote control over each of the controller's functions. With flow monitoring, weather sensing and soil moisture monitoring already installed, the IMMS 3.0 system will access this data for future reporting capability.

Toro 640 hydraulic valve-in-head sprinklers were selected for the project because of their quality and long-term durability. The system was specified as hydraulic to ensure electrical damage due to lightning strike was minimised and to mitigate the risk of nuisance fouling and potential unreliability of solenoid valves that can result



# CONTRACTORS' CORNER



This overhead photo shows the oval during installation of irrigation infrastructure, as well as oval surrounds. The machine is using laser levelling to cut and fill the surface of the oval. The pipes and risers are already installed.

from algae and other contaminants suspended in recycle water. Pilot water supply used to actuate the sprinklers is supplied from a boosted potable water source which is chlorinated and filtered, therefore maximising the reliability of the system.

During this project, access to the site was restricted for several weeks due to the unprecedented bushfires, when Iluka was isolated for an extended period. In the three months at the beginning of the year and after the bushfire emergency, Iluka had 800 mm of rainfall. Luckily, the sandy soils allowed work to continue between downpours and the project was completed and commissioned by the end of April.

## Planning important

"A well-run project delivered safely, on time and on budget doesn't just happen by itself," said Lee.

"It's all about planning and establishing an effective communication program to keep all stakeholders informed and as a way of ensuring everyone's expectations are met or exceeded."

Of course, Lee acknowledged that even with meticulous planning, issues will invariably turn up uninvited and unannounced. This only emphasises the value of good project management so that issues can be dealt with quickly and efficiently. This helps to make sure the quality of the job is not compromised and that all stakeholders, including the client, are kept in the loop.

"Put simply, it's all about teamwork and a collaborative approach to achieving a great outcome," he said.

Site Project Manager from Synergy Resource Management, Greg Linsley-Noakes, agreed with Lee about the importance of teamwork and communication, especially in minimising variations and working with the scope of works to meet a very tight budget.

"We have had our challenges with fires, floods and COVID-19, but your guys battled through these issues and got the job done," he said.

**Acknowledgment.** Thanks to Lee Rothwell for assistance with writing this article and to Jayne Rothwell for photos.

Anne Currey, Irrigation Australia

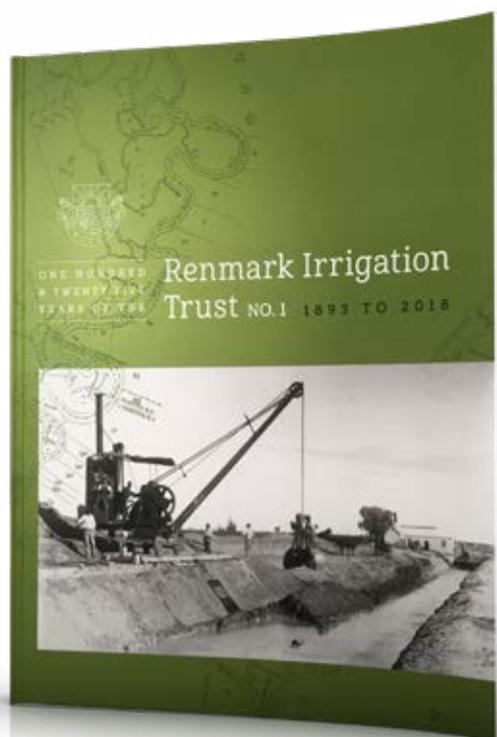


Renmark Irrigation Trust recently released a publication commemorating its 125-year history. The trust is Australia's oldest irrigation trust, and the irrigation scheme it manages is the first to receive global recognition for good water stewardship with gold certification from the Alliance for Water Stewardship, in March 2018. (The highest certification level of platinum was attained in January 2020, a description of which is not included in the book.)

The book, *One Hundred and Twenty-Five Years of the Renmark Irrigation Trust No 1: 1899 to 2018* by Geoff Bull, catalogues the move to best practice water delivery (from channels to pipes and surface irrigation to drippers). It also describes the installation of drainage infrastructure as a way of overcoming the salinity that reared its destructive head after the 1956 flood.

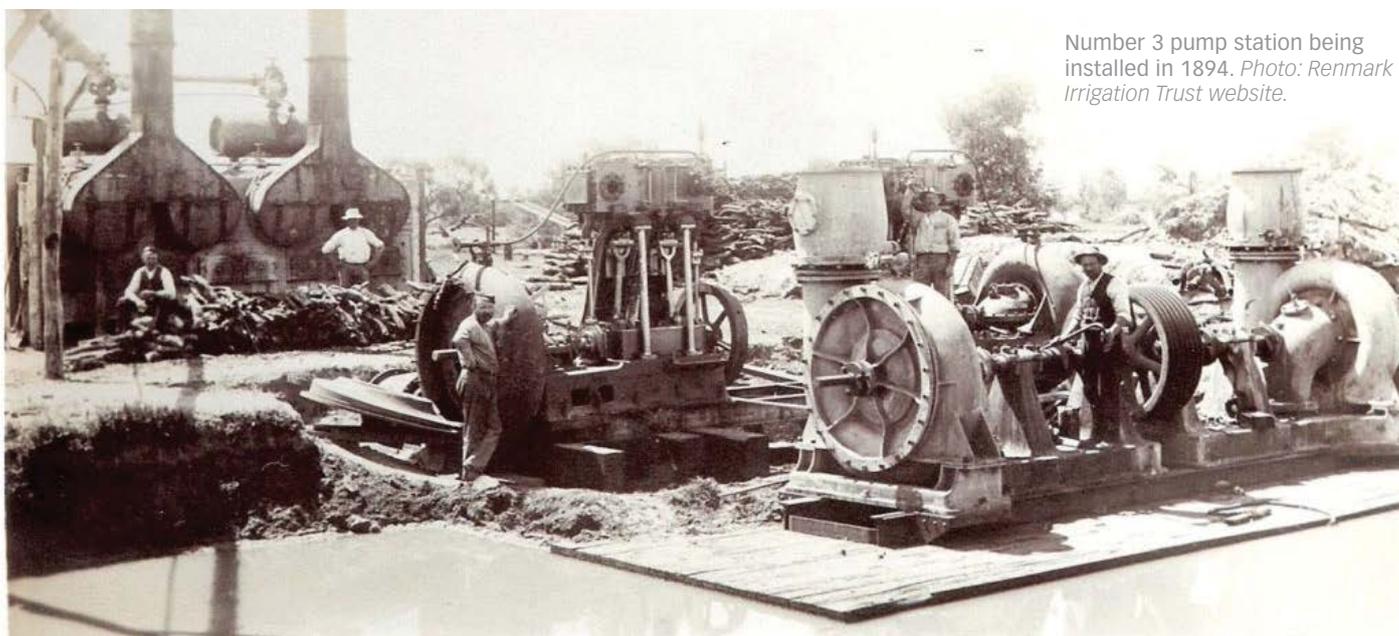
In an interesting historical note, during the 1930s, the Renmark Irrigation Trust branched out from managing water and supplied electricity to Paringa, Lyrup, Berri, Chaffey Irrigation area and the Loveday Internment Camp. This continued through World War 2, when a shortage of diesel led the trust to revert to burning timber to generate power. The timber was cut by Japanese internees at Woolenook Bend and brought downstream to the power station in paddle steamers and barges. In 1954 the trust stopped generating power and bought it from ETSA for distribution. In 1973 it sold its power distribution network to ETSA.

Included in the book is the description of another first for the trust - being the first irrigation infrastructure organisation to partner with the Commonwealth Environmental Water Holder to deliver water for rehabilitation of the floodplains damaged by past irrigation practices, enhancing the health of river system.



Today the trust manages over 140 km of piping infrastructure. The pipe and pump infrastructure was modernised in 2015-16 with the assistance of \$16.3 million from the Commonwealth Government, through the Irrigation Industry Improvement Program (3IP), to provide more efficient water supply to meet the needs of on-farm irrigation technology. Part of the funding enabled the installation of real-time water meter telemetry.

To order a copy of the book (hard cover, \$60.00 and soft cover, \$45.00 + postage) phone Renmark Irrigation Trust, 08 8586 6911. For information go to the [Renmark Irrigation Trust website](http://www.renmarkirrigationtrust.com.au).



Number 3 pump station being installed in 1894. Photo: Renmark Irrigation Trust website.



## ELECTRONIC SIGNATURES: HOW LEGAL IN FINANCIAL DOCUMENTS?

In an increasingly digitised world and with the impacts of COVID-19, the next natural step is for organisations to implement electronic approval processes (e-signing). Accounting practices are beginning to see organisations using electronic signatures to sign documents and to authorise transactions. This article looks at the legal differences between different forms of electronic signatures.



### SNAPSHOT

- Examples of e-signatures include digitised versions of a physical signature, a typed name at the end of an email message and digital signature that uses encryption and decryption technology alongside public key infrastructure (PKI)
- A digital signature that uses encryption and decryption with PKI is the most and secure and reliable option to use for business
- Financial and tax auditors will review how businesses design controls, including use of e-signatures, to reduce the risk of fraudulent approvals being accepted.
- Businesses should have policies to do with authorisation and acceptance of documents, especially in an environment of growing attempts at fraud where fraudsters impersonate an email account holder to change bank account details for employees or vendors.

### What are e-signatures?

Electronic signatures, or e-signatures, are the electronic version of manually handwritten, physical signatures (known as 'wet signatures'). Like a wet signature, an e-signature is a legal concept; its purpose is to bind a signatory to a document, in a way that proves the person signing is who they say they are.

There are several ways of achieving this, some of which are more reliable than others. Examples include:

- a digitised version of a physical signature, e.g. a scanned image of the signature saved in an electronic format and pasted into a document
- a typed name at the end of an email message
- a digital signature, which uses encryption and decryption technology alongside public key infrastructure (PKI).

A digital signature requires the signatory to prove their identity through an authentication process. This prevents tampering, making it the most secure and reliable option. It is the foundation on which almost all enterprise e-signature software is built.

## Digital versus electronic signatures

Although the terms are similar, e-signatures and digital signatures are quite different.

An e-signature is a legal concept and a catch-all term for a variety of methods (see those listed in the previous page) for authenticating signers.

Digital signatures are a very specific security technology for authenticating and securing objects using public/private key cryptography. The signature is authenticated with a certificate-based digital ID, typically issued by a trusted, third party certificate authority.

A good enterprise e-signature platform will use digital signatures.

## What weight do electronic approvals have and what controls do I need to support using them?

Those charged with the governance of your organisation are required to design the control environment to suit their business needs and reduce the risk of fraud and error to an acceptable level.

Financial and tax auditors, such as TNR, examine whether organisations have suitably designed and implemented effective approval controls. This means that if your organisation intends to use electronic means to approve documents or expenditure, they will review how you have designed your controls to reduce the risk of fraudulent approvals being accepted.

---

*“Enterprise e-signature platforms require a signatory to prove their identity to sign the document. This provides evidence of their identity, and then ‘seals’ the document to prevent it being easily edited.”*

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The *Electronic Transactions Act (NSW) 2000* and the *Electronic Transactions (Queensland) Act 2001* outline that if a person’s signature is required then three tests must be met for the signature to be valid:

1. Identification—a method must be used to identify the person/people and capture their intentions. For example, the signing officer is bound by their declaration even if they did not send the communication but rather consented to someone sending it on their behalf.
2. Reliability—the process must maintain the integrity of the information. For example, the information must remain complete and unaltered throughout the course of a transaction.
3. Consent—the recipient must agree to receive digitally signed documents.

A scanned image of a signature on an unsecured document fails these tests because the document:

- fails to identify who attached a picture of the signature—anyone can scan your signature from a public document and attach it to an approval form without your knowledge
- can be manipulated to add the signature, varying what was intended to be approved.

Enterprise e-signature platforms require a signatory to prove their identity to sign the document. This provides evidence of their identity, and then ‘seals’ the document to prevent it being easily edited. These controls increase its reliability and add an extra layer of security.

## Policies on their own are not enough

Most organisations have reviewed their control environment and developed policies that aim to address these three tests. But they are not always adjusting their control activities to implement their policies. This means that processing staff are inappropriately accepting documents with just pictures of signatures or email approvals.

## Does an email from me count?

Generally, no, because a basic email also fails these tests.

Over the last couple of years, we have seen an increased number of fraud attempts whereby fraudsters impersonate an email account holder to change bank account details for employees or vendors.

This shows that emails lack the security to evidence the identity of the account holder and the account holder’s intentions. Emails are not reliable because they can be manipulated before being sent or once received.

Organisations need to consider the risks of accepting email approvals and requests when designing their control environment and implementing control activities. This includes implementing complementary controls to verify information, such as calling the sender from independently sourced contact details from the entity’s website rather than the footer of the email.

**Acknowledgment.** The Information provided in this document has been provided with thanks from the Queensland Audit Office.

**Disclaimer.** This information is not advice. Readers should not act solely on the basis of material contained in this article. Items herein are general comments only and do not constitute or convey advice per se. We recommend that formal advice be sought before acting on anything contained in this article.

Thomas, Noble and Russell, Lismore NSW

## FRANKLIN ELECTRIC

### TOP THREE BENEFITS OF VFDS FOR IRRIGATION PUMPING

Variable frequency drives (VFDs) are now widely used for irrigation pumping applications because of the many cost-saving opportunities they provide. Here, we look at the top three benefits of installing VFDs on irrigation pumps.

#### Energy savings through system flexibility

One of the major benefits of VFDs is that they can be programmed to run the pump at a certain speed and flow rate.

In the past, irrigators needed to size the pump for the worst possible case, and then use a combination of valves to try to run the system at the best efficiency point (BEP). It is difficult to meet the BEP in all zones this way, however, so there are always zones where the pump is oversized, resulting in increased wear on the system, higher energy consumption and higher costs.

VFDs allow irrigators to customise the way the system runs so that pump speed will slow down, and flow and pressure be reduced to operate a smaller zone at the BEP. This has long-term benefits as less system maintenance will be needed, equipment will have a longer lifecycle, and energy costs will be greatly reduced.

#### Reduced water loss

By ensuring pumps operate at the optimum pressure for the irrigation application, VFDs have cost and environmental saving benefits for water. If an irrigation system is operated with more pressure than required, sprinklers will mist which creates smaller water droplets through the nozzle that are more easily moved by the wind and evaporate into the atmosphere resulting in a loss of water.

VFDs also allow irrigators to adjust pumps to automatically suit conditions so that water is not unnecessarily delivered. By doing this, scheduling is improved, rootzone waterlogging is avoided and there is no waste of water.

#### Maintenance savings

As well as reducing wear on equipment, VFDs also have other features that help to further reduce maintenance costs and increase the lifecycle of pumps.

VFDs are soft-start devices so problems associated with water hammer and excess power draw during start-up are eliminated, and flow or pressure surges are reduced.



#### The Franklin Electric advantage

Franklin Electric's line of VFDs – Drive-Tech – was designed and developed to optimise, control and protect pumping systems. The VFDs are compatible with different types of pumps, including vertical multi-stage, centrifugal and submersible. Drive-Tech VFDs can be used for water supply and irrigation applications and are suitable to operate most new or existing systems up to 15 kW.

The Drive-Tech enclosure is manufactured from diecast aluminium, and is sturdy, lightweight, easy to cool and compact in size. The panel has an IP55 rating, so it can be installed in humid and dusty places.

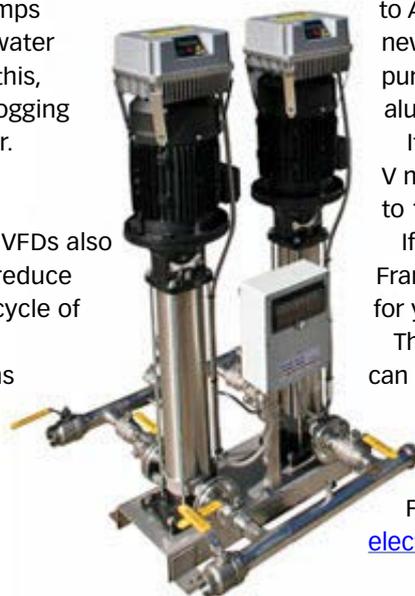
Drive-Tech Solar is also available for efficient pumping and moving of water using the sun's energy to generate DC power from solar arrays. This is then converted to AC power to operate the electric motor of a new or existing above or below ground water pump. It has an enclosure rating of IP65, with an aluminum body and 304SS metal parts.

It also offers operation of 3-phase 230 or 400 V motors to power pumps with motor needs up to 15 kW–30 amps maximum.

If you need a VFD for a pump above 15 kW, Franklin Electric can design a system specifically for you using drives higher than 300 kW.

The knowledgeable team at Franklin Electric can help you find the right VFD for your installation to make sure you're getting the most benefit from it.

**Information.** For information go to the Franklin Electric website. <https://franklin-electric.com.au/>



## RAINFINE

### RAINFINE INTRODUCES JUST-FINE PIPE

Corrosive water, caused by factors ranging from high or low pH to variable mineral content to waste water applications, can weaken and deteriorate standard galvanised pipe, leading to premature failure.

RainFine Just-Fine irrigation uPVC lined pipes protect your irrigation pipelines from any corrosive components in your water, ensuring a long life for your machine.

"Water quality issues continue to be a challenge for growers around the world, and while several different options to handle corrosive water have existed in the market for years, farmers have told us there was a real need to have a better solution," said Wang Zhi, director of global sales at RainFine.

"We looked at this issue with a new approach and redesigned an entirely different solution about which we are extremely proud and, even more importantly, that our farmer clients are telling us is an absolute gamechanger for them."

The new Just-Fine pipe features a manufactured insert UV-stabilised plastic flange that allows for positive flange contact and eliminates the potential for a gap between flanges at joints, resulting in improved strength and span consistency. It is the same span joint design used for existing RainFine galvanised pipe, but with the added protection of the Just-Fine PVC liner through the span pipe to provide a high level of quality and rigidity.

To address the pipe expansion and contraction challenges that cause the liner to move within the pipe, potentially leading to cracks and leaks, RainFine introduced new design innovations.



- Rigid uPVC provides the solid base for the pipe, does not expand or contract like the poly pipes do and will not crack after time at any deviation like at flanges or pipe ends.
- Stainless steel fittings (304) are used at the pipe ends for rigidity and keeping with the corrosion free goals. The riser pipes and elbows are also supplied with 304 stainless steel.
- The pipe uses an insert-type flange with double rubber seals which allow for any expansion and contraction in the pipes, and they provide a perfect fit and seal, eliminating any leakage.
- The pipe sprinkler outlet uses a 3/4" 304 stainless-steel outlet fitting with ideal unrestricted flow characteristics and with a strong nut that will not break off over time as poly ones are inclined to do.

Re-piping your older Lindsay or IrriFrance style pivots with Just-Fine pipes and fittings can extend their life significantly, providing a longer-term solution to the conservative farm operator.

For more information about protecting your pipes with Just-Fine pipes, contact RainFine today, website <http://www.rainfineirrigation.com>.



- ◆ **Just-Fine uPVC Lined Pipe – the perfect solution for corrosive, acid and saline water.**
- ◆ **Special uPVC 2.5mm wall thickness uPVC pipe-liner is stable in hot or cold climates.**
- ◆ **Sprinkler outlet is made of stainless steel with curvature on inner pipe wall, dependable.**
- ◆ **Just-Fine uPVC Lined Pipe comes with a 20 year warranty, the best in the business.**

### Center pivot with uPVC lined pipes



<http://www.rainfineirrigation.com>

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## ANTELCO RELEASES NEW CATALOGUE

In April, Antelco released its 2020 *Metric Irrigation Equipment Catalogue*, which features drippers, sprays, sprinklers, valves, fittings and accessories. The catalogue is free and is available as an [online](#) magazine or as a PDF.



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