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The Overflow

Quarterly Publication of Irrigation Australia (WA Region)

IRRIGATION AUSTRALIA

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The Overflow is the quarterly publication of Irrigation Australia (WA Region). Articles published are views expressed by the authors. IAL(WA) is not responsible for their accuracy and disclaims any liability which may arise from any person acting on the materials contained within. Editorial content does not necessarily represent the views or policy of Irrigation Australia (WA Region)

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IRRIGATION AUSTRALIA

Keep up-to-date with irrigation in Australia, visit the IAL website at **www.irrigation.org.au**

Mark Your Diary

August
14 Soil Types & Amendments Workshop, Richgro
14 Biophilic Urbanism Seminar
see page 19 for further information
16-17 WA Horticulture Update, DPIRD
see page 20 for further information

September
19 Soil Types & Amendments Workshop, Richgro
20 Introduction to Irrigation – Urban

October
16 Irrigation Australia (WA Region) AGM
25 Irrigation Australia National AGM

For further information, please contact Ellen Slobe on (08) 9368 3136 or ellen.slobe@irrigation.org.au

Cover: Northbridge Piazza - vertical garden. See Biophilic article page 19. Photo credit - Deep Green Landscaping

Authorised sprinkler testing signs

If you are testing a system outside of water rostering hours, as a gardening industry professional, you are not required to register for an exemption with the Water Corporation. However, to promote that you are doing authorised work, you might like to have a sign clearly displayed at the front of the property. These signs are available from the IAL (WA).

Now available in:
Corflute ($25) and Magnetic ($75).
GST Exclusive.

All signs approximately 400mm x 300mm. For enquires and order form please contact our WA office on (08) 9368 3136.

Chairman's Report

by Clinton Hort - IAL (WA) Industry Chairman

IRRIGATION AUSTRALIA

Dear Members,

Welcome to this Winter issue of The Overflow. We are already two-thirds of the way through the season, with some relatively good rainfall in recent weeks, in line with long term averages for June and July. I hope industry members have been taking some time to settle down and enjoy the off-season, as well as reflect on the previous season and make plans for the coming year.

We encourage members to get involved and connect with your industry association at regional level. In a climate of restricted water resources and a struggling economy (although reports of recovery are heartening) industry needs to work together to achieve its goals.

There have been many plans in motion behind the scenes at Irrigation Australia, particularly related to Waterwise, some of which are reported on in this edition in the Regional Update, with more to be announced in coming months.

On 20th June, Water Corporation CEO Sue Murphy announced that she will not be continuing in the role when her contract expires. Water Corporation have been a long-term valued stakeholder in the industry and Mrs Murphy has been a key figure in the industry during that time. While she is still at the helm until the end of the year, we wish her all the very best and thank her for her contribution to the irrigation and water industries. You can read an extremely well-written and thoughtful article on Sue's time with Water Corporation, originally published in the Water & Wastewater International magazine, page 6.

Work is well underway for our Waterwise Expo in WA on 14th August next year. The Member's Interest & Technical Committee have secured a very good venue for the Expo – Optus Stadium. The exhibition prospectus will be out soon. Keep an eye out for this, and mark your diary - you will want to be at this event next year.

I hope you enjoy this edition of The Overflow.

Clinton Hort - Chair - IAL (WA)

From the CEO

Bryan Ward

IRRIGATION AUSTRALIA

Dear Members,

According to BOM data this autumn has been the fourth-warmest on record in Australia, with below average rainfall for most of the country, and many parts of Australia are encountering severe drought conditions.

According to Blair Trewin, a senior climatologist at the bureau the areas experiencing the most significant drought at the moment are in New South Wales, north-west Victoria and eastern South Australia. "Many parts of central and eastern New South Wales have had well below average rainfall, really since April last year and since the start of this year, the dry conditions have spread to cover most inland parts of the state."

Conditions for many farmers are extreme and even if rains arrive the impact of destocking will have a significant effect on their livelihoods and the Australian economy for many years ahead.

Irrigation Australia applauds any assistance from Government and the financial sector to ease the burden on farmers and where possible to provide financial relief however aid organisations such as Rural Aid/Buy a Bale, Drought Angels, Aussie Helpers and Lions Need for Feed are doing a fantastic job providing further support for our essential primary producers. We encourage all Irrigation Australia members who can spare a few dollars to support any of these worthwhile causes via their websites.

The Irrigation Australia Conference & Exhibition was held in June in Sydney and feedback reports from delegates and exhibitors has been very positive. Thank to the many delegates from Western Australia who made the journey across to attend this event.

We now look forward to the next Waterwise Expo to be held at the brand-new Optus Stadium in Burswood in August next year. This event will provide an opportunity for suppliers to showcase their technology to Irrigation Australia members in WA and the program is sure to be of interest.

You will find information in this edition of Overflow about the new Waterwise website which is being developed to add further value to the Waterwise program and we look forward to further enhancements to promote our Waterwise Irrigation Design Shops and Waterwise Garden Irrigators to continue the objective of the program which is to save our precious water.

Bryan Ward - Chief Executive Officer

Regional Update

Tracy Martin - National Membership & Regions Manager and Ellen Slobe - WA Projects Officer

Whilst our intrepid National Memberships & Regions Manager, Tracy Martin enjoys Long Service Leave in a European summer, the activities in the WA Region must continue in her absence….

Training & Member Events

Over the winter months, we have delivered several training workshops for the industry to participate in and build on their professional development and/or acquire units of competency towards Certificate III in Irrigation, including a full Cert III in Irrigation School in Perth, part 1 of 2 (3-day block) of Cert III School in Karratha, and an Irrigation Efficiency Course in July.

An Introduction to Irrigation – Urban workshop and the part 2 of the Cert III School in Karratha will round out the training suite for 2018.

A series of free small business workshops were also introduced recently, which have proven highly successful. Content was delivered by Small Business Development Corporation and feedback from participants indicate these have been useful for small business owners, particularly in the areas of digital marketing.

A successful half-day workshop at Richgro in May was fully booked, so two more (repeat) workshops have been announced, one in August and another in September. See the Diary (inside cover), and page 17 for more information.

Waterwise

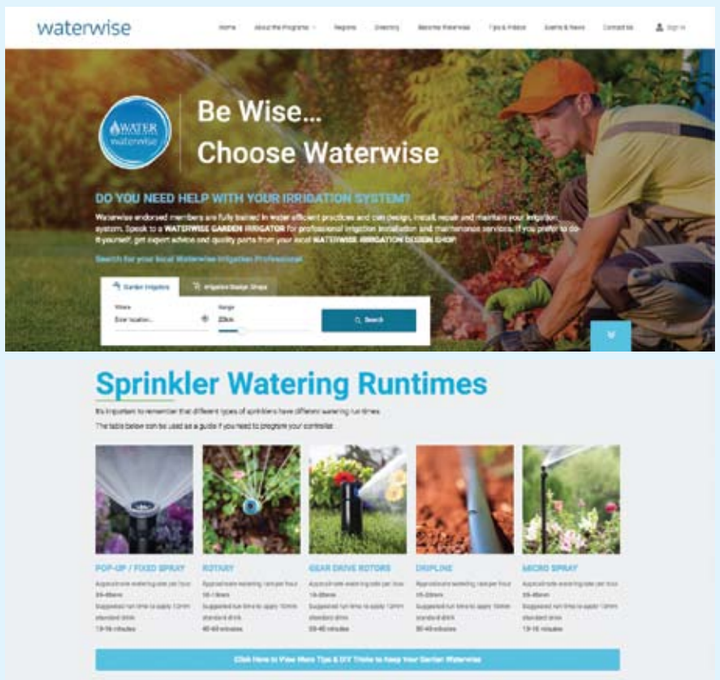
There has been significant activity in the Waterwise space since the last Overflow edition.

Audits for both programs have been undertaken successfully prior to the end of financial year. This is a learning opportunity for both the members and IAL as Program Administrator. Breaches were identified in some cases. Despite this, the members involved have been found extremely willing and receptive to work through and resolve any issues identified. Auditing is an important aspect of the Waterwise Programs to maintain their integrity, to ensure members promoted as "Waterwise" are in fact providing the services promised.

A new pricing structure was introduced for the Waterwise Programs from 1st July. While it has been received with some trepidation from some, the feedback has been extremely positive when given the opportunity to explain the work we are trying to do on behalf of our members. We do encourage you to get in contact with us if there are any queries or concerns regarding the Programs. Any, and all constructive feedback is welcomed.

The Waterwise Programs website has now been developed and is now live! Please check out: www.waterwiseprograms.com.au

Renewed and financial members will have received an invitation to submit their business information for uploading into the Waterwise business directory. This website and directory will be a valuable asset to Waterwise members. All future marketing and promotion will direct the public to this website, so please do use it to its fullest potential. If you have any relevant educational articles, images, videos or documents aimed at the domestic gardener that could be included, please submit to the WA office for possible inclusion.This website is a work in progress, so your feedback and submissions to continue to develop this valuable resource is welcomed.



Above: The Waterwise Programs website

Above and Left: Cert III in Irrigation in Karratha (part 1)

Above: Irrigation Efficiency Course, South Perth

SUE MURPHY: MEET AUSTRALIA'S WATER WONDER WOMAN

Sue Murphy - CEO Water Corporation

Above: Group selfie - after Sue made her announcement to Water Corporation's senior leaders. Image supplied by the Water Corporation

Article originally published in WaterWorld Magazine, May 2018. Reproduced with permission.

Sue Murphy feels understandably strong about gender equality in the workplace. After all, as CEO of Water Corporation, managing an asset base of over AUD$15 billion, she has earned her place at the top of one of the world's leading water utilities.

Approaching a decade at the helm, Murphy feels strongly not just about gender balance within the utility but also the cultural balance. "I've put a lot of effort into inclusivity," she says. "It's no good getting a work crew and forcing someone to employ one woman in that crew. Because if that crew isn't inclusive and the workplace isn't inclusive then that person will have a horrible life and will go. It's about working with your whole workforce to encourage inclusivity. Then it's not about whether people are male or female, it's whether people are included and feel welcome in the workforce."

Employing over 2,750 people, Water Corporation is made up of a third female staff "at virtually every level", says the CEO. Under Murphy's leadership, the utility has also focused not just on gender equality, but diversity across its workforce, recruiting people of different ages and backgrounds.
"Most of what we do is about trying to change people's behaviour…You can't possibly influence your community if, as an organisation, you don't understand them and reflect their makeup in your makeup," she says. "So, if we're all men, how can we influence a community because a community isn't all men?"

THIRD WORLD RESPONSIBILITIES
Murphy is a visible and popular figure in the global water sector – often speaking at conferences, commenting on top-level issues and she also made WWi magazine's Top 25 Leaders annual listing. She believes that the reputation that the water sector is male dominated only applies in the developed world. "I think it's interesting that in the Third World, when you go to poorer countries, water is seen as exclusively women's business: women carry water, move water, treat water and pump water," she says. "It's only as we get more and more engineering centric that it moves into being seen as a man's business. I think that the role of providing an essential service for the community around you is something that is often seen as a female role. The engineering dominated water sector has historically been male dominated because it's full of engineers who were historically male."

One of the jewels in Murphy's crown of projects developed under her watch is the groundwater replenishment scheme. She describes it as a "full closing of the water cycle" and the utility's "most exciting project". "It's the ultimate way to make your water supply climate independent," enthuses the CEO. In a nutshell, the indirect potable reuse plan involves treating municipal wastewater, putting it through reverse osmosis (RO) membranes and then injecting it into deep aquifers, to be extracted as needed in the future – 10 years from now. Although not unique to the Water Corporation – take California in the US – the utility is clearly thinking ahead to meet increased needs in the future.

Located in Craigie, Stage I saw the construction of a 14 billion litre a year Advanced Water Recycling Plant, which has now commenced operations. Stage two will see another facility built of the same scale, effectively doubling capacity to 28 billion litres per year. The expansion is slated to be completed by 2019. "The plant we're doing the work on only has residential, municipal wastewater going through it, so the quality of the wastewater going through it is pretty good – it doesn't have industrial heavy metals. It's also located near an aquifer that is suitable to inject into - not all wastewater treatment plants are quite that simple."

As with any reuse scheme, indirect and more importantly direct, community engagement is the key needed to unlock any negative perceptions surrounding the recycling of water. For Murphy, community acceptance came naturally but required a decade of hard work.

Before Water Corporation went to the government to approve the idea, it spent 10 years working on the concept: operating a pilot plant for three years, including a visitor centre for the public and school children. From this, a regulatory framework was developed for the reused water."By the time we made the decision and got the government sign off to build the plant, we'd been talking about it for so long that half of Perth thought they had been drinking it for decades. So we kind of bored everyone into submission by engaging and talking and communicating and we made a point of never using metaphors. We were very open about what we were doing and where the water was going."Summing up the project, Murphy adds: "We are putting potable water into an aquifer: in reality the water we're putting in is cleaner than the water in the aquifer."

ONE BUM TO KICK (OBK)
With the success of the groundwater replenishment scheme behind her, it would be natural for the CEO to boast, or to point fingers at other less successful regions for not being as forward thinking as her utility. That's not Murphy's style. Even discussing the looming threat of 'Day Zero' in Cape Town – a discussion which has perplexed and even provoked heated responses from the most level-headed CEOs – Murphy answers with true diplomacy. "I'm not critical of Cape Town," she says. "I think the failure is not a failure of planning per se, but a complex water utility and planning arrangement that makes no one actually accountable. There's something like 24 separate water companies in Cape Town – that makes it very difficult to plan. If you are going to plan you need to have some element of scale and the ability to actually deliver and influence the whole thing."

For Water Corporation, covering the whole state of Western Australia, Murphy describes it as the "one bum to kick model", known as OBK. "As we're one water utility, comprising water and wastewater, we have an integration for the water cycle in our remit across the state, so it's our job to plan and to make sure plans are in place."

Combining water and wastewater responsibilities under one roof are key, she says."I think often the failure is not a failure of planning but a failure of government structures," she adds.

DESALINATION IS CRITICAL
Australia's desalination story has been widely talked about. The country faced its worst drought between 1997 and 2000, which came to be known as the Millennium Drought. With six major seawater desalination plants pushed through and built in a record eight years, the rains then fell, rendering some of the plants obsolete.

Despite local media reports focusing on the idle plants running the background, at a cost to the taxpayer, in the West of the country Water Corporation's desalination facilities have been running since day one. "Our story is the opposite of everywhere else in Australia," says Murphy. "Everyone always used to joke that the best way to make it rain was to build a desalination plant! We built two very large desalination plants and it still hasn't rained. For us, our plants are absolutely critical."

Water Corporation operates two desalination plants: one in Kwinana and the second in Binningup. Both have been operating over 100 percent capacity.

The Perth seawater desalination plant produces 45 billion litres a year of drinking water. The company's second desalination plant, called the Southern Seawater Desalination Plant, started production in 2013 and produces 100 billion litres of drinking water a year. A long term purchase agreement was also signed, with energy provided by a wind and solar farm near Geraldton. "For us, desalination is baseload," says Murphy. "It's insurance. If you insure your car and you don't crash it, you don't ring up your insurance company and abuse them. To secure your water supply and you don't need to use that insurance seems slightly premature to phone them [water utilities] up and abuse them."

She adds: "The trouble with all those things is politics. If one side of politics builds the plant and it's not used, then the other side criticises it. One of the risks in any political situation is that people take sides and options come off the table…What we need to do is to keep all options on the table to be explored and resist allowing water to be used as a political football."

BEING DATA SMART
With all the discussion about smart water, big data and the internet of things, one industry concern is that there are currently new tools being offered to utilities to produce more data when they need to sort out existing information they already have. Murphy believes that as sensors get cheaper, they can be deployed in a "more efficient way".

"A lot of the issues we have are about our own internal siloing and how we divvy up tasks and share the data," she says. "What Big Data might do is to help us to integrate our own organisation better and remove those silos, which can only be a good thing." The CEO adds: "Couldn't we all better use the data we have, yes? Do we need more data and in a more integrated way of using it? Yes. Is putting more sensors on and getting more data going to solve more problems? No.
I think a lot of the issues we see, and Cape Town is one of them, is how we've structured ourselves causes us often as many problems as the problem."

THE NEXT DECADE

As methods of communication evolve, utilities have to keep up to provide information to their customers in multiple channels. Water Corporation reports that customer service through Facebook and Twitter grew in 2017, with other 4,400 social customer interactions. Despite the rapid evolution of technology, Murphy believes utilities should not forget their main purpose.

“As we get more technical, people feel like they are in control,” she says. “They want us to be technical, to be modern and know what we’re doing and find those leaks and do all those things. But the sense of community feels like it’s being lost. I think what we have to do is both: we have to deliver water as efficiently and slickly as possible.”She adds: “We have to recognise that water is very primal – if the power is turned off to your house, you may be a bit cold or dark. But if the water is turned off to your house you’ll die. It’s part of our bodies. Our customers, whether they trust us or not in what they say, they take our product straight from the tap and drink it. How much more trust can you have than to ingest something?”

In October, Murphy would have been in the role of CEO for 10 years. Still going strong with a decade behind her, what does she have planned next? “Everyone has a use-by date,” jokes Murphy. “I’ve been in the role for 10 years so maybe I’m due to do something else – I don’t have a plan. I’m appointed by my board so I guess it’s my board’s call, not mine. It’s all good fun at the Water Corporation – it’s a great industry to be part of it. We’re very privileged to be part of how we shape how our community operates at a fundamental level.”

Water Corporation has earned its place among the top, progressive utilities globally, including PUB in Singapore, Phnom Penh in Cambodia, DC Water in the US and many others. Much of this has to be credited to Murphy, instilling a healthy culture which has filtered down not only to her employees but also her community to accept change.

Murphy is a great advocate not only for Australia but the global water industry, proving that in male-dominated engineering sectors, a female CEO can lead the way. Even if she moves on later this year after achieving the decade milestone, her legacy in Western Australia will continue to be remembered long after she has moved on.

Editor’s note :
On 20th June, Water Corporation CEO Sue Murphy announced that she has decided not to renew her contract, which expires at the end of the year. Mrs Murphy has spent a decade as CEO, and has played a key role in Western Australia's future by maintaining water supplies at a demanding and complex time of declining rainfall and resources-led growth.

Irrigation Australia (WA Region) thank Mrs Murphy for her contribution to the West Australian water and irrigation industries and wish her the very best in her future endeavours.

STING NEMATODE RESEARCH PART 2

Top left: Sting nematode (*Ibipora lolii*). Above: Sting nematode damage in kikuyu

Article by Peter Ruscoe, Sports Turf Technology

This is the second in a series of articles outlining the findings of a 4-year research project into the sting nematode on turf grass in Western Australia.

Introduction

The sting nematode (*Ibipora lolii*) is generally considered the most damaging pest of turf grass on the sandy soils of the Swan Coastal Plain in Western Australia. It is a relatively large plant-parasitic nematode, up to 2.6 mm in length, that feeds on the root tips, causing a shallow and dysfunctional root system. The above-ground symptoms include wilting, yellowing, and poor recovery from damage, leaving an irregular patchwork of bare areas. A nematode survey conducted on sports fields as part of this research project found that kikuyu is particularly susceptible to damage by sting nematode.

The life cycle of this nematode has never been studied, although a similar nematode in the USA (*Belonolaimus longicaudatus*) is reported to complete its life cycle in 24 days. The life span of the sting nematode is not known.

The aim of this research was to understand the population dynamics of sting nematode in the Perth region, including its vertical movement down the soil profile, providing useful knowledge to devise better management strategies.

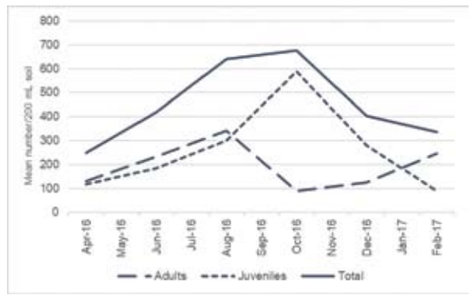
Population Dynamics

The population density of sting nematode was monitored for two years, commencing in April 2016, at two kikuyu sports fields (Lightning Park, Noranda; Charles Riley Reserve, North Beach). Three plots (2 x 2 m) were marked at each site, from which soil samples were collected every two months at a depth of 0-10 cm, and twice per year (summer and winter) at 10-30 cm, 30-50 cm, and 50-70 cm. Nematodes were counted as adult (male/female) or juvenile stages.

Sting nematode exhibited a pattern of seasonal fluctuation in population density. Numbers increased in cool and wet conditions from May to October, then declined during the hot and dry period from November to April. The soil moisture level was consistently higher during the winter rainfall period, providing more favourable conditions for the nematode.

Juvenile stages were present at every sampling date, indicating that sting nematode reproduces all-year-round, peaking in October. Thus, late winter and early spring is the period when the most damage to the turf root system occurs from nematodes feeding.

The graph below shows the results from the first year of monitoring at Lightning Park; there has been a similar trend in the second year. The results from Charles Riley followed the same seasonal pattern at lower population density.



Above: Population dynamics of sting nematode in a kikuyu sports field at Lightning Park, Noranda.

Depth Distribution

In terms of the distribution of sting nematode down the soil profile, the highest population density was in the top 10 cm, where the majority of the turf root system is located. The nematode was found at all sampling depths to 70 cm, demonstrating that it is capable of deep vertical movement.

The implications for turf management are significant. Any control measures applied to the surface, or the removal and replacement of soil, will not prevent reinfestation by nematodes living deeper in the profile. The population dynamics at depth followed the same trend as the surface, with higher numbers in winter than summer.

	Mean no. nematodes/200 ml soil	
Depth	**June 2016**	**February 2017**
0-10 cm	419	335
10-30cm	61	26
30-50cm	51	26
50-70cm	77	50

Left: Depth distribution of sting nematode in a kikuyu sports field at Lightning Park, Noranda.

WATERING SPIKE DOES IT RIGHT...

Article by Antelco

"Perfect for the home gardener as well as a great solution for many commercial nursery and landscape situations."

Every irrigator, from the home gardener to the professional nursery manager, knows the challenge of putting the right amount of water onto each plant. Differences in elevation, in distance from the water source and plant water requirements all contribute to this challenge. For nearly every situation, Antelco have come up with a great solution with their Asta drip.

The Asta drip is a spike-mounted, pressure-compensating dripper that applies a precise amount of water wherever it is installed. There are three different flow rates - 2, 4 and 8 L/hr - to choose from ensuring that, whatever plant water needs are, there is a dripper available for the task. The features of the Asta drip mean that it can be used in a wide variety of situations. It's perfect for the home gardener as well as being a great solution for many commercial nursery and landscape situations.

Home gardeners love to mix and match plants of different types, in pots, in garden beds and on patios and verandas. While the result is often a stunningly beautiful array of colours and shapes it can be a challenge to water. The Asta drip is the perfect answer. The pressure-compensating feature, which operates over a wide range of pressures from 100 to 300 kPa, means that regardless of position each plant gets the water it needs. The plants on the veranda get the same amount of water as the ones of the ground. If some plants have slightly different water needs, the simple colour-coded nozzles mean it is easy to select a flow rate that suits.

The Asta drip is stake mounted with a 4 mm barbed fitting for easy connection to a 4 mm supply tube. With Antelco's 4 mm fittings, including proprietary elbows and joiners, tubing can be discreetly tucked away so the focus of the garden is on the plants and not on the irrigation system. The specially designed stake on which the Asta drip is mounted can be securely pushed into any potting medium ensuring the dripper stays in place and provides water where it is wanted.

Some gardeners use rainwater to water their gardens, which can sometimes lead to blocking problems in drippers and small sprays. The turbulent pathway of the Asta drip minimises blocking problems and a unique self-flushing feature, which is activated when the water is turned off, gives added protection.

Of course, home gardeners are not the only ones facing these types of challenges. In commercial nurseries, both production and retail, getting watering right is critical. Poor watering can result in significant losses in production and income.

In production nurseries even watering has been identified by the Nursey and Garden Industry Association as a key contributor to profitability. The features of the Asta drip, particularly its wide range of pressure compensation and the high cv, mean that each pot receives exactly the target amount of water. The Asta drip is stake mounted and supplied through a 4 mm tube which can be fixed to the lateral at any point, giving flexibility in spacings between pots and drippers.

The Asta drip has also been installed successfully in tree lots and shade houses, where the product's features ensure uniform watering and putting water where it counts.

Our groundwater future in Perth:

2006

2015

Above: Rebalancing the groundwater system would help recover wetlands that have dried up because of declining groundwater levels, such as Loch McNess, near Yanchep.

Securing Gnangara groundwater and adapting to climate change

Government of Western Australia
Department of Water and Environmental Regulation

As part of the State Government's work with water users to prepare the next Gnangara groundwater allocation plan, the Department of Water and Environmental Regulation provides a dedicated website resource, Managing Perth's Gnangara Groundwater system, via https://gnangara.dwer.wa.gov.au. The following information has been extracted from the brochure, Our groundwater future in Perth: Securing Gnangara groundwater and adapting to climate change, recently published on the website.

A system out of balance

Rainfall, streamflow and recharge to groundwater have been declining across south-west Western Australia since the 1970's. Most of our rain falls in winter and this is when groundwater is recharged, so when there is less winter rain there is less recharge to groundwater.

When we developed the 2009 Gnangara groundwater allocation plan, average annual rainfall was 729 mm (Per th Airport rainfall site 1975–2008). Since then we've had two of the driest years on record: 483 mm in 2010 and 578 mm in 2015. Between now and 2030, we expect an average of between 650 mm and 700 mm with dry years occurring more often.

The rapid reduction in rainfall and recharge has been faster than reductions to groundwater use and has shifted the groundwater system out of balance.

Our goal is…

To rebalance the Gnangara groundwater system by 2030 to secure our lowest cost and most accessible water source for Perth and to support a healthy environment.

High groundwater use and lower rainfall have resulted in declining groundwater levels and drying of wetlands and vegetation.

In 2016–17 water levels at 16 out of 30 representative wetland and vegetation sites were lower than the criteria levels set by the Minister for the Environment to protect the groundwater system and dependent ecosystems.

A system out of balance also puts water quality at risk in some locations. Enough groundwater needs to flow out to the river and coast to prevent saltwater intrusion into aquifers. Saline water has already moved inland in the Superficial aquifer in some places.

If we act together to rebalance the system, we can adjust to changes in rainfall, increase water security and reduce adverse impacts on water users and the environment.

What can we do to secure our groundwater future?

To maintain groundwater as a viable resource for ongoing use and other public and environmental benefits, we need to stabilise groundwater levels and enable some key areas to recover.

There are many ways to do this. To help achieve a better balance, some local governments and businesses are already investing in water-efficient technology, investigating managed aquifer recharge and applying water-sensitive urban design.

New urban developments can also be an opportunity to promote alternative, local water supply solutions that are fit-for purpose, especially for public open space. All water users will need to consider options like these and use water more efficiently to adjust to reduced groundwater availability.

Working together

All water users have a part to play in adapting groundwater use to the drying climate. We can all contribute by rethinking how we use, manage and interact with water in our homes and businesses.

Better water outcomes are also more achievable if we work together. There are great examples of this across different industries.

The Waterwise Council Program, developed by the Department of Water and Environmental Regulation and the Water Corporation, has built a cooperative working relationship with local governments resulting in improved water use efficiency within council facilities, public open space and within the communities. The partners are continuing to improve this program for better groundwater outcomes.

The Department of Water and Environmental Regulation is a participant in the Cooperative Research Centre for Water Sensitive Cities, which is researching how water management can support cities to be sustainable, resilient, productive and livable. All of the research is available online, including a vision for Perth as a water sensitive city. watersensitivecities.org.au

Strategies to rebalance Gnangara groundwater in a drying climate by 2030

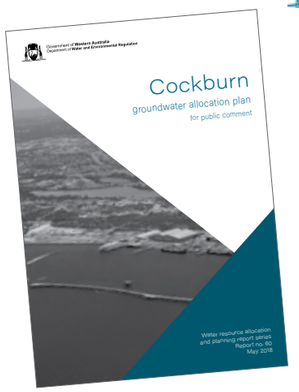
Sustainable groundwater	Water efficiency and innovation	Alternative sources
• Reduce groundwater abstraction. • Increase recharge through planned land-use changes. • Use science and research to find the best solutions for each location.	• Improve water-use efficiency to reduce water demand. • Enhance urban design to reduce demand and increase recharge.	• Reduce reliance on groundwater by using fit-for-purpose alternatives. • Increase groundwater replenishment and managed aquifer recharge in the best locations.

We can achieve this by working together

Share information, work together and form partnerships to build capacity and find water solutions.

HAVE YOUR SAY ON PLAN FOR COCKBURN GROUNDWATER

Government of Western Australia
Department of Water and Environmental Regulation



Above: The area covered by the Cockburn groundwater allocation plan

Market gardeners and turf producers in and around Cockburn have until 3 September 2018 to comment on a State Government plan updating groundwater allocation in the area for the next decade.

The Department of Water and Environmental Regulation (DWER) is seeking public feedback on the 2018 Cockburn groundwater allocation plan for public comment to replace the 2007 Cockburn groundwater area water management plan.

Based on advanced scientific research and extensive stakeholder consultation, the Cockburn plan sets out the amount of groundwater available to be taken from the Superficial aquifer for local use – and how much groundwater must be left to protect both the shallow resource and the important wetlands that rely on it.

"The 2018 Cockburn water allocation plan modelling shows that while current groundwater use poses a low risk to the resource, full use of the existing licensed entitlements in the area would cause unacceptable water quality and environmental impacts," said DWER Director of Water Assessment and Allocation Susan Worley.

A balancing act

The drier and hotter trends caused by climate change across Western Australia's south-west require DWER to balance competing demands on groundwater for both community use and the area's internationally recognised environmental assets, such as the Ramsar-listed Thomsons Lake and parts of Beeliar Regional Park.

To reflect the ongoing declines in rainfall forecast to 2030, Cockburn groundwater allocation volumes have been revised to secure sustainable supplies for irrigated horticulture, green public spaces, industry and domestic garden bores.

Allocation volumes are also expected to shrink through the return of groundwater licences to DWER in line with ongoing land use changes from rural to light industry and urban – particularly in the Western Trade Coast industry development and investigation areas. The 2018 Cockburn water allocation plan works in conjunction with DWER's Western Trade Coast heavy industry local water supply strategy 2016 by suggesting the use of alternative water sources – such as recharging recycled wastewater into aquifers – to meet future demand from industry.

To support these changes, DWER will continue to communicate with rural landholders, land developers and other State Government agencies on their changing needs for water.

How to comment

Copies of the Cockburn groundwater allocation plan for public comment and accompanying Cockburn groundwater allocation methods report are on the DWER website via http://www.water.wa.gov.au/planning-for-the-future/allocation-plans/kwinanapeel-region/Cockburn-groundwater-allocation-plan. Written submissions can be also be made online via allocation.planning@dwer.wa.gov.au or phone 08 9550 4222 for further assistance.

SOIL – IT'S MORE IMPORTANT THAN YOU THINK

RICHGRO
Bring your garden to life

Article by Richgro

Richgro Garden Products regularly offers free workshops from its office and production sites in Jandakot. In business since 1916, Richgro has a wealth of knowledge and lends its experts for free workshops proudly supported by Irrigation Australia.

The last workshop conducted in May had over 20 attendants from councils, shires, Landscaping businesses, environmental and government departments. The objective was to equip the attendants with a comprehensive knowledge of soils and soil testing.

Why Soil Test?

It is a case of short term loss, long term gain. The saving of what is the result of the test, against not knowing what to apply. Tests can be performed on crops, turf, gardens, new areas and old areas and in the form of soil, tissue and water samples. Every sample is different in its makeup; hence, the results are always different, needing a different conclusion from even neighbouring areas.

Cost of not testing versus cost of testing

Testing will give you the facts of what is happening. It will identify the nutrients that are needed and can monitor the health of the soil or plant. It supports you in making decisions about the fertiliser rate, timing and correct products to use. It also reduces the risk of something going wrong.

If you are not testing, you are guessing. Full tests of soil, tissue and water, will show you what is going on.

A case on hand was a WA council which used a special Tree Planting Mix - 2,139 trees planted in beach soil - 2,139 trees all survived. Soil tests were carried out prior to planting. Very close to the ocean with high pH soil. Results showed a custom mix was required containing organics, clay, wetting agent and controlled release fertiliser. Trees were planted over a number of months. Not one loss and all still growing today. A soil test was requested after 12 months to test for nutrients and organics to conclude the project.

Ongoing maintenance and planning, followed by annual testing, will ensure you are being pro-active rather than reactive. Some councils such as Town of Victoria Park, Cockburn, Rockingham and Collie have experienced the benefits of a good program. Also, landscapers such as Phase 3 Landscapes, Landscape Elements and Deep Green Corporation, having followed up on soil tests, report a huge improvement in the local soil conditions and health of the plants and turf.

Soil Test Reports

Soil test reports enable you to plan ahead, program events and improve the health of what you are looking after. Councils can then book in renovations, maintenance and improve the quality of new and existing plants. For landscapers, it is a way of helping the client know what soil, water or conditions they are working with. From Mandurah in the south to Yanchep in the north, all the new estates that are so different in the soil and climatic conditions can benefit from soil tests. They are all trying to achieve the one result. Do it once - do it right!

When planning a project – testing takes 2-3 weeks. Tests need to be carried out before hand and then approved for use in that situation.

After Testing

What next? The report helps you achieve a common goal. It builds a picture of where the problem is and can be addressed where fertiliser and soil amendments will be most effective.

There is always an answer to the results which allows you to program for the year(s) ahead and thereafter maintain and monitor.

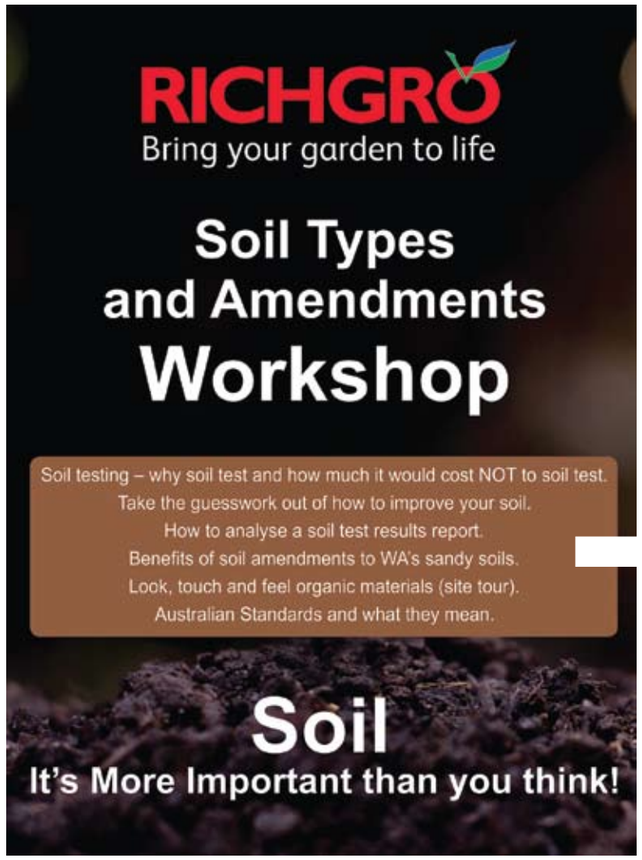
Australian Standards

When dealing with soils and soil products it is important to know about Australian Standards. Australian Standards Certification gives you the assurance of quality. Products certified under Australian Standards have been independently tested and proven to deliver the results the product claims. There are several standards:

- AS 3743-2003 for potting mixes and garden soils;
- AS 4454-2012 for composts, soil conditioners and mulches;
- AS 4419-2003 soils for landscaping and garden use;
- AS 6000-2016 Organic and biodynamic products and certified organic products

Richgro manufactures all its products to Australian Standards and has certification on a number of those. Products are monitored consistently by its on-site laboratory which has years of knowledge, expertise and is monitored by annual checks from government sources within the industry. The Laboratory also supplies testing services to all your requirements.

For further information on our Workshops and Laboratory Services please contact David Miles at Richgro -
T: (08) 6258 7100 - M: 0402 345 170 -
david.miles@richgro.com.au



Workshop Details:

Tuesday, 14th August 9am - 12 noon

Wednesday, 19th September 9am - 12 noon

Richgro, 203 Acourt Road, Jandakot. Contact David Miles at Richgro or Irrigation Australian (WA Region) office to register.

Above: Attendees at the May workshop

BIOPHILIC CITIES AND WHAT IT MEANS FOR WESTERN AUSTRALIA

By Peter Newman AO, Professor of Sustainability, Curtin University

Every now and then a new fashion in building and construction comes along and you just think 'that is so obvious, why do they have to call it something so obscure and fancy?' Biophilic cities is one of those.

Biophilic cities literally means 'loving nature in cities' but it was given a special meaning by E O Wilson, a Nobel Prize winning biologist. He insisted that we need to go beyond how we see nature in cities as being something that happens between buildings or on the edge of cities, or that we go to visit on weekends. Nature must be in, on and around buildings as we need it in our daily lives. We co-evolved in daily contact with nature and our modern cities deprive us of this contact and without it we get sick. Tim Beatley's book 'Biophilic Cities' Island Press, 2011, is probably the best on this.

The data on the benefits of biophilic cities has been collected in many academic papers and books and shows how we are far more healthy when we see, touch, smell, feel and generally are around some kind of nature. It destresses us, reduces blood pressure, lifts our spirits, and helps us think more clearly. There are now hospitals that are measuring improved healing rates after they have introduced biophilic design. KTP Hospital in Singapore is now a tourist attraction due to its wonderful biophilic design as well as having a reputation as a place preferred by sick patients.

One of the key reasons why cities are investing in biophilic urbanism is that it cools them down because of the natural air conditioning from plants transpiring. Cooling cities from the urban heat island effect as well as global warming extremes that are setting in, will be a political and personal priority within most cities of the future.

But there are also other environmental gains from biophilic cities. Green roofs, green balconies and green walls are not only good for us, they are good for birds, insects, and all kinds of wildlife. KTP Hospital has shown 36 species of butterflies returned to the area after it was opened as well as some pythons that were not as welcome as the butterflies!

Singapore has probably the greatest biophilic urbanism on display across the city and it is now regulated to require a two to three times replacement of the building floorplate with green roof/balcony/wall. See https://vimeo.com/41260886

For those involved in the water industry there are a number of obvious benefits. One is the reduction in storm water flow due to the rain being absorbed in the plant and soil cover with a much slower release as the rain builds up. Some cities like Toronto have mandated biophilic design on buildings because it reduces the pollution from storm water flowing into Lake Ontario. The other is how to reduce concrete in cities and delight in the flows of water that are part of our city and should not be hidden away in pipes and concrete canals. Singapore has led the way in Asia in digging up concrete drains and daylighting piped stormwater flows so that creeks and rivers are able to flow again through their city. Bishan is the best example (see film above) as it has created a beautiful regional park while also managing the flash floods that come from tropical storms with water sensitive design.

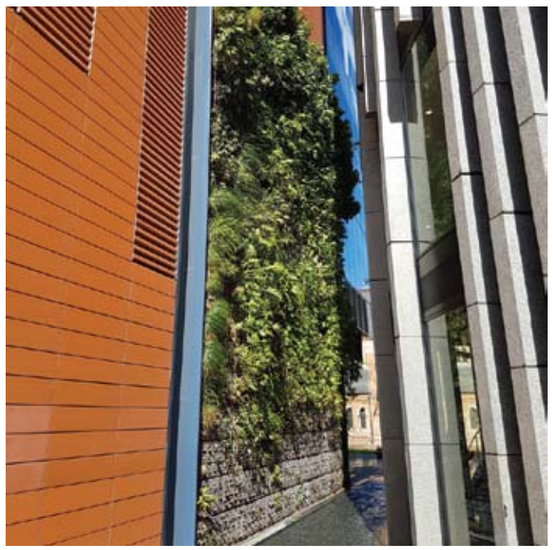
Overflow readers would probably deduce that I am very keen on this idea for Perth and can probably also see that it will mean a lot more irrigation is needed. The reality is that if we are going to green our city and cool it down with more plants in, on and around our buildings, then it will need more water. It may hopefully lead to more grey water recycling but if we want to cool the city we will need lots more plants transpiring, not just sitting there in a xeric state. This means we will need more water scientifically drip feeding our planter systems.

Biophilic urbanism will need more science to be done in Perth to evaluate what works best and lots more demonstrations like the few examples of the Josh Byrne 'urban wetland', Perth City Library green wall and Fremantle Council's Adelaide Street mall demonstration green wall. It is encouraging that larger scale projects appear to be increasing in popularity around Perth, but it's also important for regional cities - especially those with hotter climates.

WA is not currently leading the way on biophilic urbanism but we need this innovation in urban design and planning. It's not just a fancy term – it's important.

However, there is a strong steering committee leading a growing "Biophilic Cities Perth" organisation.

Biophilic Cities Perth hold well attended events to generate community activism towards encouraging and educating local government and industry as to both the potential and the necessity of biophilic urbanism.



Above: City of Perth Library vertical garden

Left: City of Fremantle, Adelaide Street mall green wall

BIOPHILIC URBANISM

Creating a vibrant and natureful future city.

Tuesday 14 August
9:00 am - 1:30 pm
City of Gosnells Civic Centre

Hear a diverse panel of experts deliver a comprehensive set of inspiring guidelines, tools, approaches and real life examples of creating liveable, thriving and diverse cities. With biophilic urbanism as the core theme, presentations range from governance, community, water, urban forest, infill to tiny houses and nature pods.

This event is presented as part of **National Science Week 2018** and received grant funding from the Australian Government.

Visit **switchyourthinking.com** to register

Biophilic Cities Perth · national science week · An Australian Government Initiative · Inspiring Australia · switch your thinking · Serpentine Jarrahdale Food & Farm Alliance Inc.

Earlier this year, Fremantle was the first Australian city to join the international Biophilic Cities Network.

A Biophilic city is one that contains abundant biodiversity and nature, which works to conserve and enhance that nature, and provides its residents with opportunities to learn about and connect with the natural environment.

To become a Partner City, the City of Fremantle has committed to monitoring five indicators that align with their existing Greening Fremantle: Strategy 2020 and Urban Forest Plan. Key focus areas include increasing canopy cover and access to public open space, particular in residential areas where thermal mapping has indicated above average baseline temperatures.

Upcoming events:

Biophilic Urbanism Seminar
Tues, 14 August 9am - 1.30pm
City of Gosnells Civic Centre

Movie Night - Biophilic Design
"The Architecture of Life"
Mon, 20 August 6pm - 7:30pm
The Backlot Studio
21 Simpson Street, Leederville

Above: Keynote speaker and event MC, Tristan Kitchener

DPIRD UPDATE TO LOOK AT FUTURE TRENDS IN HORTICULTURE

The Department of Primary Industries and Regional Development (DPIRD) will host the 2018 Western Australian Horticulture Update on August 16 and 17 at Crown Convention Centre.

DPIRD's Managing Director of Research, Development and Innovation, Mark Sweetingham said the update will help strengthen Western Australian industry government partnerships and collaboration and allow all levels of industry to interact and collaborate.

"The focus this year is on the future trends affecting the WA horticulture industry, including the changing retail landscape and how shifts in consumer decision making is impacting growers," Dr Sweetingham said.

Keynote speaker and event MC, Tristan Kitchener from Kitchener and Partners said, "it's important for producers to understand how they can help solve the pain-points of their retail customers as well as the end consumer, and identify opportunities for adding value across all the activities they do". Tristan has a background in retail and management consultancy and routinely provides advice and support along the grocery value chain.

The update will help encourage profitable business approaches to support growth within WA and the horticultural industry by having information sessions on benchmarking and financial information and showcase growers who have implemented innovative practices on-farm and in production.

Other highlights of the event include:
• the introduction of precision agriculture and the value in gathering data,
• research updates from biosecurity experts and ag scientists,
• Wines of WA will host a wine tasting session on day one and the Cancer Council of WA will present a WA fresh produce 'Crunch&Sip' morning tea on day two.

DPIRD thanks event sponsors Perth Markets Limited, C-Wise, the Royal Agricultural Society of WA and the Cancer Council WA for their support of the event.

The 2018 WA Horticulture Update is also supported by vegetablesWA, Pomewest, CitrusWA, the Agricultural Produce Commission and Wines of WA.

For further details in relation to the event please visit the website https://www.agric.wa.gov.au/horticulture/western-australian-horticulture-update-2018 or contact Kirrily Palmer at kirrily.palmer@dpird.wa.gov.au

Department of Primary Industries and Regional Development

AUSTRALIAN WATER ASSOCIATION

WESTERN AUSTRALIAN WATER AWARDS

Each year, the Australian Water Association recognises its members' contribution to the water sector through a number of individual and organisational awards. Nominations for the 2018 WA Water Awards are open until 31 August.

The Australian Water Association WA Awards were established in 1996 to acknowledge and celebrate the exceptional achievements by individuals and organisations in the WA water industry. The Awards recognise innovation and excellence in delivery of water projects and programs. The awards have become the vehicle that showcases the outstanding work that is being carried out across the state, including a number of entries from Regional WA.

The WA Awards are in line with the Australian Water Association National Awards and provide the opportunity for the WA winners to enter in the National Awards which will be presented at the AWA's International Water Conference & Exhibition "Ozwater" in 2019.

If you have an innovative project, program or piece of research making waves in the WA water sector, or you're an inspirational individual, nominate for one of the award categories below. The winners will be announced at the WA Water Awards Dinner on 26 October 2018.

Individual categories :
• Water Professional of the Year
• Young Water Professional of the Year
• Student Water Prize

Organisation categories :
• Program Innovation Award
• Infrastructure Project Innovation Award
• Research Innovation Award
• WA Water Sensitive Urban Design (Grahame Heal) Award
• WA Innovating for Sustainable Water and Environmental Outcomes Award

Who can nominate for the Awards?
All Awards, (aside from the Student Water Prize and the WA Innovating for Sustainable Water and Environmental Outcomes Award), are open to Australian Water Association members only.

Further information, and conditions of entry can be found on AWA website : http://www.awa.asn.au/AWA_MBRR/About_AWA/Awards/State_Awards/WA.aspx

Or contact Australian Water Association on 1300 361 426

SWAN SYSTEMS:

TURNING DATA INTO DECISIONS FOR GOLF COURSE MANAGEMENT

Article submitted by SWAN Systems

Introduction

In this, the fourth (and final) article in SWAN Systems' Overflow series, we will focus on golf course management. SWAN is a cloud-based decision support system that can automatically collect and store weather, irrigation, soil moisture, and fertiliser application data. The software analyses the data to provide recommendations for optimised irrigation – it takes the guesswork out of optimising water use. It also provides integrated modules for nutrient planning and management, and satellite data is used to generate a health (or "greenness") index for sites based on absorption and reflectance data.

Drivers

As well as regulatory drivers for irrigation optimisation, the golf sector, like other irrigation sectors, has a variety of objectives. These include:

- Providing an appealing environment, including high quality and fit-for-purpose turf
- Efficiency gains (for water and nutrient usage) to minimise waste and reduce costs
- Continuous improvement
- Accountability

SWAN Systems software can be used as an effective management tool both on a day-to-day basis for getting irrigation and nutrition right, and for seasonal review, reporting, and to identify areas for improvement.

Putting it into context

We'll look at an example of golf course management using SWAN Systems – the Rottnest Island Golf course. Rottnest is a holiday destination island off the coast of Perth, Western Australia that is effectively a "closed" system, with limited mains water supply and very limited and regulated capacity for environmental discharge. The golf course and the neighbouring oval are the primary public open green space facilities on the island and comprise the bulk of the irrigated turf areas. These also provide a means of absorbing recycled water to ensure Public Open Space (POS) maintenance does not draw on potable water supplied to Rottnest.

As a result, the water supply will be relatively plentiful during peak holiday seasons (summer) and one of the aims for POS irrigation is to use enough water during these times, while still protecting the environmentally sensitive surrounding salt lakes and wetlands from nutrient discharge. A significant proportion of the nutrients derive from the background water, with occasional sparingly supplied fertiliser. Monitoring nutrient application is key to ensure turf nutritional balance is maintained.

1 Normalised Difference Vegetation Index: provides a measure of plant health by assessing the amount of live green vegetation present. SWAN's use of NDVI was detailed in the Summer 2018 edition of The Overflow.

Water usage is bound by regulatory requirements and a nutrient management plan. These require that root zone soil moisture does not exceed field capacity during irrigation. This is to minimise the risk of waterlogging during the irrigation season: a shallow water table underlies much of the course.

Water, Nutrient and Satellite Data

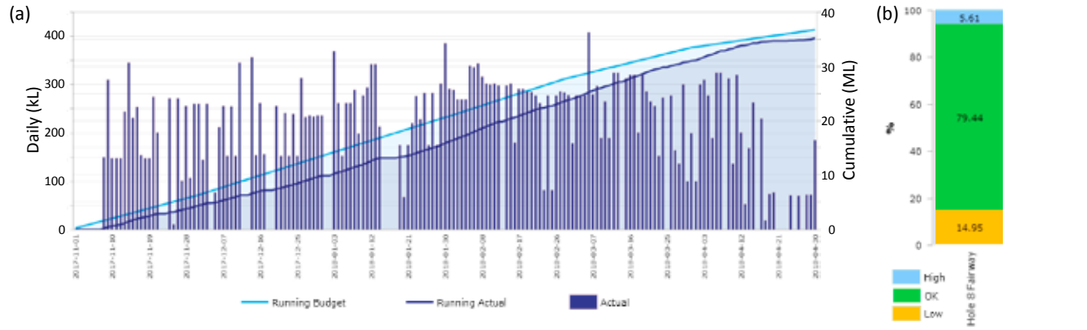
SWAN Systems was used to collect and analyse Rottnest Island Golf Course's daily irrigation data, soil moisture data, and nutrient applications for tees, fairways and greens from January 2018 to May 2018. SWAN also had access to daily water use for the whole course from November 2017 to May 2018. The irrigation season is typically drawing to a close by April, but Rottnest (and Perth generally) experienced an unusual, extended dry autumn. There was negligible rainfall until the last week of May.

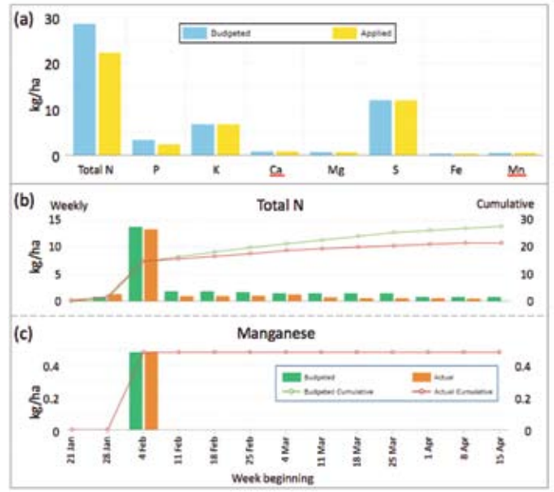
In the first instance, we reviewed satellite-generated NDVI[1] imagery for the course and noted that greens and fairways had been maintained with relatively consistent greenness during the year (Figure 1). As might be expected, the putting surfaces were greener.

(Above) Figure 1: Plant health Index (NDVI) comparison of fairways and putting greens.

The water usage pattern at Rottnest Island Golf Course has been quite conservative, in line with the environmental constraints. Across the whole course, application rates were similar to that expected for a passive Perth POS reserve (6,500 kL/ha; see Figure 2).

Slightly more water could have been used on some of the holes between January and May, while still avoiding drainage. This is typified by the soil moisture summary generated by SWAN for Fairway 8, where approximately 15% of the time the soil was dry (Figure 2b).





(Above) Figure 3: Seasonal and cumulative nutrient applications. (a) Totals for elements. (b) Cumulative total Nitrogen, applied irrigation water and one-off granular application. (c) Cumulative Manganese, applied once as a component of a granular fertiliser. All applications are in kg/ha.

Most of the time with dry soil occurred during the dry autumn. Importantly though, there was almost no drainage during the season, and what little occurred was due to an extremely atypical 142 mm January rainfall event.

SWAN Systems keeps track of nutrient additions in two ways. First, with the input of water analysis results, SWAN automatically tallies cumulative nutrient additions due to the nutrient loading in the recycled water. Second, granular fertiliser applications can be logged from the database of fertilisers that are stored in SWAN. In the case of Rottnest Island Golf Course, a granular fertiliser was added mid-season.

Nutrient additions to the golf course during Q1 and Q2 2018 are depicted in Figure 3. A report of total application by element is presented (Figure 3a), along with examples of reports showing weekly and cumulative applications via recycled water and granular fertiliser (Figure 3b and 3c, showing total N and manganese). These data indicate that nutrient applications to the turf should all be mopped up by growth and, given there were no drainage events due to irrigation, there should be very limited environmental discharge of N or P.

(Below) Figure 2. (a) Water usage for the whole course (Nov 2017 – May 2018). The total irrigated area is 5.6 ha. (b) Fairway 8 soil moisture status summary – the proportion of time with soil moisture wet, optimal or dry from Jan 2018 – April 2018.

Above: Ozone Reserve filtration system

OZONE RESERVE GROUNDWATER IRON FILTRATION SYSTEM

City of Perth

To irrigate the greenspace across the Perth CBD and surrounding areas requires a significant irrigation distribution network.

Irrigation water supply is sourced from an artesian groundwater bore located within Langley Park capable of 38 litres per second (LPS). Groundwater is pumped directly through a groundwater filtration system located within Ozone Reserve to removed dissolved iron and then stored in Lake Vasto for irrigation purposes.

An irrigation pump station capable of around 240 (LPS) pressurises the mainline and provides up to 500,000 Kl of groundwater to irrigate 66 hectares of greenspace and parks from the heritage listed Stirling Gardens in the west, along Riverside Drive to Langley Park and east towards Queens Gardens, Point Fraser and the Causeway.

During 2016 the previous groundwater treatment system failed and was bypassed sending untreated groundwater into Lake Vasto. As a result, iron staining of City infrastructure occurred, and the visual amenity of Lake Vasto was impacted.

The previous groundwater treatment system was a chemical based system, dosing Sodium Hydroxide for pH correction and Potassium Permanganate to oxidise the dissolved Ferrous (Fe) contained within the groundwater. The resultant flocculant was then filtered from the water prior to delivery into Lake Vasto.

During 2017 the City of Perth released a tender for the replacement of the existing chemical treatment system. The tender specifications called for the supply installation and commissioning of a non-chemical groundwater filtration system capable of filtering groundwater at a flow of 38LPS with an iron content of 20PPM, ensuring that the maximum residual level of iron in the water delivered into Lake Vasto had an iron content of less than 0.3PPM.

Demolition works of the existing groundwater treatment system commenced in October 2017. The installation of the non-chemical groundwater filtration system was undertaken by Elliotts Irrigation with these works being completed in February 2018.

A six x 60-inch modular tank system was engineered with independent remote control and monitoring capabilities allowing the ability to monitor flowrates through each unit. Lake level is also monitored allowing a comprehensive 24-hour 7 day a week overview of system operation and performance.

Computer graphing and trending is carried out over each module along with metering and total water usage allowing the City to compare trends and usage over the future months and years of operation.

The system was also designed to have zero water wastage, during backwash and rinse cycles all water is returned to Lake Vasto via a concrete backwash tank which is compartmentalised to allow the dissolved iron to drop out as it flows through the backwash tank.

The City's state of the art groundwater filtration system came online in early February 2018 with current water quality data showing the iron content to be 0.0PPM.

The annual maintenance budget for the previous chemical treatment system including the purchase of chemicals was $131,164.00 per annum. The proposed maintenance cost of the new non-chemical groundwater filtration system is estimated to be $15,000.00 per annum.

Due to the reduced maintenance cost, it is estimated that the capital replacement cost of $545,890.00 will be recouped in savings within the next 5 years. The useful life of the filtration system is expected to exceed 15 years. The net cost savings over a 15-year useful life period are approximately $1,700,000.00

Removing chemicals from the process ensures improved safety outcomes for City staff and contractors and provides significant environmental benefits.

Above: Lake Vasto - January 2018

Above: Lake Vesto - April 2018

BRINGING IRRIGATION up to par

Article supplied by Toro

Above: Neil using Lynx Map App on his smart phone to manually run Flex 34 sprinklers on 9th Green. Right: Aerial view of course

Anyone involved in managing a large irrigation system knows that its performance can change over time. Even with good maintenance, wear of sprinklers, pumps and other components tends to reduce efficiency. As the system performance declines costs rise until the point where an upgrade is warranted. Mandurah Country Club has recently faced this challenge and thanks to the collaboration between the golf course staff, the chief supplier, Toro, the contractor, Total Eden and the willing assistance of enthusiastic club members, the Club now has a refurbished irrigation system that is performing better than ever.

Neil Graham, the course superintendent, joined Mandurah Country Club in 2016.

"It soon became clear that we had significant wiring and reliability problems with the existing control system. We had good support from Toro for the system, but it was not as immediate or as comprehensive as the current NSN service because of the age of the controller. It was pretty simple to justify to the Club why they should invest in a new control system and decoders because of the persistent problems due to the age of the system" said Neil.

"We chose the Toro Lynx GAC decoder system as it allowed us to replace all the wiring and decoders while maintaining all of the existing hydraulic hardware. Our experience with the existing Toro system combined with the features of the new Lynx GAC central control system made it a simple choice. Lynx offers more precise run times and better diagnostics of the voltage and amperage, which makes finding problems so much easier. The higher surge protection, which is included in the Lynx system, is also a big advantage in our environment."

Neil saw the renovation as an opportunity to collect some valuable data about the irrigation system and has produced some up to date, accurate maps and plans of all the irrigation assets. Mandurah has an active volunteer program for its members and guided by Neil, the members marked the location of all key assets including every sprinkler, solenoid, decoder and valve box. The location of each asset was marked with paint. This enabled PerthCAD to fly the course with drones and create new plans, in 3D, of the whole course and of the irrigation system.

As Neil explained. "I had prior golf course involvement with John Walker from PerthCAD which gave me the opportunity to look at accurately mapping wire paths, sprinklers and valves. John had just commenced mapping with a Drone and after several discussions, I decided to proceed. Volunteers marked sprinklers and valves and the wire paths which allowed for accurate GPS coordinates to be determined for each asset across the whole course. The 3D imagery gives us an excellent tool on the Lynx system for managing the system now. It will also help in future upgrades as it allows contour drawings to be completed simply, during construction projects. We will always have good plans of our system as a result."

The new system required the installation of a new two wire path and new decoders. Total Eden were chosen to perform the task of installing the new control system, and ploughing in the new decoder cables, decoders and surge protection systems. The new two wire path was laid in less than a week. This was achieved thanks to some good planning and the work of Mandurah CC Technician, Lyall who had clearly marked out all of the wire paths.

The wiring up of decoders and installation of the Control System took a further week. During the installation staff from the Club, Total Eden and Toro checked the integrity of every piece of cable at each valve location.

"It was a time-consuming task that took nearly two days but demonstrates the commitment to quality of all the people involved" said Neil.

As soon as the cable was installed and tested, Mandurah CC engaged PerthCAD to prepare the as constructed drawings. PerthCAD flew drones over the whole course taking over one thousand images showing the cable paths, valves and the sprinkler locations. The result was a GPS plotted, photo realistic image of the golf course.

The Lynx GAC central control system has the capacity to use GPS data to map the irrigation system and ultimately control the overall irrigation scheduling. The manager can use simple interactive maps of any part of the system and course to control all irrigation operations.

"During the audit of our system we noted the location and condition of every sprinkler, valve types, coils, nozzles and number of sprinklers on a block. Each valve was given a code and entered into the new Lync GAC database. This allowed us to enter accurate details into the Lynx system to improve distribution uniformity across the course" said Neil.

The Lynx database was built using the information from the drones, original as constructed drawings and the data collated from the earlier sprinkler audit. This led to the creation of new hydraulic flow management, which results in the system operating within the limitations of the pipework, ensuring correct sprinkler pressure at all locations on the course. As a result, water uniformity has improved, the pumping system is operating at its best efficiency point and the Club is saving water, energy and money.

The club also took the opportunity to install six Toro Turfguard sensors, to measure soil temperature, moisture and salinity at critical points on the course. The data from the Turfguard sensors is automatically relayed to the Lynx software, providing maintenance staff much needed information that can be used for pest control, fertilizer programs and watering regimes.

Superintendent Neil is delighted with the results. "The new Toro Lynx system has improved the distribution flow across the course with more accurate data going into the hydraulic tree to improve the evenness of watering. We also have more control over our watering because of the mobile phone apps which are a standard part of the Lynx package. These apps on my phone give me complete control and access. The improvement in course quality has been noticed not only by course staff but by members and visitors too. Toro's backup and service are second to none. The whole team including the Club members, Total Eden, PerthCAD and Toro worked together to do an excellent job" said Neill.

> "The Lynx GAC central control system has the capacity to use GPS data to map the irrigation system and ultimately control the overall irrigation scheduling."

Above: Perth seawater desalination plant - Kwinana

Desalination plants provide more than one trillion litres of water in WA - but we can't rest on our laurels

Water Corporation's two desalination plants reached a significant milestone recently – producing one trillion litres of drinking water from the Indian Ocean since opening.
How much is one trillion litres of water? Imagine Optus Stadium filled around 1,000 times or around 444,444 Olympic swimming pools.

The Perth Seawater Desalination Plant in Naval Base began producing water in late 2006 and was the first large scale plant in Australia and the largest in the southern and eastern hemispheres when it was constructed. It can produce 45 billion litres of drinking water each year; however it regularly produces more than this.

The Southern Seawater Desalination Plant near Binningup began producing water in 2011. It was built in two stages and can supply up to 100 billion litres of water each year.

The milestone of producing one trillion litres of water over the past 12 years shows just how important desalination is for our water supply. It now provides about half of the water for two million people connected to the Integrated Water Supply Scheme and is a reliable, proven technology for providing drinking water – independent of rainfall.

Desalination is a vital part of our long-term Water Forever plans to secure water supplies in response to climate change. These plans are based on a three-pronged approach to develop new water sources, reduce water use and increase water recycling.

While desalination and water recycling play a significant role to secure water sources in Western Australia, reducing water use still remains important.

We cannot become complacent about saving water, particularly during the wetter months. The drying trend associated with climate change is particularly strong between May and July over the south west of Western Australia, with rainfall since 1970 around 19 per cent less than the long-term average. Since 1996, this decline from the long-term average has increased to around 25 per cent.

And while it may feel like we have experienced a wet start to this winter, rainfall and streamflow statistics are telling us otherwise. The Perth monthly rainfall in June fell just shy of the average, and streamflow into dams was around 10 billion litres by the end of June, compared to the post-1975 average of 58 billion litres for this time of year.

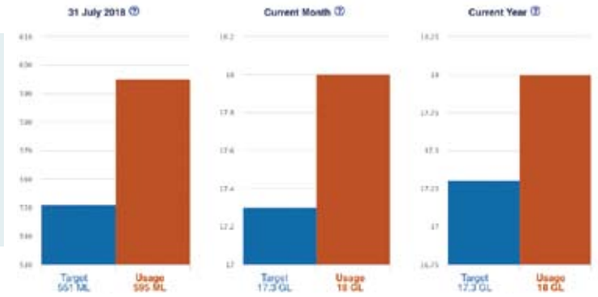
We will continue to work with industry to encourage water conservation in the community. Every drop is precious and it's up to all of us to make a difference.

Learn more about desalination at watercorporation.com.au

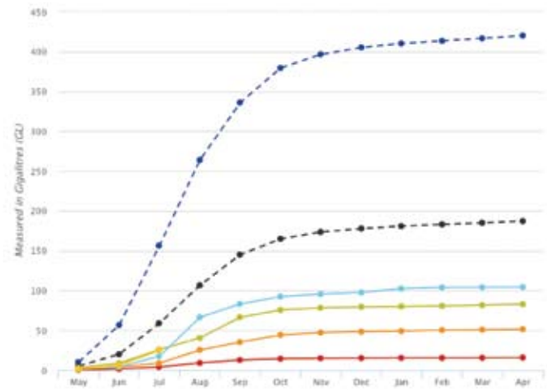
Water Update

Supplied by the Water Corporation
Current graphs can be found at www.watercorporation.com.au

Water Usage Metro Region

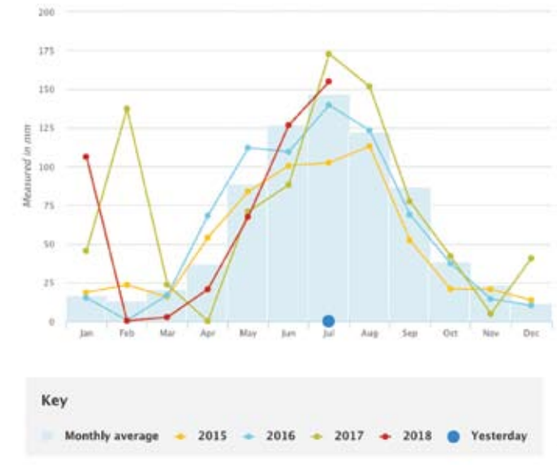


Yearly Streamflow



*The current streamflow amount is estimated until validated.
*Stirling and Samson Brook Dams are included within this data.

Perth Rainfall Comparison



1 August, 2018

Waterwise Garden Irrigator Directory

The Waterwise Garden Irrigator Program (WGIP) is a joint initiative of the WA Region of Irrigation Australia (IAL) and the Water Corporation. The program aims to optimise the water-use efficiency of domestic landscape irrigation systems installed in WA. Irrigators endorsed under the program are qualified to design and install water efficient irrigation systems to an industry standard.

Waterwise Garden Irrigator	Waterwise Garden Irrigator	Waterwise Garden Irrigator
AAA Irrigation	Green Horizons Landscape Construction	Retic Turf & Soakwells Pty Ltd
Able Irrigation	Growing Assets	Reticulation Pro
Ace Horticulture Services	Horizon West Landscaping & Irrigation	Robert Reynolds
Adair's Landscaping & Irrigation	Instant Gardens	Scott Jordan Landscaping
Addwater Reticulation	iQ Reticulation	Softscapes & Reticulation Pty Ltd
Adonis Gardening & Irrigation	Irrigation WA Pty Ltd	Southern Quickscapes
Advantage Bores & Reticulation Services	Irriscape Reticulation & Landscaping	Sprinkler Fixers
Albany Spray On Lawns	Ivey Irrigation	Superior Landscaping & Reticulation
Alkimos Landscaping & Irrigation	Jim Duggan Irrigation	The Garden Fixer
All water Irrigation	Jim's Mowing East Rivervale	The Organic Mechanic Garden Services
Allwest Bores & Reticulation	Jim's Mowing Wilson North	The Retic Bloke
Aurora Landscaping	Joel Irrigation & Landscaping Pty Ltd	The Retic & Landscape Shop
B & C Fiorini Pty Ltd	J.O.K.Developments	The Right Stuff for Landholders
Backyard Creations	Landscape Elements Pty Ltd	The Watershed Water Systems
BHG Garden Service	Landscape Works WA	Think Water Bunbury
Blue Moon Reticulation & Landscaping	LD TOTAL	Think Water Dunsborough
Bradkaz Irrigation	Love My Retic	Think Water Geraldton
Brookfield Landscaping	Luke's Landscaping & Irrigation Services	Tim Davies Landscaping
Clackline Reticulation	MJ Landscaping	TLC Services Perth
Clean-cut Gardening	Mr Retic	Top Dog Landscaping and Reticulation
Coast to Coast Irrigation	Ningaloo Landscaping	Total Eden Watering Systems
Condo Landscapes Pty Ltd	Peel Reticulation & Landscaping	Turfed Out
Country Landscaping Pty Ltd	Peel Scape Solutions	Tys Pools Pumps and Reticulation Pty Ltd
Custom Green Scapes	Perdita Reticulation & Garden Solutions	Urban Ecological
DBM Landscapes	Perfect Home Solutions	Urban Outlook
DJ's Property Maintenance Services	Perth Lawns and Retic	WA Reticulation Services
Down to Earth Projects	Perth Reticulation Service	WA Reticulation Supplies
Earlybird Landscaping	Pimp My Yard	Water Installations Pty Ltd
Earth & Water Pty Ltd	Plants and More Landscaping	WaterLink
Elliotts Irrigation Pty Ltd	Portworks	Water Well Reticulation
Evergrow Gardenscapes	Prime Landscaping	Waterwise Landscaping
Evergreen Blades	Rain Maker Irrigation Services	Waterwise West
First Element Irrigation	Retic Express	Westside Reticulation
Garden Solutions	Retic Revival	WF Landscape Industries Pty Ltd

Full contact details for each business are available from the WGIP Business List downloadable from the IAL website.www.irrigationaustralia.com.au/documents/item/13 Country: www.irrigationaustralia.com.au/documents/item/14

Waterwise Irrigation Design Shop Directory

The Water Corporation and Irrigation Australia Ltd have teamed up to develop a program aimed at reducing water consumption outside the home.

With more than 50% of household water being used on the lawn and garden, and an increasing number of Do-It-Yourself enthusiasts installing their own irrigation systems, it is important that the people employed in irrigation design shops have the knowledge and skills to provide their customers with waterwise advice, products and services.

Waterwise Irrigation Design Shop	Waterwise Irrigation Design Shop
Controlled Irrigation Supplies	Think Water Dunsborough
Elliotts Irrigation Pty Ltd	Total Eden Watering Systems - Balcatta
Muchea Irrigation	Total Eden Watering Systems - Bibra Lake
Reece Irrigation - Belmont	Total Eden Watering Systems - Byford
Reece Irrigation - Canning Vale	Total Eden Watering Systems - Canning Vale
Reece Irrigation - Malaga	Total Eden Watering Systems - Greenwood
Reece Irrigation - Osborne Park	Total Eden Watering Systems - Joondalup
Reece Irrigation - Rockingham	Total Eden Watering Systems - Malaga
The Retic & Landscape Shop	Total Eden Watering Systems - Mandurah
The Watershed Water Systems - Cockburn	Total Eden Watering Systems - Midland
The Watershed Water Systems - Joondalup	Total Eden Watering Systems - Myaree
The Watershed Water Systems - Kelmscott	Total Eden Watering Systems - Osborne Park
The Watershed Water Systems - Midland	Total Eden Watering Systems - Rockingham
The Watershed Water Systems - Morley	WA Reticulation Supplies - Armadale
The Watershed Water Systems - Subiaco	WA Reticulation Supplies - Midland
Think Water Broome	

When looking for help to install or modify your own irrigation system, choose a Waterwise Irrigation Design Shop in your local area. See list here or visit our website at www.irrigationaustralia.com.au/documents/item/173

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DESIGNED & MADE IN AUSTRALIA

Visual Indicator
When in the closed position the blue handle is at 90° to the body and when in the open position it is in line with the body clearly indicating if the valve is open or closed.

Frost Resistant
Proven performance in frost conditions.

Easy Action
The handle is not only easy to operate but has a positive on/off action through 90°. It is ergonomically designed to enable easy gripping

Install in any Direction
To assist with easy installation Philmac ball valves can work in any direction and at any angle.

Robust Construction
Built to withstand pressures up to 1600 kPa and provide years of reliable operation.

Approvals
All blue handled ball valves carry Standardsmark approval.

Quality Materials
High quality injection moulded plastic bodies and components plus NBR O-rings and stainless steel screws means years of reliable operation.

Certified Product™
Australian Standard

Trusted, reliable and hard working, just like you

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