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Albion Park's water travel story unfolds

By **MATTHEW KEOUGH***

THE Albion Park Bowling Club near Wollongong, NSW, began to investigate ways of saving water in 1999. The initial investigation was for the sinking of a bore and the installation of an automatic watering system.

The automatic watering system was installed, along with two 22,500-litre poly water tanks. Some roof water was redirected into the tanks but only from about 200 square metres so the main water source was town supply (potable water). The system used Toro 765 heads and Toro Control panel.

There was a minimal reduction of water use, mainly due to better and more accurate watering methods. The club had one 'push-up' old style green built in the late 1950s and two new ATRI USGA-grade greens newly constructed with sand-based profiles.

At this time the bore was deemed to be too expensive an option, due mainly to the fact the water bill was only \$3000 to \$4000 annually. This mindset would change dramatically six years later when the drought began to take effect and water restrictions tightened, with the looming possibility that clubs would not be allowed potable water to be used on greens. I moved to Albion Park in 2005, right in the middle of this period. Within my first week of working there I was attending meetings at night with a steering committee to help formulate a plan to overcome the issues of water restrictions. It was at these meetings that the decision was made to seek a



The Hydrosmart system was installed in 2007 to enable the bore water to be used more readily in irrigating the club's three greens.

Government Community Water Grant and to sink a bore.

The bore project

The total aim of the project, as a best-case scenario, would see a complete reliance on town water removed and a large reduction in the cost of purchasing the water. What we didn't gain from rain water would be topped up from the use of a bore. Some preliminary investigations into the quality and quantity of bore water were done through consultation with local mem-

bers, some of whom were born and bred Albion Parkers. We knew that there was ground water close by as one of the carparks was built over an old well, which was there for at least 50 years previously and at some stage was a potable water supply. Also, two blocks down the road there was a natural dam that was always full and had plenty of reeds and wildlife inhabiting it. We were fairly confident of our results.

The instigation of a Government Grant added to the value of the project, initially forecast to cost around \$80,000; with the grant of up to \$50,000, it would cost the club around \$30,000. That would incorporate a bore, capture of 90% of the club's roof run-off and increase the water storage to around 250,000 litres.

The final proposal that was sent off for approval to gain the water grant had the project set up in three stages:

- the club's already established infrastructure, including the automatic watering system and tanks.



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- the improvements to this system, larger tanks (two 75,000-litre), pumps and associated plumbing to toilets and urinals, plus redirection of roof runoff; and
- the bore.

Grant application

To gain the grant the club had to show benefits to the community, an obvious reduction in the reliance on town supply and an easy-to-follow blueprint for others to follow and implement. It was calculated that at least 1200-2000 square metres could be used to capture water, although in the original plan it needed a series of tanks and pumps to achieve this as the club drained in two directions. To establish a base water usage, an account for the winter period was used as a base amount for internal club use. It was estimat-

Young Gun faces challenges head-on

MATTHEW Keough, head greenkeeper at Engadine Bowling Club in Sydney's south-west, was the Scotts NSW Bowling Greenkeeper of the Year in 2009 and is featured in this issue's Turf's Young Guns series. Mr Keough won the award while at the Albion Park BC, Wollongong, NSW (see main article).

At Engadine he has many challenges with old greens and equipment. He is converting one of the club's three Greenlees Park couch greens to Tifdwarf this summer and will be starting work on a new automatic irrigation system and upgrading equipment when possible. He said the greens had not had a new top in 15 to 20 years.

Mr Keough said greenkeeping was a "lifestyle" rather than a career, but "you can make a career out of the lifestyle". He said the challenges for the industry included environmental issues, the encroachment of synthetic greens and the number of smaller clubs that were folding.

He said the new e-Par program available through the NSW Bowling Greenkeepers Association was a great step forward. While the water issue had faded with the easing of the drought, Mr Keough said the use and availability of chemicals was a major issue for the industry. He said many clubs were looking to use more biological products.

ed that the greens alone accounted for about half the total water or around 1.8 megalitres a year.

We decided to pump from the tanks into the toilets and urinals, as watering for greens alone was not enough to gain the grant. We believed we could capture enough from 1200-2000 square metres of roof space with average rainfall to cover around half of the water used by the club.

The obvious problem with this theory is that it rains when it wants to and at that stage we were experiencing less than average rainfall and, of course, the biggest problem we faced was where to store 1.8 megalitres to use when we wanted. We only had scope and budget for storage of 150,000 litres.

Bore development

We began to drill the new bore in November/December 2005. The biggest issue initially was where to site the bore. A location close to an old well site was our obvious position, but the main pumping station and large tanks were more than 100 metres away. Added to the distance were two carparks and the clubhouse.

The final site was five metres from the large storage tanks in a small garden bed. We had less room to drop in a storage/header tank for the bore supply but saved about \$10,000 from the first-choice site.

The ground under Albion Park is a mix of clay and basalt rock, which made for interesting drilling. The first pocket of water was discovered at around 12 metres, then there was a fairly solid supply all the way from 18 metres to 30 metres after that back to solid ground. The first test results were devastating. The water was clear but had a stagnant smell with it and the total dissolved salts (TDS) were around the 10,000ppm – not a desirable level.

The decision was then made to drill further to see if we could find better water. Dapto Bowling Club, about 10 kilometres away, had a similar result: highly brackish water about 12m down, then drilled to about 30m and discovered reasonable water (1200ppm TDS) down to 50m.

The Albion Park board decided to continue drilling to 120m but the drilling contractor advised against that as it was becoming less likely that the outcome would be bet-



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ter. The final result was a very long expensive hole with no useable water.

Where to next? Generally, water that is high in salt is usually a stagnant supply and the ground surrounding it clay/hard rock. Fresh ground water is freer-moving in sandy or sandstone ground. The bore company advised us to start pumping as it had seen TDS drop when the water started moving through the ground. By the time we had the pumping equipment in place it was January/February 2006. We started pumping day and night for about two weeks, then had the water tested again. The result was a drop in TDS to 5800ppm.

The water was retested in July 2006 and the TDS was 5320ppm. We felt we had found the bottom line in TDS readings.

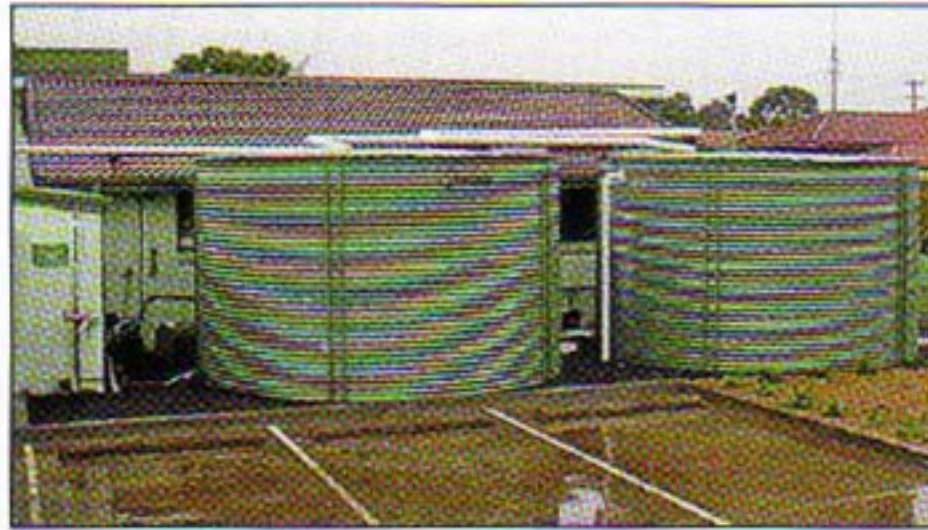
At this time it was decided to retest the bore every 12 months and re-evaluate the findings on a year-by-year basis. By doing it this way, if the TDS gradually increased we could stop pumping with limited damage to the greens.

By then we were on the back-end of the growing season so water for the greens was less of a priority; we had the autumn and winter to get it sorted. With \$20,000 spent on chasing the bore we had to make the decision: do we just concrete over the hole or do we invest more and try to recoup some of the losses?

The club decided to explore some sort of filtration to enable it to safely use the water. We knew that the water was clear, with virtually zero solids – at least this would be a start.

First choice for trying to remove salt was filtering. After extensive investigation desalination was advised as the best method. However, with a starting price of \$50,000 this idea was soon knocked on the head.

We began to run the water through the toilets, which was working fine until the stainless steel urinals started to show spotting of rust and the toilet s-bends had some small staining. We also investigated sewer mining but this was going to



Some of the tanks in place at Albion Park as part of storage for stormwater capture.

be another large expense and obviously meant giving up completely on the bore.

In the meantime the club had received the Government Community Water Grant and this was now the priority as we had to have the works completed to a tight deadline. The bore was shut down, as construction of new tanks and installation of a rain bank and associated works needed to be done and the bore had to be disconnected.

Once the new tanks were installed we isolated the toilets from the supply to the bowling greens, although both would use the new 150,000-litre tanks as a supply. We would also shandy the water down to about one in three to reduce the concentration of TDS to around 1800ppm.

As a temporary idea we would plumb the bore water directly into the suction line in the irrigation system. Eventually, if the water proved useful, we would set up a header tank to store the bore water before it was drawn into the irrigation network. The idea of doing this was to let us use the bore supply if possible on the greens but not through the toilet system.

We also explored the possibility of joining an alternate grasses study that was being conducted from Queensland. They were testing different grasses and irrigating them with varying concentrations of saline water. This was abandoned due to the restrictive nature of the study – in particular, the three-year time-frame it would take to complete the study.

Hydrosmart system

In the winter and spring of 2006 we became aware of the Hydrosmart system. The unit was an in-line chemical-free and maintenance-free water treatment system. It used electronic frequencies to pulse through the water to break down the chemical bonds in the water.

It is simply plumbed in line with your irrigation outflow and switched on, and that's it: no filters, no noise – just a new shed to keep it dry. ▶



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◀ The technology comes from naval vessels, where similar systems were used to de-scale pipework in ships. Although very skeptical at first, we began to investigate customers who had used the device and to our surprise all of them were confident the machine made a large difference.

One of the Hydrosmart units was installed at Ballarat Country Club. This was a club built on a similar soil profile to Albion Park: heavy clay with old push-up greens. The club had a fairly large dam that was topped up with the use of a bore.

With the severe drought conditions that it was experiencing, the reliance on bore water was higher than in any previous year.

The Ballarat bore had a TDS of between 1200ppm and 2000ppm and often fluctuated, and generally they would shandy it to help reduce concentration levels. Superintendent Jeff Powell said that since they had installed the system, the grass cover and general health had not been better. This was around December 2006, and the greens in particular were in excellent health. They were a poa-bent-grass mix. He was fairly impressed with the results, including on his fairways, where they were trialling new grasses (couch, kikuyu and seashore paspalum) for the new course that was in the process of construction.

When he made the decision to purchase the machine he had gone to a local winery that had been using it for a couple of years. The winery had similar saline water content but also elevated iron content. The winery had been using the Hydrosmart on a gradually increasing number of vines. We installed the Hydrosmart in March 2007.

By the time the system was complete it was April 2007 – just shy of two years after the project's start. By now we had been using the bore water on and off over the summer months whenever we could. The club was seeing a noticeable reduction in its water usage and the greens were in a very healthy condition.



Storage tanks at Albion Park Bowling Club form an important part of the club's water management plan.

Added to the use of the Hydrosmart system, we began to apply one tonne of gypsum per green per year. This would help in relieving any salt build-ups within the soil structure and assist in providing good water movement within the soil profile. As we had two new sand-based greens that were very free-draining, our main concern was with the old 1950s-style green that had a bad reputation for draining.

This was done only in the summer of 2007-08 as the soil test came back showing an increase in the amount of

sodium from 0.03 to 0.04 in all greens. This was also the season in which I regrassed the old-style green from a couch mix to a single-strain Tifdwarf.

During the grassing we restricted the use of saline water for the first six weeks of growth to prevent any possible restriction of growth. After this period the use of the shandied blend was continued on a normal basis with no real detriment.

We found very few issues relating to the use of the water in particular with the growth of grass across all greens. There was zero burn on the grass leaf, even when used in extreme heat (30°C-plus). The cover remained healthy, and weed, pest and disease issues didn't show any real change from any previous years.

I noticed that every time we used the bore shandy we had to wash down the club windows as drift from the irrigation settled on the glass and left a streaky film across it. This was the same for the aluminum seats, particularly if the bore had not been pumped for a while.

The salt ate away at several parts of the pressure vessel that controlled the bore. The spear pump that was in the bore was fine, but the salt managed to corrode a couple of valves attached to the pressure vessel.

Occasionally, the bore water had that stagnant odour to it but not all the time. ●

* Matthew Keough was head greenkeeper at Albion Park Bowling Club from 2005 to 2009.