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# Turfgrass

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## Made in China

How Aussies are playing a major  
role in China's golf boom





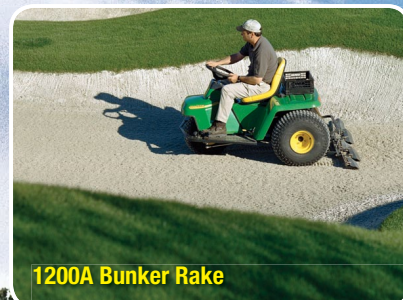
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## COVER: Made in China:

The golf boom in China has opened up many wonderful opportunities for Australian superintendents and golf course architects. The Chinese characters translate to 'made in China' (Zhong Guo Zhi Zao).

### Cover Design:

Jo Corne

### Photos: Golf course

photos courtesy of Darren Moore and Shadow Creek G&CC, Beijing. Chinese Flag - iStockphoto.com



## Made in China

6

Up until the 1980s the game of golf in China was practically non-existent. Since the first official golf club license was issued back in 1984, course development has mushroomed and the country now has anywhere between 300 and 400 with more still in the pipeline. Such a boom has afforded Australians within the design, construction and maintenance niches of the golf course industry many opportunities and in this edition's cover story Darren Moore, Steve Alexander and Phil Ryan reflect on their involvement helping advance one of the quickest growing golf markets in the world.

## The Vines keeps on walking

16

The summer of 2007-2008 will be one that superintendent Dion Warr at The Vines Resort and Country Club in Perth won't forget in a hurry. A fire in the maintenance facility last January caused around \$500,000 in damage and forced his crew to work out of temporary facilities for the best part of nine months. Now one year on and with that incident behind them, they are now getting ready to showcase The Vines to the world as it prepares to host the tri-sanctioned 2009 Johnnie Walker Classic.

## Making a little go a long way

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For most enterprises that rely on irrigation to be sustainable, reducing water usage and the cost of ownership are common goals for improved performance and economic viability. In the first of a three-part series on improving irrigation practices, Scott Johnstone looks at four key efficiency factors and how, by making small adjustments to these, they can make a huge difference.

## The right of reply

26

A number of high profile superintendents have been lost in recent times and their sudden departure has forced many of their colleagues to question their own situation in what can often be a fickle industry. One such superintendent, who found himself out of a job after 12 years' service, looks back at his recent demise and warns others that the same thing could easily happen to them if they are not diligent.

## OPINION

### Golf carts

40

Once only used by golfers who had a legitimate medical reason, motorised cart usage has exploded in recent times. The Pulse quizzes five superintendents to see how much of an issue golf cart traffic management is at their facility and what strategies they have put in place to reduce their impact on turf surfaces.

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### The environmental, social, economic and health benefits of turf

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In 2007 Turf Producers Australia commissioned Peter McMaugh and Dr Ross Higginson to undertake a literature review on the benefits of turf in order to help build a more positive image for the industry. The study shows that the turf industry is well placed to counter any negative press directed its way.

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A two-year field study in WA has demonstrated the potential to use saline groundwater to irrigate halophytic turfgrasses.

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### Long Reef set for self-sufficient future

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Over the past six years Long Reef Golf Club has introduced a number of initiatives to improve water and environmental management issues. Honoured by the industry in 2006, the club is now embarking on another project which will mean total self-sufficiency in its water use.



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## Bayside transformation 50

Byron Bay Golf Club superintendent Shaun Cross reviews some of the water management changes which have helped ensure that one of the country's more environmentally conscious townships has a golf course it can be proud of.

## ENVIRONMENTAL MANAGEMENT

### Building a better Bargara 52

When he isn't managing maintenance operations at Bargara Golf Club, superintendent Wayne Marshall spends his spare time studying for a Bachelor of Environmental Science degree. Given the work he has undertaken at Bargara over the past six years, he could make a pretty good case to his university supervisors that he deserves an honorary degree.

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# Looking out for number one

**A**s a few superintendents have found to their disenchantment in recent times, gainful employment in the turf industry can at times be tenuous. One minute you're running maintenance operations and the next you are posting a job request ad on the AGCSA website. The manner in which some have been lost to the industry has left many disillusioned and indeed the scruples of some who have wielded the axe leave a lot to be desired.

Losing a job has significant emotional and financial implications and is something that hopefully many of you won't have to endure. I can in some small way relate to those who have suffered such a fate as I was faced with a similar situation a few years ago. In 2000 I did the whole backpacker thing, living in England for two years during which time I worked as a production manager for an internet company. It was a great job but with the bottom falling out of the dot.com industry at the time it was very much a month-by-month proposition.

Then it happened. The entire office, around 30 of us, was called into the boardroom one afternoon and informed the company would be restructuring. A number of us – four as it turned out – would, unfortunately, be surplus to requirements and we were to find out our individual fates by going into the boardroom one at a time. Being the resident 'backpacker' I knew my name was at the top of the list. My colleagues knew it too and there were a number of sympathetic looks my way as I made the long walk from my desk to the boardroom. Given my situation at the time job security wasn't exactly an issue so when I was told that I was out of a job I wasn't too concerned (besides, the payout I received more than covered for my subsequent trip to the Middle East).

What hit hardest, however, apart from the hangover the following morning, was seeing one of my colleagues come out of the boardroom a few minutes after me. He was another of the company's producers, a strapping Yorkshire lad, handy footballer, who was one of the nicest guys you would ever meet. No one expected his name to be on the list – he was far too experienced to let go we thought – but when he came out of the room with an expression of complete shock on his face we were all stunned silent. What made this chap's situation worse was that he and his partner had only just recently bought a house and had a young bub that had been born with significant health issues. One could only imagine what was going through his mind.

Thinking about it now, job security is more important than ever, especially in the context of global uncertainty brought about by the recent financial crisis. We can sometimes be guilty of taking our positions for granted but can we afford to do so any more?

Do yourself a favour. Given the time of year, why not make a New Year's resolution to sit down and make sure your own house is in order. Securing water resources is a prime focus for many in the industry at this time – shouldn't securing your job be just as important, whether it's making sure a contract is up to date or having all the necessary paperwork in order? Likewise, if it's your health that's giving you sleepless nights, make that appointment. A good friend of mine recently went to get a nagging back ache checked out and three months later was diagnosed with an autoimmune disease which, if left untreated, could have had fatal consequences.

If I can draw on Pat Pauli's excellent piece in the December edition of the AGCSA Action newsletter, there comes a time when we have to take the responsibility ourselves and do what we need to do to reach the level of professionalism that we would all like to aspire to. Every superintendent owes it to themselves and their families to ensure they have done all they can to ensure they are looking out for number one – and numbers two, three, four and five as the case may be.

Have a safe festive season and don't let summer stress you out too much.



*Brett Robinson*  
**Brett Robinson**  
Editor



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JOHN NEYLAN AND SCOTT PETERSEN, AGCSA JOINT GENERAL MANAGERS

# Reward skills or risk going backwards

Each year presents its own challenges and 2008 has been no different. It started with optimism, in particular the hope for good rains, yet ended with some uncertainty as the world staggers through a global financial crisis. Even as I write, the stock market continues to tumble and Brisbane has been smashed by cyclonic winds and torrential rains.

The world economy seems a bit like maintaining a golf course. One minute all is good and under control and the next minute the wheels have fallen off and nothing you do can arrest the problem until nature runs its course. I wonder if all the economists, stock brokers and bankers that are members of golf courses now have an appreciation for the challenges that a golf course superintendent faces in the light of their own current plight. It could be said that at least on a golf course we have a good understanding of the interacting elements that make the job the challenge it is – I doubt that the same can be said about those managing the economy.

The challenge for 2009 and onwards is without a doubt the recruitment and retention of staff. To encourage young people into the golf industry as greenkeepers is becoming increasingly more difficult as we compete in what has been a market of relatively low unemployment.

Apprentices have long been the lifeblood and part of the success of the industry and it is becoming increasingly more difficult to attract apprentices to golf clubs. The common theme has been that the work is too demanding (often due to the weather extremes), the pay is poor



and the career path is somewhat uncertain or unclear. Unfortunately we are seeing too many outstanding people move out of the industry because they can earn considerably more elsewhere.

In a recent report released by the Minerals Council of Australia, it was predicted that the minerals industry in the year 2020 will need to employ an additional 90,000 people – a 70 per cent increase on current employment levels. Of these about 30,000 will be semi-skilled operators. The states most affected will be WA, QLD and SA. How will the golf industry be able to compete with this demand for labour?

The Australian system of training apprentices has been well proven with the combination of on-the-job training and formal schooling. There is little doubt that those individuals who chose to stay in the profession and show aptitude and initiative are well placed to work anywhere in the world. The opportunities for ongoing education and training undoubtedly value adds to the labour force on any golf course and can reasonably be considered as a factor contributing to the quality of Australian golf courses.

In the AGCSA's 2007 Wages and Salary Survey it became apparent that there is very little financial incentive to study, with unqualified groundsmen earning often as

much or more as qualified greenkeepers, and very little increase evident for advancing through Levels 3, 4, Diploma or Advanced Diploma. The average wage that an apprentice receives is less than \$30,000 with groundsmen wages not much more than \$35,000. This reveals a concerning trend as our industry competes with other sectors of the sporting industry, IT and other trades to attract new staff, but offers comparatively little incentive for young people.

A superintendent recently raised an interesting aspect to the labour issue where he has decided to give it away in part because he cannot get or retain suitable staff. In his words he has had enough of being on the course seven days a week to make sure that the essentials are attended to.

Looking ahead, how are we going to keep good quality staff? There is little doubt that they must be better remunerated. Given that many clubs are running tight budgets, this can be difficult to achieve and maybe clubs will need to restructure their work force so there are fewer employees which are better skilled and better paid.

As an industry we need to think about the career structure and provide a better progression in the work place so that people can see there is a series of rungs that can be achieved through improving skills, ongoing education and reward for loyalty. Clubs are going to be challenged by the realisation that greenkeeping is a skilled profession and must reward these skills or their golf courses are going to go backwards. 📉



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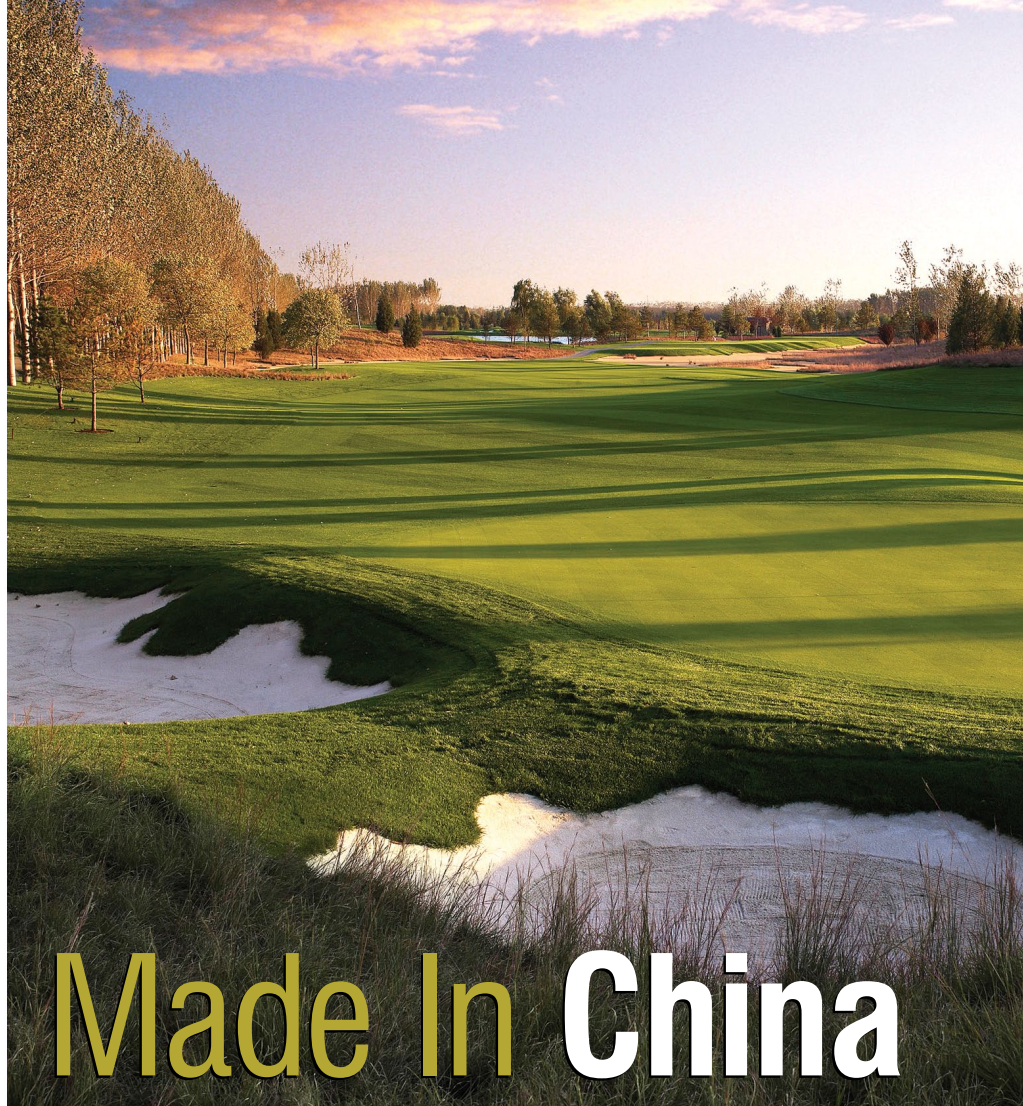
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Since late 2007 Darren Moore has been superintendent at Shadow Creek Golf and Country Club, a new private residential golf club located 10 minutes from Beijing International Airport

The game of golf in Asia has taken off phenomenally in recent times and no place more so than China. As Pulitzer Prize-winning New York Times columnist and golf tragic Thomas L. Friedman quipped in a US Golf Digest article back in 2001, "Forget the Ming Dynasty, China is on the verge of a Ping Dynasty!" He was right and since then new course construction has continued to blossom. Playing a key role in this development surge have been a number of Australians whose design skills and turf management expertise have been highly sought after. Over the next 10 pages, superintendents Darren Moore and Steve Alexander, together with course architect Phil Ryan, take us inside China where they have all to different extents played their part in furthering the industry.



# Made In China

It may come as a surprise to some, but golf in China supposedly has a long history. Scotland has always been considered the traditional home of golf since the 15th Century, but recently a Chinese academic has claimed that the game was played among the noble classes in China some 500 years earlier.

Professor Ling Hongling of Lanzhou University claims to have uncovered evidence in a book, called the Dongxuan Records, that proves golf was played in China in AD 945. The book, written during the Song Dynasty from AD 960 to AD 1279, claims the game was called 'chuiwan' and was played with 10 different jewel-encrusted clubs, including a 'cuanbang' (equivalent to a modern-day driver) and a 'shaobang' (an ancient 3-wood). The term 'chui' actually means 'to hit' while 'wan' is the term for a ball.

Under communist rule, golf was suppressed for many decades throughout mainland China and it wasn't until 1984 that the first official club license was granted to Chung Shan Hot Springs Golf Club. Even though official club licenses are still difficult to obtain today, the development of the game in China is moving at a rapid rate. New golf courses are being developed in many of the progressive cities while modern golf academies are opening in

major cities. School children are also being introduced to the game through academies located within private schools, while at the elite level China continues to attract an increasing number of major professional tournaments and events.

It is very difficult to get accurate records of existing clubs and planned projects but recent reports suggest there could be between 300-400 courses in China with over 50 in the Beijing region alone. Mission Hills in southern China is in the Guinness Book of Records as the biggest golf club in the world with 180 holes, however with the economic slowdown hitting many developed countries in recent times it will be interesting to see how golf development progresses over the next several years.

## FINE CHINA

In the late 1990s, when I was working as superintendent at The Manila Southwoods Golf and Country Club in The Philippines I was lucky enough to travel through Shanghai and southern China. At the time I thought to myself what a tough place to grow grass, but 10 years on I find myself living on the outskirts of Beijing adapting very quickly to the extreme weather conditions, language and the wonderful culture that China has to offer.





Since late 2007 I have been superintendent at Shadow Creek Golf and Country Club, a new private residential golf club located only 10 minutes from the Beijing International Airport. The metropolitan area of Beijing is home to over 12 million people and the city is changing rapidly each year with the 2008 Olympics seeing a lot of infrastructure development fast-tracked, including railway systems, highways and building development. In comparison, however, new golf course development has only gradually increased over the last five years.

Shadow Creek, designed by Jack Nicklaus, is quite unique for China as it is a private residential golf club. Once you have purchased a home for around AU\$3.5million you then get full access to the golf course. We currently have 50 homes and another 200 are in the development stage. Only residential members and their guests are allowed to play the course and on a busy day at this stage we would be lucky to top 30 golfers.

When I arrived for the initial job interview I was very surprised with the development

**Moore relies heavily on his assistant Yahooo Wang (left) and interpreter Joanna in daily course maintenance operations and dealing with local suppliers**

and facilities of the area. For China standards it is very Western with international schools, residential estates, shopping and is very close to the heart of downtown Beijing.

Once I settled in the family moved over. The kids (Danielle, 8 and Nicole, 6) settled in quickly and have made friends fast. The schools in our area are excellent and the children learn Mandarin every day as part of their curriculum. My wife Simone is now working at the Dutch Embassy so we are all keeping busy which is important in a foreign country.

## SOMETHING DIFFERENT

I started at Shadow Creek at the end of the grow-in period in September 2007. I was fortunate to have two other Australians (John Carson and Steve Alexander) involved in the construction and grow-in stages so the course has been constructed very well.

In creating Shadow Creek, the Nicklaus design team introduced a new look into the Beijing golf scene with the inclusion of warm-season grasses in the out-of-play areas, random style bunkering, natural waste areas, bentgrass tees and a fun but challenging layout. The fairways and roughs were planted with a mixed perennial ryegrass blend and the tees and greens were sown with T-1 bentgrass, a new generation variety developed by Jacklin Seeds.

T-1 has performed very well in this region as it can establish very quickly while possessing excellent disease tolerance. The colour of the bent throughout the year has been excellent, even with minimal nitrogen inputs, and after the greens have been frozen in winter (the

selection was ranked number one for colour in past NTEP trials). Going back to bentgrass after working the last 12 years on Tifdwarf and TifEagle was a nice challenge and so far I am enjoying working with nearly all cool-season grasses on the site.

The weather in Beijing is very extreme with hot humid summers and cold icy winters. Last autumn I quickly discovered the ideal growing window is very short and no sooner have you battled your way through the summer and the stresses that puts on the turf, you are then preparing quickly for the harsh winter.

Average winter temperatures range from a minimum of -11°C to a maximum of -1°C. Together with winds from inner Mongolia the conditions feel very harsh and dry in the winter with minimal rainfall. Working through my first winter was certainly an experience as the irrigation system needed to be blown out while keeping the main line charged for hand watering when needed. All tees and greens needed to be covered with shade cloth and blankets to protect the crown from winter desiccation.

Our biggest challenge in the summer months is dealing with pythium and rhizoctonia outbreaks in the ryegrass as night temperatures and daily humidity levels rise. The pressure is constant for several months so developing an intense cultural programme, controlled fertility plan and fungicide regimen is critical.

Our water quality and native soil types are a challenge. The water we use is treated first from a small river that passes the airport area and is then transferred into our storage lakes which interconnect. We have high bicarbonates, pH and sodium levels in the





water, however, the trends are starting to improve and the water quality is improving. We maintain an aggressive cultural and amendment programme while running the acid/fertilisation system when needed.

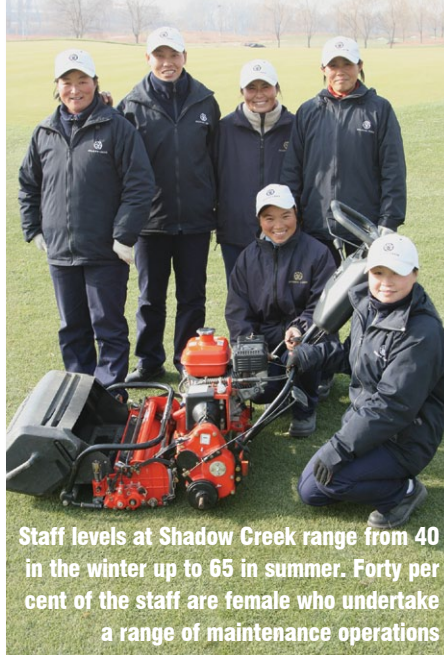
## CULTURAL CHALLENGES

My first priority when I arrived at Shadow Creek was to find an excellent interpreter as my Mandarin was non-existent and only a couple of the staff could speak a little English. The main hurdle was to translate product names and find available active ingredients and fertiliser types and determine what products needed to be imported from Australia or the USA. Local governing laws on product labels still need to be enforced. At the last local golf show I asked a couple of the suppliers what the active name was on the bottle as the label was all in Chinese. The response was "that information is a secret and cannot be given, but it kills many diseases".

It doesn't matter where you work in Asia, forward planning is critical to ensure you have products ready for use. Some things just take longer to receive and source. Even the sand needs to be hand screened before being used on the course.

Due to the deep freezing conditions in the winter it is an ideal time to focus on turf management and OH&S training. The industry here in China is really in the infancy stage and ongoing training programmes are needed both in the field and in the classroom.

The first challenge was to ensure staff would wear proper personal protection equipment as many of them had never used spray masks, gloves and ear protection before. My Chinese staff love to learn which is very



Staff levels at Shadow Creek range from 40 in the winter up to 65 in summer. Forty per cent of the staff are female who undertake a range of maintenance operations

satisfying and many of the supervisors know that one day they will be running their own operations and realise they have potential.

Staff levels range from 40 in the winter up to 65 in the summer and the average operator pay is about AU\$260 a month. Wages have been on the rise over the last few years with much-needed new labour laws and conditions for companies to follow. The staff is made up of 40 per cent female. They work really hard in the landscape department, irrigation hand watering and do a great job on the walk-behind and fairway mowers.

My assistant, Yahoo Wang, is very enthusiastic and has worked on golf courses for over nine years. Yahoo can understand a fair bit of English which helps considerably in daily operations, and the rest of the time I really depend on my interpreter Joanna to work on the golf course and in the office to translate everything to my staff and suppliers.

Joanna has just completed a three-year turf management degree which is a joint programme with Michigan State University and the Beijing Forestry University.

The challenge in the industry now is that many golf courses are being designed, built and grassed very quickly. As well as raising concerns about quality control, there is also a shortage of trained turf managers that have both technical and hands-on training to be able to run new clubs.

Australians have been requested for many projects in Asia over the last 10-15 years. I think Australians have adapted well to the diverse cultures within Asia and the local staff seem to adapt well to the teaching style, work ethic and easy going nature of the Aussies.

One thing you must possess is patience and be willing to teach. One of the most satisfying aspects of the job is seeing your key supervisors grow and eventually become golf course superintendents and help further the industry in their homeland.

If any superintendents are planning to work in China or Asia it is important to do enough background checks on the developments, locations, owners and permits needed. China has very detailed requirements on obtaining a work permit but once you have all documents in order the process seems to be very organised.

China is a very diverse and challenging place to work and sometimes can be difficult. I left a great team at Lakelands Golf Club and I have always enjoyed working and gaining experiences from varied courses around the world. I am fortunate to be in an industry which allows such travel and I have a supportive family which makes the transition to a new country a whole lot easier.

# The new frontier

BY PHIL RYAN

In 1982 there were no real golf courses in mainland China. Today there are over 350 and at least another 50 are being added each year. Since January 2008 Pacific Coast Design (PCD) has signed up four contracts for new golf courses and one of those, in Beijing, is being grassed as I write this (mid-November 2008).

In Australia, PCD and a major development company won a public tender for a new 18-hole, public residential golf course in a major capital city. The tender was issued by the local authority that not only controlled the land but was also the planning authority. The land had been used for grazing and was/is significantly degraded.

Following a detailed and lengthy

documentation process, in November 2007 we were notified that the project had received planning permission but there were objections. In October 2008 we were notified that the court had reaffirmed the approvals but that a single objector was appealing and that this could not be heard until March 2009.

From when PCD and the development company won the tender to the March of 2009 it will be nine and a half years! Do not even ask how much money this process has cost and this is not an isolated incident by any means.

In complete contrast, PCD signed a contract in February 2008 for a new 18-hole golf course in Beijing and this is the course they are grassing as I write. The Beijing project had a full environmental assessment and all

necessary permits, the entire process taking just four months prior to PCD being appointed. I will leave it up to readers to guess why a lot of Australian golf architects are now working overseas.

In a similar fashion, many Australian golf course superintendents are also making the move to China and other parts of Asia where their talents are being recognised not only with monetary compensation but also with the delegation of responsibility.

Sean Griffin, an Australian superintendent who has been overseas for many years, is currently part of the team building six new golf courses – yes, six courses! – at the one time as part of the new 36 golf course – yes, 36 golf courses at the one venue! – project the



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◀ Mission Hills Group is developing on Hainan Island in the south of China. The Mission Hills Group already has the largest single golf development in the world with 12 golf courses currently in play at the one venue near Shenzhen, also in southern China.

Everywhere across China new golf courses are being developed and this rapid pace of development is leading to many new opportunities for superintendents. It is a daunting task for someone who has not been out of Australia before to go to a new country like China, face great difficulties with language and develop a team that can put together a new golf course project. However, once that person has proven themselves to the Chinese they are normally given a great deal of freedom and responsibility to run their own show, as project owners really respect the work ethic, innovation and lateral thinking that most Australian expats have shown.

Other Australian superintendents, like Shane Templeton (Sanya), Darren Moore (Beijing), Ross Grieve (Hong Kong) and Steve Alexander, have all had success at varying levels and some of the above have now been in China for over 15 years.

## CHINA TO A TEE

China currently has over a million golfers and the numbers are growing at a rapid pace. It is now considered quite important in the business community to be able to play golf

and a lot of business is done on the golf course. Golf is popular with both men and women in China so sponsorship of golf events is normally very well supported.

Driving through most Chinese cities, and I have driven through a lot of them, you will always see at least one advertising billboard using a golf image to sell something.

I really like Chinese people, and China is no different to Australia in that most people are very nice, but there is always a small percentage that are the exception. The people I work with are normally very respectful, friendly and open to advice, although you will always have some cultural differences. I have played golf with many Chinese clients and found it to be fun although they do take their golf far more seriously than I do so accordingly I normally lose the money.

The major cities in China were the first to discover golf and so today we now see much of the new golf development occur in the more regional cities and tourist zones. Even these regional cities are huge (for example Hangzhou, located 180km south of Shanghai, has a population of 6.4 million).

While many people talk about China's large population (the July 2007 estimate was 1.321 billion) the total land area of China is 9,326,410 square kilometers so there is a lot of non agricultural land that is still available for golf. The government, quite rightly, has put significant restrictions on the use of agricultural

land and most of the sites PCD inspects for golf courses are mountainous, reclaimed zones, old quarries or simply stony ground unsuitable for crop production.

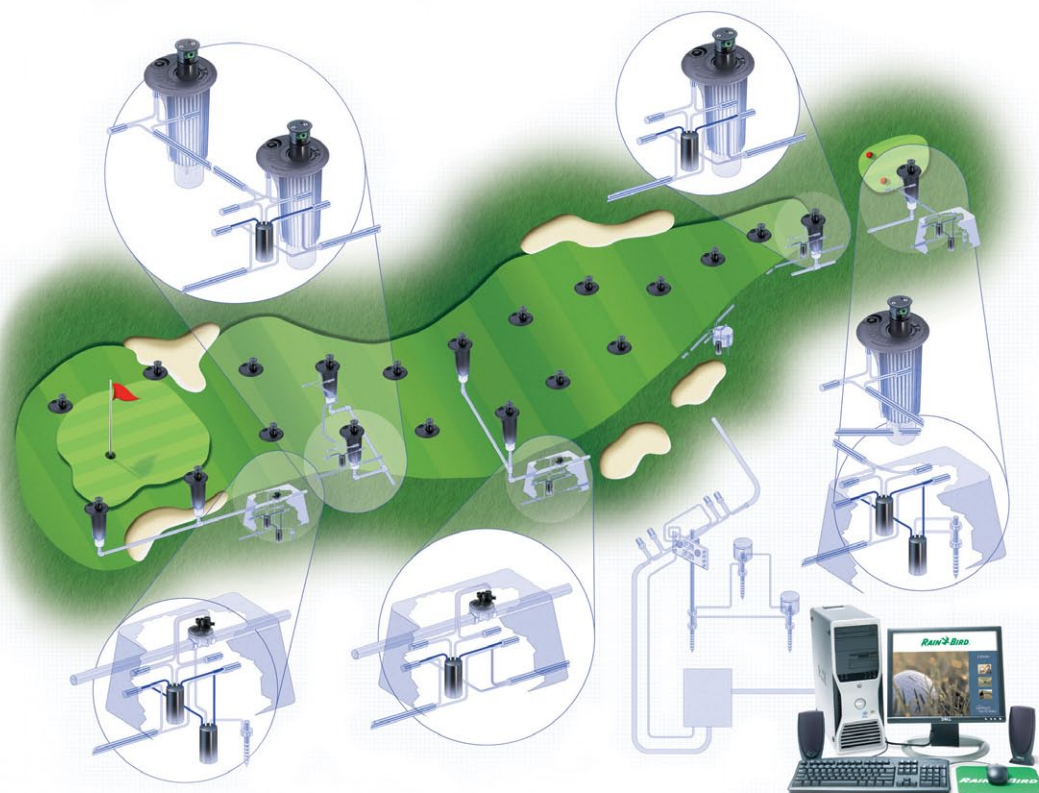
The Chinese accept that many of the prospective golf sites will require significant capital funding to develop and so budgets for course construction are normally far more generous than Australia. Clients are looking to create golf courses that will attract attention and then transform that attention into regular golf play. This combination means that course architects are often given a lot of artistic freedom, however, clients still require a full detailing of what is intended prior to commencement.

Nearly all of the golf projects are linked to residential or resort accommodation so the market for golf is directly linked to the Chinese economy. With the current financial crisis impacting many parts of the world, golf development in China is still growing strongly but this may be impacted slightly in 2009, as the effects from other parts of the world's slowing economies affect Chinese exports. However, the golf industry is lucky in that the Chinese economy is more interdependent on internal market growth than exports.

These are difficult times and nobody can predict the future, but if the past is anything to go by, China will over the next few years continue to become a major force in the global golf community. ▶



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Steve Alexander has called China home since 1992 and is currently technical director for Forward Sports Management Group. As part of that role Alexander travels throughout China visiting the company's new course developments and is photographed here with boss Chen Chao Xing on site in Urumqi in China's north

## China – my **home** away from home

Since arriving in China in 1992, the country's economic growth has constantly risen which has contributed significantly to the continual growth of the game of golf. As businesses have continued to develop in areas where agriculture was once the major industry, education levels and living expectations have developed golf in tandem with housing developments.

Being involved from the early stages of the golf boom here has been a real eye-opener and given me the opportunity to be involved with an area of the industry which can often be difficult to crack into in Australia – construction. When I first arrived in China there were less than 20 golf courses. Now there around 400 either built or under construction and there are few, if any, countries in the world that can offer the opportunities for someone in our profession that China currently does.

During my time here I have seen many industry expatriates come and go. I have also helped other Aussies looking to break into the industry here, but it must be said that China is not for everyone. I have been fortunate to be involved with some high profile courses which have been successful in planning and completion through to hosting major golf tournaments. This has allowed my name to gain a good reputation which has in turn enabled me to be selective when choosing which owners to work.

My first experience of the industry here certainly wasn't a positive one, working for owners who didn't honour contract

For Steve Alexander it only seems like yesterday that he boarded a plane in December 1992 to look at an opportunity to work in the golf industry in China. Some 16 years later and with a host of experiences, both good and bad, under his belt, the former Sydneysider is still plying his trade at a time when the industry is experiencing its biggest growth surge.

agreements. An example of this was my transportation to and from work, which was about an hour's journey. Transport was initially provided but after less than a year into my two-year contract the owners decided to stop it. They gave me an ultimatum – either I move to a small room out on site or stay in town and make my own way.

At this very early stage of my time here I couldn't speak the language, but was willing to show I was dedicated to my work and willing to tough it out. I ended up having to catch a public bus to and from work, which sometimes meant sitting next to livestock and having to jump out of bus windows as they were so crowded and I was too big to squeeze through cramped packed crowds.

At the same time I got to experience the caring side of the peasants I used to work closely with on site. Many peasant Chinese never had interaction with foreigners back then in 1993, so it became normal practice on Mondays that the head of the local village would come to my office at lunch, put me on the back of his bicycle and take me to

his house where his wife would feed me. I would eat my lunch along with a house full of intrigued onlookers before the same gentleman took me back to work on his bike. It was this type of adventure that made me want to stay and help play a part in building China's golf industry.

In those first two years I had very limited contact with other industry peers and with the exception of being able to purchase Jacobsen mowing equipment, all other materials such as chemicals and fertilisers were purchased locally from agriculture suppliers, with mixed results it must be said. This of course has changed over time with imported products and now even speciality golf course fertilisers and chemicals are available and produced in China.

### THE BIG BREAK

Having toughed it out in my first two years, I took a position that would ultimately set me on a course to greater things. I was introduced to my second project through Club Corp America and I was initially employed as grow-



in/maintenance superintendent of the 27-hole Gary Player-designed Sand River Golf Club in Shenzhen (across border from Hong Kong).

The project was the first to use seashore paspalum in China which allowed me to become involved with the development and training of local staff who have now gone on to become successful superintendents in their own right. It also enabled me to make the transformation from being a 'grass grower' into full on construction management as I was both construction superintendent and grow-in/maintenance superintendent. One of the most pleasing aspects of the development was helping save a wetland area that has since prospered and turned into a native wildlife sanctuary.

After finishing at Sand River, I was introduced to another project only minutes down the road. Shenzhen Golf Club was one of the first golf clubs built in China and they were preparing to start a total renovation of their 27-hole layout. Having worked at Sand River for three years, we formed a good team which we moved to the new project.

It was here that I had my first taste of going into business as three of us – Chris Steilberg, Theron Knapp and myself – formed a company (Global Golf Engineering) to supervise and

re-construct Shenzhen. My role as project manager elevated me into a new world dealing with major Chinese golf industry personnel which gave me a new understanding and renewed enthusiasm to branch out.

On completion of Shenzhen Golf Club I had a crack at the big one – Mission Hills Golf Club, now the largest golf club in the world. To say it was an experience is an understatement, both for good and bad reasons. During my time at Mission Hills the club was being transformed from four to six courses and it was a real experience to be involved with so many courses and staff. In saying that, however, the personal feeling you get when you work on courses in Australia was absent and much of what is great about the golf industry was lost in the name of 'franchise golf'.

### COOL CHANGE

Being involved with projects in Shenzhen from 1995-2001 was a wonderful experience and during that time Shenzhen went from being a sleepy fishing village into one of the most dynamic and wealthy cities in China, its close proximity to Hong Kong helping make it very 'living-friendly'.

Having spent seven years in southern China I decided to make a move north and

landed a position on a Nick Faldo project in Beijing. This was another learning experience for which I am grateful. Having come from Sydney and southern China working with predominately warm-season turfgrasses, making a move north gave me the opportunity to work with cool-season grasses on a large scale.

Beijing has a very unique climate which creates problems difficult to understand until you are actually dealing with them. You can get everything from sand storms, freezing northerly winds and dry hot summers. Not surprisingly turfgrass selection is critical and a topic of great discussion.

My first project was Beijing Hong Hua Golf Club about 10 minutes drive from the Olympic stadium, which is now one of the most utilised courses in Beijing. Being so centrally located created problems during construction when relics were found on site. Construction was stopped for nearly three months until it was clarified that they weren't of historical importance. My second project in Beijing was Shadow Creek, now home to superintendent Darren Moore.

On both these projects I was employed by developers to supervise contractors during construction and deal with architects and

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Alexander was involved in the construction of Beijing's Shadow Creek and was able to ensure the final product was as maintenance-friendly as possible.

consultants. Being involved with construction allowed me to have an influence during the decision making and construction stages to ensure each course was as maintenance-friendly as they could be.

## BRIGHT FUTURE

China's current golf boom has been steadily building for a number of years, supported by strong economic growth and the middle and upper class wanting to be seen playing what is still considered and elitist sport. Golf will continue to develop as long as the Central Government allows it.

Currently I am working as a technical director for Forward Sports Management Group which is a subsidiary of CITIC, one of the big three companies in China. This allows me to travel around the country visiting many new projects and over the past year I have been fortunate enough to visit sites from as far north as Urumqi to Kunming and Hainan Island in the south. Sometimes I ask myself who will play these courses as most of the newer sites are fairly isolated, but when you think

of China's population it's not hard to imagine growth will reach these places at some stage.

Part of my role is visiting sites prior to and during construction and writing reports to my seniors after discussions with architects and site personnel on how best to proceed with construction scheduling and planning. This is extremely important to ensure proper materials and equipment are used for a particular job.

The Chinese golf construction market has become very cut-throat meaning that quality control is often difficult. Some site managers try to cut corners to save money, not realising the affects they will have on course maintenance and playability in the future. In my role I work closely with our site managers selecting quality materials and making them understand the importance of each step during construction.

Our company currently has eight projects on the go and I am based on a project just outside of Guangzhou. As with most projects in China, this Nelson and Haworth design is part of a large high-end housing estate, even though the Central Government has supposedly banned such projects.

A large part of my new role is preparing and presenting training seminars ranging from quality golf construction to dealing with foreigners. Over the past year I feel I'm slowly making a difference and we are currently reviewing the company's construction specifications to ensure continuity and quality prevail on all our projects.

I have visited many projects throughout China and seen varying quality of construction work carried out, but unfortunately one common theme seems to hamper most projects – poor maintenance. During my early days here it was common for foreign superintendents to be employed for 2-3 years while the club's marketing department where selling memberships and housing. After this time local staff would take over. Once this happened budgets dropped significantly which had a major impact on overall maintenance.

Things have changed these days with fewer foreign superintendents being employed full-time to maintain projects. High-end projects that have developers with experience, or developers being advised by architects, may employ foreign superintendents to do initial training, but these days many local Chinese are actually studying turfgrass either in China or abroad.

Unfortunately these students do not get the hands-on training which is critical to understanding day-to-day operations and how to diagnose problems before they create even bigger problems. I have met in my travels local turf industry people who have studied abroad and also had the experience of working at clubs both in the US and UK, but it is still extremely hard for these people to convince clubs to allocate budgets large enough to allow them to prepare and maintain courses to their best potential.

Opportunities still exist for foreign superintendents with competition between clubs more noticeable than ever, however, finding the right development and then being given the opportunity is not so straight forward. Australians are held in high regard in China with our work ethic and easy going nature popular among the Chinese workers.

As mentioned previously, China is not for everyone. I have been fortunate to marry a wonderful Chinese lady, Hei Mei, and learnt to speak Mandarin which has been a bonus, but I have known of fellow peers who have been treated very poorly and found it very difficult with communication.

During my 16 years working abroad I have had two stints working in other countries as well – Myanmar and Russia – but I always come back to my 'home away from home' – China! 🇨🇳



Beijing has a very unique climate which can bring sand storms, freezing northerly winds and dry hot summers. Turfgrass selection is critical and a topic of great discussion



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Made up the Lakes and Ellenbrook 18s, The Vines is set among 190 hectares of bushland in the Swan Valley just out of Perth. It will host the 2009 Johnnie Walker Classic from 19-22 February

From a background growing kiwifruit and commercial market gardening in his native New Zealand to being the current day superintendent at one of the country's top resort facilities, Dion Warr has certainly experienced the full gamut of what the horticulture industry can offer. Calling The Vines Resort and Country Club home for the past 12 years, Warr and his crew are gearing up for the tri-sanctioned Johnnie Walker Classic which returns to the course for the second time in late February.



# The Vines keeps on

**A**s phone conversations go it was one that superintendent Dion Warr isn't likely to forget in a hurry. When he fielded a call from his general manager at The Vines Resort and Country Club in Perth one evening late last January he was expecting the usual run-of-the-mill stuff – someone had raised an issue about the condition of the course that day, a sprinkler was stuck on, or every superintendent's favourite, the ball washers needed refilling.

"Dion, the maintenance facility is on fire!" Come again!? For an instant Warr thought it was a wind up, but when his general manager mentioned in the very next breath that he was walking towards the shed and all he could see was smoke billowing up from it, Warr knew it was no growing season prank.

Bolting for the work utility, a few minutes later Warr arrived at the course and was greeted with a sight that would rip the heart out of any superintendent. The shed was ablaze and the compound was teeming with fire and emergency crews as they battled to put it out. Fortunately none of the crew were on site when the fire broke out and when they all turned up the following morning it quickly dawned just how much damage had been caused.

Investigations later assumed that the fire started in one of the maintenance utility vehicles. The ignition key may have been left on causing a battery wire to short, melt plastic, ignite and spread to the fuel tank. From there it was only a matter of time before the fire took hold, gutting the entire facility and inflicting around \$500,000 of damage.

Five machines, including two quad bikes, two utility golf carts and Warr's prized mobile office chair – his Mule – were write-offs, while of the remaining 25 machines many suffered extensive fire damage and required varying degrees of repair. Resident turf technician Eddie Ahern earned his keep in the weeks and months following the fire replacing everything from damaged panels, hydraulic hoses, steering cables and bearings through to melted tyres and Warr can't express enough gratitude for the work he put in to get everything operational again.

All course hardware – pins, flags, tee markers and signage – were a molten mess, while the staff lockers, contents, wet-weather gear and spray safety equipment were all charred. The office and workshop weren't



Dion Warr (centre) with assistants Brad Pavlinovich (Ellenbrook Course) and Paul Wright (Lakes Course)





# walking

BY BRETT ROBINSON

spared either with computers, including the irrigation and technician PCs, files and records all succumbing to the heat (the final bill came to \$42,000 for the replacement of the irrigation control computers and wiring alone!)

For nine months of 2008 The Vines maintenance staff operated out of secondary sheds already on site, as well as shipping containers which were used for storage, a makeshift staff room and the turf techs area.

Fortunately the fire caused no structural damage to the main shed which meant it didn't need to be knocked down. Instead it was reclad and completely rewired and those machines which perished were replaced with second-hand equipment (unfortunately the club had no new for old policy).

"I think we were just all in a state of shock and disbelief," recalls Warr about the events

of last January. "Fortunately the Lexus Cup had already been played in December, but in saying that if it had have happened in the lead up to something like that or the upcoming Johnnie Walker Classic I don't think it would have been a big problem.

"Greenkeepers are a pretty adaptable bunch and to the credit of the guys here once the shock of what happened wore off there was still a job to be done and they just got on with it.

"One of the overwhelming and heartening aspects of the whole thing was how other superintendents, clubs and machinery companies came to our aid. We were able to borrow machinery immediately afterwards which enabled us to keep our operations on the go. We certainly owe them for supporting us during that difficult initial period.

"If there's one thing that I can pass on to other superintendents having gone through all this, it is the importance of having battery isolation switches and making sure that staff don't leave the ignition on."

## A DIFFERENT CROP

Last January's fire was yet another interesting and challenging chapter Warr has penned in a turf management career that is now in its 23rd year. Born and bred in the Bay of Plenty on the east coast of New Zealand's North Island, it wasn't until he moved to Sydney when he was 19 that Warr started in the golf course maintenance industry. Prior to that he had worked in commercial market gardening and the burgeoning kiwifruit industry back home and landed in Sydney with intentions of setting up his own business.

Those plans never eventuated and while contemplating what to do next, Warr happened to be flicking through the Sydney UBD street directory one day and noticed the number of green patches on the pages that were either parks or golf courses. Having played the game a lot as a kid the interest was certainly there and with his background in horticulture he thought the industry would be a good fit.

His first job was as a casual at The Australian Golf Club before moving to Northbridge Golf Club where he took up the position of mechanic. Gaining his trade certificate in motor mechanics he then took on a greenkeeping trade certificate.

His next move was to The Lakes Golf Club where he worked under Peter Brown and completed his Masters in Turf Management. Warr rose to be Brown's assistant before moving on to Cronulla Golf Club where he picked up his first superintendent posting. In that role for two years, Warr then missed on the Lake Karringup job but six months later in 1996 was winging his way West after getting the nod at The Vines. ▶

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In January 2008 the maintenance shed at The Vines was gutted causing \$500,000 worth of damage. For nine months the crew operated out of temporary facilities



Warr arrived at a time when The Vines was in the throes of constructing an additional nine holes to complement the existing 27 holes designed by Graham Marsh and Ross Watson in 1989. That last nine, which would complete the full 18 of the Ellenbrook Course, was designed by Marsh and it was Warr's initial responsibility to oversee the grow-in of the new holes and contracting of works. Since then it has been primarily a maintenance operation for Warr and over those years he has continued to fine tune and enhance one the country's top ranked resort courses.

## GRAND DESIGN

Made up the Lakes and Ellenbrook 18s, The Vines is set among 190 hectares of bushland in the Swan Valley just out of Perth. If you were asked to describe the complex in a single word it would have to be 'grand'. The greens are huge and undulating, the fairways large and open, the rough generous and bunkers numerous. From design and aesthetic points of view The Vines certainly ticks all the right boxes but in doing so presents plenty of maintenance challenges.

In total, Warr and his crew maintain 100 hectares of irrigated turf, over four hectares of Penncross bentgrass greens, 220 bunkers and 20 kilometres of cart paths (Warr quips that of all the machinery they have, the tractor-mounted path edger wins hands down as his most favourite). All fairways are Greenlees Park couch, with Wintergreen couch tees on the original 27 holes and Windsorgreen couch tees on the newer nine. There are also areas of tall fescue in greens surrounds, semi-roughs and on some par 3s.

Warr is ably assisted by lieutenants Brad Pavlinovich (Ellenbrook Course) and Paul Wright (Lakes Course), two full-time irrigation technicians and two turf technicians, and during the growing season has a full complement of 26 staff on deck.

Among the primary challenges during Warr's tenure have been the management of kikuyu in couch, couch encroachment into the bent greens, and every superintendent's favourite, *Poa* from bent. Warr says The Vines seems to have the more perennial type of *Poa* which over time has developed resistance to some chemical controls, in particular paclobutrazol. This has meant Warr has had to use combinations and pre-emergents in the ever-constant battle to keep the Penncross surfaces clean and is not averse to sending out a team to undertake some manual control.

While many of his colleagues around the country are battling with water, that is one area Warr is fortunate not to lose too much sleep over. The Vines has 18 production bores which feed into a series of lakes spread around the course. Coupled with a very generous 1600 megalitre license and an aquifer which is semi-confined, meaning it doesn't recharge a deeper aquifer and gets fully recharged every

year, Warr is blessed with a reliable source which is vital considering that up to 8M can go out a night during the height of summer. Aquifer levels are recorded on a monthly basis and the club submits full hydro reports to WA Water and Rivers on a tri-annual basis.

The environment, in particular pesticide and nutrient management, are also high on Warr's maintenance agenda and both are strictly managed and recorded. Warr rarely uses phosphorous on the course and puts out a fertiliser containing phosphorous one in every four years (at about 10kg/ka). The rest of the time he uses a nitrogen-based fertiliser applied at 50-80kg/ha about three times a year on the couch.

Among future plans for the complex Warr is hoping to clear large areas of scrub to open the layouts up and enhance their visual qualities, while a lot of the original exotic screens which line each hole will go as well. Warr is also keen to regenerate pockets of bushland and promote native varieties.

## WALKING THE WALK

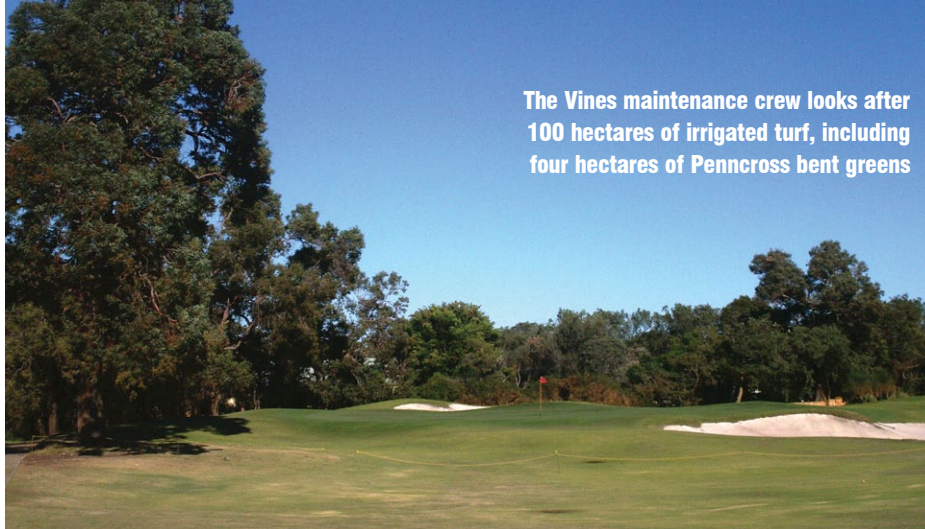
While The Vines has gained a reputation as being one of Australia's leading resort courses (indeed, under Warr's management in 2001 The Vines was voted the country's number one resort course), it has also been a popular venue for major tournaments over the years. Warr and his crew are no strangers when it comes to tournament preparation and since arriving at The Vines, Warr has added six Heineken Classics to the CV (1996-2001), the 2006 Johnnie Walker Classic and most recently the 2007 Lexus Cup.

The Vines became the first Australian course to host the Lexus Cup, the women's

The office and workshop weren't spared either with computers, including the irrigation and technician PCs, files and records all destroyed







The Vines maintenance crew looks after 100 hectares of irrigated turf, including four hectares of Pennncross bent greens

equivalent of the Ryder Cup which has been contested by the Asian and International teams, captained by Se Ri Pak and Annika Sorenstam, since 2005. Warr says that tournament was "a refreshing change" seeing it was held early in the season, however, normal service will resume this summer when the 2009 Johnnie Walker Classic tees off at The Vines from 19-22 February.

Over the past 18 years the Johnnie Walker Classic, which is tri-sanctioned by the European, Asian and Australasian PGA Tours, has been played in eight countries and 13 different golf clubs around the Asia Pacific region. It will be the fourth visit to Perth and the fifth time the event has been staged in Australia following its Down Under debut at Hope Island in 1997. The Vines hosted its first Johnnie Walker Classic in 2006 (won by Kevin Stadler) and by holding the event again this summer joins fellow WA championship venue Lake Karrinyup to do so twice.

This year's tournament has attracted many of the game's big names, including past winner Greg Norman who is expected to pull the galleries just as he did at the 2006 Australian Open at Royal Sydney Golf Club. Joining Norman is English trio Lee Westwood, Paul Casey and Ian Poulter, who finished second at the 2008 Open. Columbia's Camilo Villegas, a regular visitor to Australia since

turning pro in 2004, has also confirmed after a groundbreaking 2008 which saw him bag two consecutive US PGA Tour wins in September.

While the 2006 tournament was played entirely on the Lakes Course, this year's Johnnie Walker Classic will be held on The Vines Composite Course. Comprising holes 1, 2 and 12-18 of the Ellenbrook Course and holes 10-18 of the Lakes Course, the Composite ranks inside Australia's top 40 courses and was the favoured layout for the old Heineken Classic. As well as being his personal preference, Warr says the Composite offers a more challenging proposition and highlights the best aspects of each course.

On top of presenting those holes to a championship level, Warr and his crew will also dress and groom the driving range, chipping greens, two practice putters and the 9th hole of the Lakes which will become a second chipping and putting facility. Also, the Lakes 1st, which can be seen from the clubhouse (and by the TV cameras), will be maintained to tournament standard. To make things easier, 18 holes will be closed leading up to the tournament.

Obviously Warr's major concern in the lead-up to the tournament is managing the bentgrass greens through the height of summer and making sure they are in optimum health come the end of the season.

Not surprisingly Warr and his staff undertake an intensive greens programme, which begins with spring renovations. All greens are cored using 5/8" tines and then heavily topdressed. They are then fed up to maximise growth and recovery and are maintained at 4mm (later reduced to 3mm) to help promote a strong deep root system. Warr follows that up with a verti-drain using mini solid tines and applications of wetting agents.

In the immediate lead-up to the tournament Warr will undertake a programme of verti-draining and spiking as well as a light scarify about five weeks out, before bringing the height of cut down to 2.5mm for the tournament. Depending on the weather conditions come the week of the tournament, Warr will double cut and roll if required to produce the desired speeds of between 11-11.5 feet. Warr will also continue with the Poa and couch programmes as close to the tournament as possible to keep the surfaces spotless.

Fairways and tees will be cut at the standard 8mm, while the contours of some fairways have been brought in to toughen up certain holes. The tournament organisers have also stipulated they want the semi-rough longer and this will be maintained at 60mm. The bunkers too have been the subject of much work and with this year's tournament being held across holes on both courses, a lot of effort has also gone into making sure they are uniform.

"It (the Johnnie Walker Classic) certainly rates as one of the biggest events we have hosted and for me personally it rates up there along with the other international tournaments I have been involved with," says Warr. "For a superintendent it doesn't get much bigger than a tri-sanctioned event and the tournament is beamed live right around the world, so there is huge pressure on you and the staff to showcase the course. But we greenkeepers thrive on that sort of challenge and we are looking forward to it." 🌱

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For most enterprises that rely on irrigation to be sustainable, reducing water usage and the cost of ownership are the common goals for improved performance and economic viability. This principle applies for most commercial irrigators including golf courses, resorts, race tracks, sports fields, councils and horticultural applications.

With many regions in Australia facing water restrictions and moving towards a

Managing water resources and irrigation outputs are without question two of the key responsibilities of any modern day superintendent and turf manager. Good irrigation practices can have a significant impact on other inputs such as chemical use and fertiliser use efficiency and in many instances less water can provide better results. In this first part of a three part series on improving irrigation efficiency, Scott Johnstone looks at four key factors that impact on water and energy savings.

water 'needs' basis, as opposed to a water 'on-demand' system, reducing water usage is not a goal, it is often now a requirement.

The amount of water and energy consumption on a site is directly related to four key efficiency factors, which include:

- Scheduling coefficient;
- Flow management efficiency;
- Pumping efficiency; and
- Scheduling efficiency.

These efficiency factors are primarily determined by a combination of influences with design, product selection, operator skill and maintenance all having a profound effect. If compromises are made in some of these areas, it can result in increased water use and running costs. If poor investment decisions were made and all of the above areas are neglected, the effect would be more profound with substantial input increases compounded with substandard output performance in terms of plant quality.

The good news is that aside from reducing water consumption and running costs, good irrigation design and management practices can have a very positive flow on effect in other areas such as improved plant growth, reduced chemical usage and positive environmental impact. Making a little water go a long way can be very rewarding.

To compare two irrigation system requirements using the same site, Table 1 demonstrates the difference of water and

**TABLE 1: WATER AND ENERGY REQUIREMENTS FOR TWO POSSIBLE IRRIGATION SCENARIOS ON THE SAME SITE**

Data	Example A Good design and operation	Example B Mediocre design and operation	
Scheduling coefficient (factor)	1.2	1.5	
Flow management efficiency (%)	90%	80%	
Pumping efficiency (%)	76%	60%	
Scheduling efficiency (%)	90%	75%	<b>Variance</b>
Peak irrigation requirement, (mm/wk)	43	54	<b>25%</b>
Power requirement @ design duty (kW)	61	108	<b>78%</b>
Water usage (megalitres/year)	156	228	<b>46%</b>
Water and power cost (\$/year)	\$22,472	\$35,561	<b>58%</b>

**NB: This is a theoretical analysis based on an 18-hole golf course in Brisbane, using exactly the same environmental factors, irrigated area, plant factors, climate data, and irrigation window. Costs for both examples are based on water supply at \$100/megalitre and power for irrigation pump station at \$0.12kWhr. The only fundamental difference between the two examples above is the four key efficiency factors shown in the data table.**



As well as reducing water consumption and running costs, good irrigation design and management practices can have positive flow on effects in other areas such as improved plant growth, reduced chemical usage and positive environmental impact

energy inputs by adjusting the key efficiency values mentioned above. The values used in either example are not extreme or unrealistic if you were to audit what would be considered to be a good and mediocre irrigation system in the field.

In comparison to Example A, Example B with mediocre design and operation values uses 46 per cent more water and the running costs directly associated with the irrigation increases by 58 per cent. Also, importantly, for Example B;

- The 25 per cent increase in the peak irrigation requirement will result in a larger pump station and mainline capacity, therefore increasing capital cost to service this requirement; and
- The 78 per cent increase in power required at the irrigation pump station will result in a larger incoming power supply and transformer capacity, therefore again increasing capital cost to service this requirement.

In addition, while it is more difficult to quantify here, it would be fair to say poor irrigation practices will have a negative impact on plant quality and increase other operational costs such as fertiliser, chemical and labour inputs.

## SCHEDULING COEFFICIENT

The scheduling coefficient (SC) factor is mainly determined by the ability of the irrigation



**Scheduling coefficient can be tested by using a catch can test. Most irrigation manufacturers can supply factory test data for new systems**

emission device, such as a sprinkler head, to deliver water uniformly across the irrigated area. For a good result, scheduling coefficient target range in zero wind conditions is 1.1 to 1.3, based on critical SC window size of 10 per cent.

Important criteria when evaluating a system design or audit for SC factor are:

- Optimum sprinkler spacing and pattern;
- SPACE data or catch can test for SC, coefficient of uniformity (CU%) and distribution uniformity (DU%); and
- Uniform operating pressure at sprinkler heads and the use of pressure regulating devices, where required.

Scheduling coefficient can be tested on existing sites using a catch can test and most manufacturers can supply factory test data for new systems.

Scheduling coefficient has a huge impact on the irrigation requirement as the operator has to water up areas receiving lower precipitation rates to replenish soil moisture levels to field capacity, so the higher precipitation areas are overwatered and there is a compromise between wet spots and dry spots.

It is very important to get the design fundamentals right from the start as this can also be one of the more expensive areas to rectify, particularly if the spacing is inappropriate or the pipework is under size. It is a far simpler exercise to change out the sprinkler nozzles or heads due to wear or poor performance if the hydraulics are satisfactory.

## FLOW MANAGEMENT EFFICIENCY

Flow management efficiency is the ability of the operator and control system to keep the

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◀ pump system at maximum design capacity throughout the majority of the irrigation scheduled. The objective is to compress the irrigation window as much as possible, and at the minimum stay within the time available. For a good result, flow management efficiency target is >90 per cent.

Irrigation windows are generally limited to night time operation to avoid evaporation losses caused by sun and wind, plus utilise off peak power to minimise running costs. However, there can be other site-specific factors that can limit operational hours available for irrigation per week, such as public access.

For projects such as a sports field, with consistent station flows and a limited number of control valves, providing pump selection is good, this may be a relatively simple process. For complex projects, such as a golf course, with uneven station flows and a large number of control valves, it is vital to have more sophisticated flow management tools.

Most computer-based central control systems with flow management capability can automate this process to some extent once the database is set up properly. While theoretical databases are a useful guide, they may not cater for site variances such as topography, nozzle wear and data entry errors.

For maximum efficiency on larger projects it is important that the pump station has the capacity to efficiently handle the range of design flows. Integration with the central control system is also important so that it can report actual system flows and make adjustments or raise alarms where required.

The important criteria to check when evaluating a system design or audit for flow management efficiency are:

- Available irrigation window and limitations;
- Irrigation control system, accurate database, flow management capability;
- Pump selection and pump control system, interface with irrigation control; and



**Good flow management is becoming more critical, especially with factors such as staying within off-peak power limits and the trend towards using recycled water which limits public access**

- Flow meter with output signal, interface with irrigation and pump control.

Good flow management is becoming more critical, especially with factors such as staying within off-peak power limits and the trend towards using recycled water which limits public access when the irrigation cycle is completed.

Operators in this situation may now require an irrigation window of say 8 to 10 hours per night, whereas the original system may have been 12 hours per night, so efficiency gains need to be sought.

## PUMPING EFFICIENCY

Pumping efficiency has a big impact on energy usage and is one of the easier components to fix in an existing irrigation system. For a good result, pumping efficiency target is >75 per cent.

Pump efficiency can vary significantly depending on the type of pump and application, typically between 55-85 per cent. Also, while the pump may have a best efficiency of say 75 per cent at design flow, if operating at fixed speed, the efficiency may reduce to 55 per cent when operating at say half the design flow. This scenario may result in even pressures which can impact on scheduling coefficient, and create other issues such as pipe failure.

A pump operating outside its peak design flow, or exceeding available NPSH (suction limits), may reduce both efficiency and the design life of the pump through cavitation. A flow meter with intelligent interface to pump station and the irrigation control system can effectively protect against excessive flows and cavitation.

Simple irrigation systems with consistent flows may allow a single pump with a flat curve and fixed speed operation, whereas a more complex system with a wide range of duty requirements may demand a multi-pump station using steep curve pumps and variable speed control.

In some situations where topography is highly variable across a site or there are a wide range of sprinkler pressure requirements,

**For maximum efficiency it is important that the pump station has the capacity to efficiently handle the range of design flows and is integrated with the central control system**



**Intelligent sensor inputs, such as a weather station, can offer big savings and return on investment for turf facilities**

it may be necessary to have more than one pump station to achieve acceptable efficiency and not exceed normal pipe pressure ratings.

The important criteria to check when evaluating a system design or audit for pumping efficiency are:

- Range of design duties required, flow and pressure;
- Suction conditions and NPSH at range of duties;
- Type, selection and number of pumps;
- Pump control method, fixed speed or variable speed; and
- Interface between pump station, flow meter and irrigation control system.

Also take into consideration any site physical constraints, such as power supply capacity, shed size and hydraulic pipework capacity.

A multi-pump station (as shown in the photo on page 22) with multi-stage steep curve submersible pumps and variable speed control can handle a wide range of duties, while maintaining good efficiency. Note the flow meter, a vital tool in any pump station nowadays.



## SCHEDULING EFFICIENCY

Scheduling efficiency is how accurately you can match the irrigation to the plant's requirements. This has a huge impact on water usage and is mostly dependent on the control system and operator skill. For a good result, scheduling efficiency target is >85 per cent.

Understanding when to irrigate and how much to apply are critical to achieving good scheduling efficiency. The operator needs to know accurate application rates and should be thinking in terms of millimetres applied. The

aim is to keep moisture levels at an acceptable level within the effective plant root zone and replenish soil moisture to field capacity when an allowable deficit is reached.

Sites can have highly variable requirements, depending on many environmental factors such as soil type, slope, plant type, plant performance and climate conditions. Some factors, such as climate, change on a daily basis which increases the complexity and level of skill required to manage the irrigation effectively.

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Having a water management plan in place is a critical tool and will highlight key performance indicators

A high level of operator skill is required to maintain good scheduling efficiency. There are many tools available to assist operators including simple devices such as an open pan evaporator or rain switch, plus more sophisticated devices that can be intelligently managed or monitored through some irrigation control systems, such as weather stations and soil moisture sensors. Intelligent sensor inputs such as a weather station can offer big savings and return on investment.

The aim is to maintain plant growth in optimum condition while minimising losses through runoff, deep percolation, wind and evaporation. For best practice, my opinion is to monitor soil moisture to determine when to irrigate and use a pan evaporator or weather station to calculate the amount of irrigation to apply.

The important criteria to check when evaluating a system design or audit for pumping efficiency are:

- Human resources; time, capability and training;
- Irrigation control system programming features;
- Sensor inputs and intelligent interface capability with irrigation control system; and
- Water management plan.

## WATER MANAGEMENT PLANS

As most commercial enterprises require a plan in terms of financial operating budgets and setting performance targets, similarly a good

way to manage an irrigation system is to have a plan. An effective water management plan should include:

- Set monthly water use targets for the year, based on historical climate data averages and system efficiencies;
- Record actual monthly rainfall and evaporation;
- Monitor actual monthly water use.
- Action system management where trends are inconsistent with expectations (i.e. in a month of below average rainfall and above average evaporation you would expect to be over target, whereas a month of above average rainfall and below average evaporation you would expect to be under target).

While there is some paperwork and training required to set up a water management plan initially, it is not difficult to implement and manage from this point forward. A water management plan is a great tool for irrigation managers and will highlight key performance indicators.

## CONCLUSIONS

Along with water and energy conservation issues, decisions on your irrigation should be balanced over the life of the system based on value and return on investment to produce a quality surface or product in an environmentally responsible manner. Good irrigation practices can have a significant impact on other inputs such as chemical use and fertiliser use efficiency.

In summary, when making management decisions to achieve and maintain good irrigation efficiency, consider the following:

- Implement a water management plan;
- Understand the cost of ownership and what represents good value;
- Invest in good system design and high efficiency products;
- Provide appropriate skilled staff resources, training and support;
- Audit your system annually or biannually;
- Track maintenance and running costs; and
- Budget for planned upgrades.

## ACKNOWLEDGEMENTS

Scott Johnstone is a graduate from the Queensland Agricultural College and an IAL Certified Irrigation Designer with extensive industry experience. He is currently technical services and pump station manager for Rain Bird Australia, and can be contacted via email [rba\\_pumps@bigpond.com](mailto:rba_pumps@bigpond.com) or on 0437 078 677 for further information.

**Editor's Note: The AGCSA, as part of its Water Initiative, is in the process of developing an interactive water management plan tool for superintendents and turf managers. The AGCSA recently appointed environmental agronomist John Geary to help oversee this project and he is also available to assist superintendents in the development of water management plans. John can be contacted at the AGCSA on (03) 9548 8600 or by email [jgeary@agcsa.com.au](mailto:jgeary@agcsa.com.au).**



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**Pictured:** Ringwood Golf Course adjacent to Melbourne's new Eastlink Freeway. At over 30m tall using step tapered poles this fence is engineered to withstand winds in excess of 160kph.



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It is important for superintendents to ensure they have a written employment contract and/or letter of offer which provides for a compulsory performance management process prior to termination of their employment



# The **right** of reply

With a spate of similar stories to mine taking place around the country, I'm drawn to a conversation I had with a well-known turf identity many years ago where he relayed the words of the legendary Claude Crockford who apparently said his major frustration in the job was the lack of the right of reply. By no means considering myself in the esteemed category of Mr. Crockford, this is my attempt to describe my recent demise at a club I was thoroughly committed to.

Before I begin, let me qualify this by stating that my former employer gave me over 12 years of generous remuneration, ever-improving working conditions, and in the most part, all the necessary means to bring the course forward to a level I am proud of. Granted this article has a cathartic element to it, but hopefully it will provide many new or happily unaware superintendents with an example of where it can go wrong if you're not on the ball.

A brief history of the club in question is of an old established course built on a former orchard that features considerable undulations on clay soils, with tight tree lined fairways, tees and greens. I was appointed in 1996 after spending 14 years being successfully involved in the development of a well-known Mornington Peninsula golf project. It was apparent from the outset that that my new job

Imagine one minute everything is fine and then the next you are called into the club's board room and told you're out of a job. That situation has befallen a number of golf course superintendents in recent times and as it always does sends shockwaves throughout the industry. Not only does the industry lose the experience and knowledge of that practitioner, in many cases for good, it also makes those who still have a job question their own situation and whether they are doing all they can to protect themselves, particularly at a time when job security is paramount in the face of global uncertainty. Former VGCSA president Michael Picken was one such casualty in late 2008 and here he ruminates about his dismissal and asks whether 12 years in the one position is too long in this day and age.

offered many problems ranging from greens inconsistencies, reticulation deficiencies and an unsustainable reliance on town water for irrigation needs.

To rectify these issues a greens replacement programme was implemented and completed over an eight year period. The reticulation system was upgraded and the independent

water source problem was overcome through developing a lake system to the narrow creek that meanders through the lowest part of the property. This gave the club a substantial storage of water to draw from in times of need. During this period the antiquated maintenance facility also went through a major upgrade in order to create suitable working conditions.



With the major course issues laid to rest the club administration believed it was responsible to drive on with other pressing needs. This meant the workload continued in the form of a par 5 realignment to rectify a boundary problem, reconstructing the bowling green, the addition of a 19th hole, 2.2km of concrete paths to be installed over a period of 3-4 years and a phased-in upgrade to the ageing irrigation plumbing.

It must be noted that most of this work was carried out by contractors or sub-contractors, but that did not discount from the fact that the groundstaff were always heavily involved with all projects, providing the finish that enabled the different areas to come back into play as soon as possible. The final outcomes of these projects have always been well received by the members but it must be said there have been times when the extensive works stretched their patience.

## THE DOWNWARD SLIDE

For the first seven or eight years of my employment I believed I had the full support of both the manager and committee. This was confirmed by the fact that when my dismissal became known, many of the captains and presidents from that period contacted me as

I was about to leave with generous offers of references and endorsements.

As time moved on and faces on the committee changed, cracks started to appear. This came in guise of mixed enthusiasm to projects I put forward or work in progress. I also noted that information coming from above was slowing down and in the last year it could only be described as on a need-to-know basis. I have always maintained that a superintendent/manager relationship was the key to the job, so in a way I must take some responsibility for allowing that to decline.

Also, in fairness to the management of the club it would be reasonable to say I can be headstrong and quite intolerant when I believe in the merit of a project that will benefit the course. I also find criticism hard to take, a flaw many passionate superintendents could relate to.

As 2008 unfolded I witnessed a relatively new, and in the most part, inexperienced board take the reins, which coincided with a very supportive and involved captain moving aside. It also lined up with a restructuring of personnel in the office which appeared to create issues.

The year also marked a personal decision to have long overdue hip-replacement surgery

and then after some time back at work, a six-week holiday with my wife in Europe. Major works were again being planned but I believed 12 years of service warranted these necessary periods of time off. I also had the utmost faith in the ability of the maintenance staff.

Two weeks after returning from my holiday, an impromptu meeting was called by two members of the four-man board along with the manager. The board relayed concerns that they were getting complaints from members about the speed and standard of the clean-up that was taking place by groundstaff following the installation of phase one of the new irrigation system.

The actual installation work was being carried out by one of the state's leading irrigation contractors, who was sympathetic to the difficulties of reinstating trenches in clay during winter. It was agreed at this impromptu meeting that a priority would be placed on speeding up the process. During this meeting I protested that an enormous amount of unplanned work had been implemented while I had been away, and that staff had been left thin on the ground.

Two weeks later another meeting was called, this time with three members of the board. The tone was much more serious ►

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# YOUR RIGHTS AT TERMINATION

BY TIM GREENALL

Given the current economic climate and global financial crisis, job security is more important than ever and it is important for golf course superintendents and their staff to be aware of their rights and protect themselves as far as possible from an unfair and/or summary dismissal.

At present, only employees who are employed by a company that employs 101 employees or greater have access to unfair dismissal. That is, they have the right to lodge a complaint with the Australian Industrial Relations Commission (AIRC) within 21 days of their termination taking effect, alleging that their dismissal was harsh, unjust or unreasonable.

The employee must have been employed by the employer for at least six months prior to the termination. The AIRC will consider not only whether the reason for the dismissal was justified but also whether the method of dismissal and the process preceding it was fair (i.e. was the employee given a warning and was the employee given an opportunity to respond).

On 1 July 2009, the Federal Government's new unfair dismissal laws will come into force. These laws will introduce a simplified form of unfair dismissal laws not involving formal hearings or other legal processes. A small business will then be defined as an employer employing less than 15 employees. An employee of a small employer will need to have been employed by the employer for at least 12 months before they can make an unfair dismissal claim. All other employees will need to serve a six-month qualifying period to gain access to unfair dismissal.

Small businesses will be subject to the Fair Dismissal Code, which will allow the small business employer to avoid an unfair dismissal claim if it can answer the questions on the code appropriately, such as whether

the employee was dismissed because of a genuine redundancy or because of serious misconduct.

It is important to note that employees who have been made redundant for genuine reasons (i.e. they have been dismissed because of a business downturn or because their position is no longer required) will not have access to unfair dismissal. Further, where an employee has committed serious misconduct, such as theft, fraud, violence or a serious breach of occupational health and safety procedures the employer may be entitled to terminate the employee summarily without notice.

## UNLAWFUL TERMINATION

All employees can lodge a claim for unlawful termination where they believe they have been terminated on any of the following discriminatory grounds:

- Temporary absence due to illness or injury;
- Trade union membership or participation in trade union activities outside of working hours or, with the employer's consent, during work hours;
- Non-membership of a trade union;
- Seeking office as, or acting or having acted as, a representative of employees;
- Filing a complaint, or involvement in proceedings against an employer;
- Discrimination on the grounds of race, colour, sex, sexual preference, age, physical or mental disability, marital status, family responsibilities, pregnancy, religion, political opinion, national extraction or social origin;
- Refusing to negotiate, make, sign, vary or terminate an individual transitional employment agreement;
- Absence from work during maternity leave or other parental leave; or

- Temporary absence from work due to voluntary emergency management activity, where such an absence is reasonable.

## CONTRACTUAL PROTECTION

Aside from unfair dismissal, it is important for superintendents to ensure that they have a written employment contract and/or letter of offer, which provides for a compulsory performance management process prior to termination of their employment. The contract should require the club to be contractually obligated to performance manage the employee where the employer has issues with the employee's performance.

This would generally involve the employee being warned about the alleged unsatisfactory performance and being given an opportunity to both respond to those allegations and improve his or her performance as required within a reasonable time period.

It can be difficult for an employee to negotiate with an employer regarding the terms of their employment contract and/or letter of offer. However, in the absence of unfair dismissal rights it does give the employee a contractual right to procedural fairness in the event that the club terminates employment without reason or fair process.

**Editor's Note: AGCSA members are entitled to 30 minutes free legal advice from Melbourne-based law firm Madgwicks, whether to do with employment concerns or any other legal matter. For personalised advice in relation to your own employment situation, contact Tim Greenall on 9242 4721/email Tim.Greenall@Madgwicks.com.au or Laura Simmons-Strempel on 9242 4794/email Laura.Simmons-Strempel@Madgwicks.com.au.**

and it was agreed that it was time to add extra manpower to the already overstretched 11-man crew, so an extra groundsman was employed. It now appears on reflection that I had been given a second warning of my impending dismissal, even though at no time had this been mentioned.

For the next month we pushed on preparing the course for the biannual visit of a sister club. Another unscheduled 80m concrete path was installed and a new tee complex was built. The sister club visit received an endorsement from the visiting captain but nothing from my committee. An ominous sign it now seems. During this whole period it must be stated that

the manager gave me no reasons for concern.

Three days after completing the draft 2009 budget, which had been called for a month early, the manager called to say he'd been requested to have me in the boardroom in two hours. His comment, "It doesn't sound good."

On completion of that five minute meeting I was out of a job with a thank you for the 12 years but a decision had been made to move in a different direction. On requesting a reason, or reasons, the reply was given that there was no point, followed by the comments, "Twelve years is a long time in today's industrial climate". I had two days to clean up my belongings.

I left the boardroom and dropped the bombshell to a shocked grounds crew who were very respectful and supportive on my last two days. The manager also appeared sympathetic claiming he had no idea the decision was coming and mentioned he had dissuaded the board from emailing me the news.

He then informed me of my legal entitlements as I didn't have a contract. After I appealed that position with him, he let me know soon after the board had agreed to increase the entitled five weeks payout figure (plus long-service and annual leave) to eight weeks.



## ON REFLECTION

As I review my time at my former place of employment and superintendent positions anywhere in this country, I can't help but worry. Many of our colleagues around the states, who were kind enough to contact me following my departure, echoed these same concerns.

To start, I would implore all superintendents to have a contract and make sure it has been approved by a legal specialist. The AGCSA has a service that can provide that. Also be aware of the dangers that the old school general manager situation can create. Many American clubs have moved away from that format, to a situation where the superintendent works, and is answerable to, heavily involved committee members such as a greens chairman or captain. Some of the better clubs around the country have also followed that model.

The best periods of my professional life were when the people in control had the time, the interest and had served an extended period as a regular committee person before getting into a position of power. It would also be advisable to record your own minutes of any meeting undertaken. This at least creates some record of past conversations.

Finally, maybe it is true to say that in this day and age 12 years is a long time in the one job. Certainly the culture of the club I have just left indicates that as the last four supers prior to me, dating back into the 1960's, have all met the same fate.

**Editor's Note:** The AGCSA is in the process of compiling an induction manual for new golf club committee members and boards. The manual aims to provide a resource for general managers and board/committee members to assist in their understanding of the role of a golf course superintendent and maintenance operations.

The manual addresses a number of key areas, including assessing the value of the golf course, stressing the importance of having a structured communication framework and outlining the importance of OH&S and environmental management and liability of club management and committee members. The manual also examines the role of a superintendent, key relationships, management templates (eg: position descriptions) as well as a full glossary of golf course maintenance terms. The manual is in the final stages of production and its release will be announced through the AGCSA website.

If you would like to comment on the above article or have your say on employment issues then email ATM editor Brett Robinson [brett@agcsa.com.au](mailto:brett@agcsa.com.au) 🌱



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# Toro Turf Tour

**A**sk any golf course superintendent and they'll tell you there is nothing more prized, aside from pristine, disease-free turf, than a good night's sleep. Given the long hours the profession can demand and the daily rigours heaped upon turf's gallant practitioners, the last thing they need to worry about is the dependability of their machinery or irrigation system.

Fortunately for Idris Evans, superintendent at The Western Australian Golf Club in Perth, WA he can enjoy his time away from the course and rest easy at night knowing that his maintenance operations are backed by one of the most innovative and trustworthy names in the business – Toro. Whether it's the consistent performance of his fleet of Commercial equipment through to the Toro LTC Plus irrigation system, which has transformed the course since its installation back in 2002, it is no wonder the 22-year veteran of the turf management game sports a big smile.

Evans' entire turf management career has been spent at The Western



**With Toro playing a major role in maintenance operations, The Western Australian Golf Club in Perth has established itself as one of the finest championship courses in the state**

Australian Golf Club, including the past nine years as superintendent. During his time at the Mt Yokine course Evans and his crew have overseen some major changes which have ultimately set up the club for a long and prosperous future.

Among the impressive list of works completed include the construction of a new maintenance facility to house his prime fleet of Toro equipment, the redevelopment of a number of holes, as well as the installation of a total new Toro irrigation system.

Such have been his efforts to

improve the quality of the club's fine turf surfaces (Evans maintains Pennncross bentgrass greens, kikuyu fairways and Santa ana tees), Evans was bestowed one of the AGCSA's highest honours in 2003 – the Excellence in Golf Course Management Award.

One of the highlights of his turf management career to date, Evans says winning the award would not have been possible were it not for the hard work of his staff, support of his management and, of course, Toro.

## **Moving forward**

Evans has a total staff of 10, which includes assistant superintendent Mark Bunce and turf technician Allan Crombie, and in recent times they have seen the course move forward to a position where it has entrenched itself as one of the finest championship courses in the state.

Without doubt in Evans' mind, one of the critical factors to progress the course to its current position was the installation of the Toro LTC Plus irrigation system and Site Pro

**The Western Australian Golf Club has been home to Idris Evans for the past 22 years, including the past nine as superintendent**





## Location: The Western Australian Golf Club Superintendent: Idris Evans

central control system. Completed at the end of 2002, Evans believes the new system has effectively turned the course around, improving the quality of the turf surfaces out of sight as well as making huge inroads into improving water use efficiencies.

"Prior to the new system going in it took anywhere up to 14 hours to water the course," recalls Evans. "We had a consultant come in and draw up plans and we narrowed it down to two companies. Once we weighed up everything – operating systems, software, sprinklers etc – Toro came out on top.

"We chose Toro mainly because of the back-up and reliability and also the versatility of sprinklers and their interchangeable parts. We went for a valve-in-head system and we have 910 sprinklers all controlled by satellite. Each hole has its own controller which gives us the freedom of operating the system out in the field at any time and also to operate independently of the central computer if there are any issues.

"What has it meant for the club? Well, it means I can sleep a lot easier at night for a start. Certainly the reliability is impressive and it gives me peace of mind. It's easy to operate and the problems we had with the old system breaking down are now a thing of the past.

"In terms of the golf course it has allowed us to use water more efficiently by targeting exactly where, when and how much we want. Turf quality has increased dramatically and now we can water 31 hectares of turf on a full irrigation cycle in just six hours.



**Evans can now water 31 hectares of turf on a full irrigation cycle in just six hours**

We have it connected to a weather station which looks after run times and effectively means the system operates itself. "

When the new irrigation system went in, The Western Australian was one of the first courses in the country to fit the 800S Series sprinklers which had just been released. While they have been a proven performer over the past six years, Evans has started retrofitting surrounds, tees and fairways with the new and improved 835S Series.

"The 835S sprinklers are amazing," continues Evans. "They are so versatile. We can change them from part circle to full circle in a matter of seconds without the need to pull them out of the ground. We can also adjust the arc on them at any given time without a hassle."

### Red shed

While Evans could wax lyrical about the Toro irrigation system, he is quick not to forget the remainder of his Toro fleet which help the staff maintain The Western Australian's immaculate surfaces. Pop your head into the maintenance facility and you'll come across a well maintained fleet of Toro equipment which includes:

- 3 Greensmaster 3150 triplexes (two for greens, one for tees)
- 3 Greensmaster 1000s
- 1 Greensmaster Flex 21
- 3 Workman 2110 utilities
- 1 Workman 4200 4WD
- 2 Reelmaster 6500-Ds
- 1 3100-D (Sidewinder)
- 1 Groundsmaster 328-D
- 1 Multi Pro 1250
- 1 Sand Pro 5040

While all get a solid workout, the new Sand Pro 5040 is quickly becoming one of Evans' most prized possessions. Toro's premier bunker rake, the 5040 will come in very handy particularly considering the course is about to add six new fairway bunkers to the 70-plus already dotted around the course.

The new 5040 has dramatically increased the versatility and function of the Sand Pro model. The patent-pending Quick Attach System for front, mid and rear attachments allows for under-a-minute attachment changes. With a powerful 18-horsepower engine and hydraulic power steering, superintendents can be sure of increased productivity with 17 attachments, including the Flex Blade which raises and lowers hydraulically. Each attachment has

# Toro Turf Tour

**TORO**



## Location: The Western Australian Golf Club **Superintendent: Idris Evans**

**The ProCore 648 pedestrian aerator goes to work on the practice putter**



been specifically designed to take the operator influence out of the equation for high performance and a consistent surface finish.

"The Sand Pro is fast becoming the most popular machine among the crew, particularly those guys who are on bunker detail," laughs Evans. "We do about 50-52,000 rounds of golf a year and the bunkers take a hammering. Every superintendent knows bunkers are one of the biggest hassles in golf course maintenance and we do spend a lot of man hours shovelling sand, levelling floors and pulling faces down. That's where new Sand Pro 5040 will come into its own."

"We bought it with all the attachments. The hydraulic blade at the front will reduce the amount of shovelling of sand we will have to do and I can easily train up the younger guys who aren't as experienced with bobcats or loaders. They can go in and do the work that I want them to do without the need to tie up senior staff. It will give us a lot more versatility."

While the Sand Pro has already found dutiful employment, another popular Toro machine is also set to join the 'team'. When the Toro Turf Tour visited Evans he and his staff were putting the versatile ProCore 648 aerator through its paces on the club's practice putter. So pleased was Evans with its performance, he had little trouble convincing the board and general manager to pencil it in as the next asset for the club.

The ProCore 648 is an innovative new walking aerator from Toro. The rear wheels are within the 48" aeration swath of the machine so the tyres don't run over the freshly aerated turf. This eliminates the problem of smashing the cores into the holes, preventing topdressing from filling them.

While the new Sand Pro and ProCore 648 have won over many of his staff, Evans remains a big fan of the Toro Multi Pro dedicated spray unit. So simple is it to operate that Evans reckons he has trained up more members of staff on it than any other piece of machinery.

"The beauty of the Multi Pro is that with chemical and fertiliser applications we are not losing a vehicle or needing to put a tank on one of the Workman utilities which can be very time-consuming," comments Evans.

"This thing is ready to go at a moment's notice and the ease of applying chemicals is superb. It effectively takes the guess work out of spraying which means we are applying the chemical more efficiently which saves us money in the long run."

### **Perfect fit**

Over the next five to six years, Evans estimates that 80-90 per cent of his capital expenditure will be on Toro equipment. That's quite an endorsement and proves how much of a good fit Toro is for Evans and his maintenance operations.

"I suppose it comes down to familiarity and knowing that at the end of the day the equipment is reliable, trustworthy and the back-up is great," sums up Evans. "My turf technician is a Toro man too and he loves the equipment. Also, the staff like operating machines that cut well and function efficiently; there is nothing worse than going out on a piece of machinery that doesn't work or breaks down constantly."

"I like Toro gear – it's as simple as that. For me it's all about reliability and knowing that it's going to work every time we turn the key and complete the job properly. I'm judged on looks and the appearance of the golf course and Toro allows me to achieve my targets. That's why Toro is the number one choice at The Western Australian Golf Club."

# Toro Turf Tour **TORO**



# The Western Australian Golf Club is counting on Toro in more ways than one



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# Local ecotypes perform in bentgrass salinity trials

As part of the AGCSA's Horticulture Australia Limited funded project TU 06001, individual bentgrass ecotypes that had shown excellent turfgrass characteristics in previously funded projects, and observed salinity tolerance from the sites at which they were initially collected, would be subjected to a replicated controlled salinity tolerance trial.

This trial was established in a greenhouse at Chisholm TAFE, Rosebud Campus in Victoria. There were 31 grasses assessed with 27 being locally collected bentgrass ecotypes, three were known bentgrass varieties (Mariner, Seaside II and Penn G2) as well as one variety that is a blend of *Poa annua* var. reptans selections from Penn State University. The last four varieties were all included in a trial conducted at Barwon Heads Golf Club in 2003-2004 which compared the effects of potable water versus saline effluent used for irrigating bentgrass and *Poa annua*.

The individual grass plots were established by planting 10mm diameter cores into 100mm square pots filled with a sandy soil type. The pots were irrigated with potable water until they had achieved a full cover across the top of the entire pot. This process was undertaken from the end of June 2007 until mid-January 2008 when the salinity treatments were first imposed.

Plots were watered using a watering can with a known salinity concentration. They were watered three times per week with an equivalent of 5-10mm of irrigation per application. There were three salinity treatments with the bentgrass ecotypes being replicated four times within each treatment. The initial salinity concentrations were 0, 4 and 8dS/m and these levels were obtained by increasing the salinity by 2dS/m on a weekly basis where required.

After 13 weeks it was decided to increase the salinity regime to 8 and 12dS/m so the pots that had been watered with the 4dS/m



In this instalment of AGCSATech Update John Neylan and Andrew Peart look at some of the observations to emerge from the ongoing hybrid couchgrass selection trials at Lakelands Golf Club and present the results from the bentgrass salinity tolerance trials at Chisholm TAFE.



The HAL funded bentgrass salinity trial at Chisholm TAFE, Rosebud Campus in Victoria is assessing the 31 varieties – 27 locally collected bentgrass ecotypes, three known bentgrass varieties (Mariner, Seaside II and Penn G2) as well as Penn State University *Poa annua* var. reptans

salinity were increased to 12dS/m while those at 8dS/m remained. For the final six weeks of the trial those pots being watered with 8dS/m were then watered with 16dS/m.

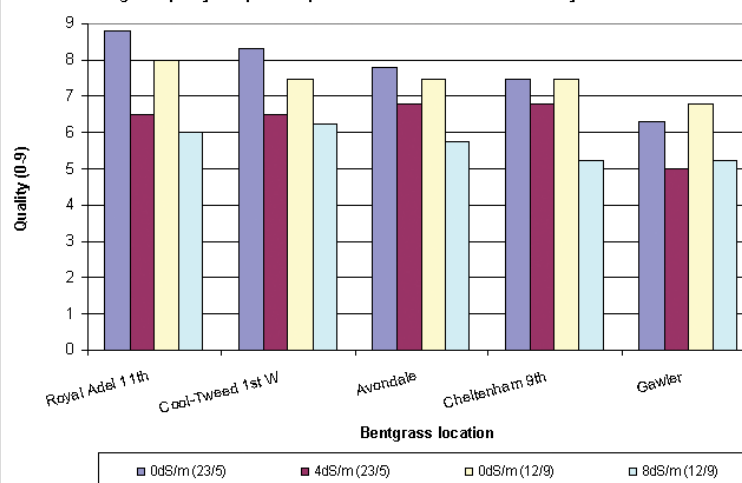
The total exposure of the ecotypes to the salinity regimes can be summarised as;

- Treatment One  
13 weeks at 4dS/m  
22 weeks at 12dS/m
- Treatment Two  
29 weeks at 8dS/m  
6 weeks at 16dS/m
- Treatment Three  
35 weeks at 0dS/m (control)

Assessments for visual turf quality and leaf firing were undertaken generally 2-3 times per week. At the conclusion of each salinity regime there was a significant difference observed in the tolerance and subsequent turfgrass quality and leaf firing among all grasses.

Figure 1

Turfgrass quality compared to potable water at the end of the salinity treatment at 4 and 8 dS/m







**The Royal Adelaide 11th green selection demonstrating salinity tolerance at 8dS/m and 12dS/m**

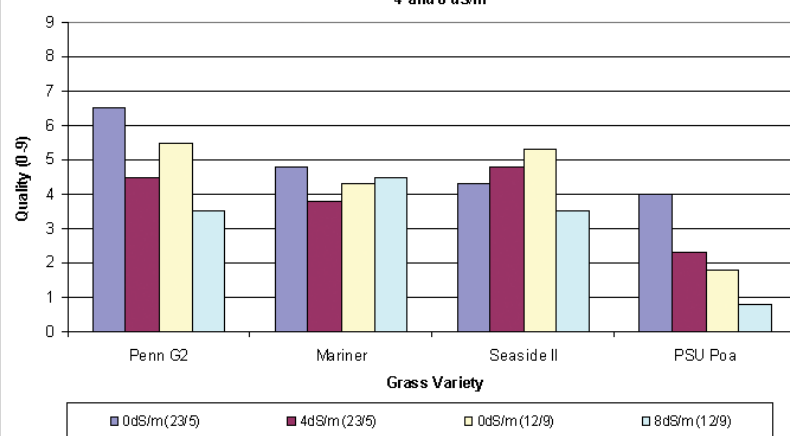
Table 1 shows the turfgrass quality of the best performing 12 ecotypes and commercial varieties being subjected to 12dS/m after having been subjected to 13 weeks at 4dS/m. At that salinity regime it shows that Penn G2 is not significantly different in turfgrass quality than the three best performing locally collected bentgrasses.

Work conducted by Marcum (2000), that compared the salt tolerance of 35 bentgrass varieties, showed that the bentgrass cultivars Mariner and Seaside II were the two best performing cultivars in terms of salinity tolerance when assessing per cent green leaf and were also in the top group for clipping weight and root depth. The trial conducted at Chisholm has shown many Australian collected bentgrass ecotypes to have superior turfgrass quality and resistance to leaf firing over these two cultivars.

Figures 1 and 2 show quality ratings for the better performing ecotypes and commercial varieties when exposed to the 4dS/m saline water for 13 weeks and the 8dS/m water for 29 weeks as opposed to potable water. With the exception of the bentgrass collected from Coolangatta Tweed 5th West Course, the other

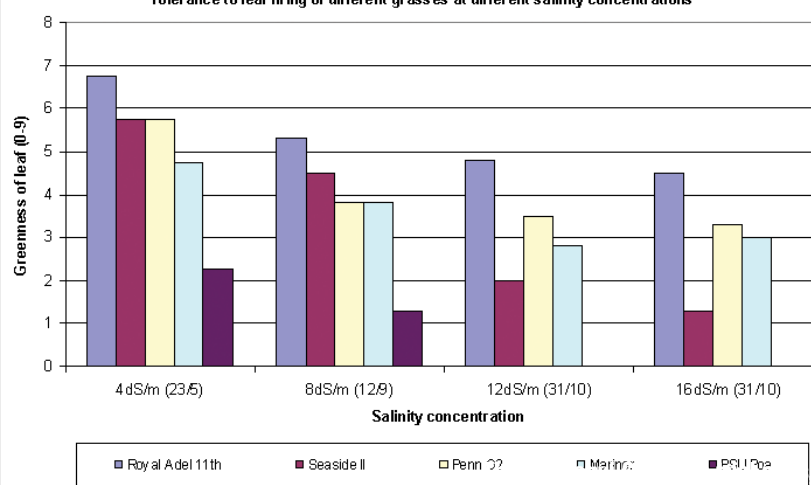
**Figure 2**

Turfgrass quality of known grasses compared to potable water at the end of the salinity treatment at 4 and 8 dS/m



**Figure 3**

Tolerance to leaf firing of different grasses at different salinity concentrations



locally collected bentgrasses shown have better turfgrass quality under potable water than the known bentgrass varieties.

As well as assessing the overall turfgrass quality, tolerance to leaf firing was also assessed. Figure 3 compares the tolerance of the best performing locally collected ecotype,

from Royal Adelaide Golf Club's 11th green, compared to that of the known grass varieties at each of the four salinity regimes.

The 27 Australian eco-types in general performed much better than the known bentgrass varieties Penn G2, Seaside II and Mariner that were included as industry standards.

**TABLE 1: TURFGRASS QUALITY RATINGS AT 12DS/M (0=WORST, 9=BEST)**

Variety Source	10-Jun	11-Jul	12-Aug	12-Sep	14-Oct	31-Oct
Royal Adel 11th	7.0	6.3	6.3	5.0	4.8	4.8
Cheltenham 9th	5.3	5.5	6.3	5.3	4.8	4.3
Flinders	5.3	4.5	4.8	5.3	4.0	3.8
Penn G2	4.5	4.3	3.3	3.5	3.5	3.5
Cool-Tweed 5th W	4.3	4.3	4.5	4.0	3.8	3.3
Cool-Tweed 1st W	4.8	5.0	5.3	4.8	3.8	3.3
Werribee Park 13th	5.0	4.0	4.3	3.8	3.0	3.0
Royal Adel 11th	4.8	4.3	4.0	4.3	3.5	3.0
Mariner	3.3	3.5	3.5	4.0	3.0	3.0
Joondalup 5th Lakes	5.8	4.5	4.3	3.8	3.8	3.0
Gawler	4.8	4.3	4.3	4.0	3.0	3.0
Gawler	4.8	4.5	4.5	4.8	3.3	3.0
Flinders 4th	5.3	4.8	4.5	4.0	3.3	3.0
Cool-Tweed 4thW	4.5	4.0	4.0	4.3	3.3	3.0
Seaside II	3.8	4.0	4.3	3.8	2.8	2.3
PSU Poa	0.8	0.0	0.0	0.0	0.0	0.0
p<0.05	0.9	0.9	1.3	1.3	1.1	1.3

## WARM-SEASON GREENS GRASS REGIONAL TRIALS

A critical part of the warm-season grass trials being undertaken in conjunction with the QDPI&F has been the establishment of the regional trial sites (refer to last edition's AGCSATech Update – Volume 10.6 pp36-40).

There are seven regional trial sites established and data is being collected on grow-in, turf quality and pests and disease and in particular the experiences of golf course superintendents in maintaining these grasses. The data that is being collected will provide important practical information on the management of these new grasses. Many thanks must go to the clubs and superintendents involved for their support with this trial.



The AGCSATech team has recently inspected each of the regional sites and has provided a very interesting insight into these new grasses under a range of environments and maintenance regimes. The recent observations are as follows;

- All of the new hybrid couchgrasses are superior to Tifgreen (328).
- MS-Supreme has been selected by several superintendents as the better of the new hybrid couchgrasses.
- Disease is prominent in most of the new hybrid couchgrasses, though it does vary considerably from site to site. Where there is good fertility and preventative fungicides applied there is minimal disease.
- Seashore paspalum is very susceptible to disease (in particular dollar spot) under cloudy, humid conditions, however, the disease often disappears with the onset of sunny conditions and lower humidity.
- Seashore paspalum at its best looks spectacular, however, achieving reasonable putting speeds can be difficult.
- All grasses require frequent, light sand dustings to manage the accumulation of thatch.

## HYBRID COUCH GRASS SELECTION TRIALS

In Australia, couchgrass putting greens have usually been established with imported varieties bred overseas, principally Tifgreen (328) and Tifdwarf and in more recent times TifEagle. In old and well established putting greens there can often exist variations in the couchgrass population. This clonal variation can produce several types or strains in the one sward, even though the turf was originally established with a single variety.

Tifgreen and Tifdwarf are vegetatively propagated (i.e. established from plant material rather than seed) and were originally developed by cross breeding *Cynodon dactylon* and *Cynodon transvaalensis* and then selecting from the resultant hybrid population. The varieties are sterile hybrids and do not set viable seed, however, they are genetically unstable and do not necessarily remain true-to-type.

As a result, off-types are a common characteristic of many older and well established putting greens. It is uncertain what the trigger mechanism is for these off-types to occur, however, there are a range of conditions that may encourage the development and expansion of these off-types including mowing height, climate, pests and maintenance regimes.

During the 1990s and early 2000s, the choice of warm-season grass varieties



**Since 2001, 100 hybrid couchgrass off-types were collected from putting and bowling greens around Australia and planted into plots at Lakelands GC for further evaluation**



**Under a programme of no fungicide applications TifEagle was one of five varieties to demonstrate greater incidence of disease**

was expanded by a range of second-generation hybrid *Cynodon* cultivars. These new varieties maintain better sward density under lower mowing heights (down to 2.5mm or lower) compared with Tifgreen and Tifdwarf. The varieties – Champion Dwarf, MS-Supreme, FloraDwarf, TifEagle and MiniVerde – are from US breeding programmes, while Novotek was selected in north Queensland.

Three of these (FloraDwarf, MS-Supreme and Novotek) arose as spontaneous mutations from Tifgreen, while Champion Dwarf and

MiniVerde were derived via spontaneous mutation from Tifdwarf. The final variety, TifEagle, was the result of deliberately inducing a mutation through irradiation of Tifway.

The maintenance of any turfgrass species or variety is highly dependent on the climatic conditions and maintenance practices to which it is subjected. Because of the natural variation and the apparent successful survival of some of these off-types, the AGCSA started a project in 2001 to collect a wide range of ecotypes and to assess their potential for development for use in putting greens.

Since 2001, 100 hybrid couchgrass off-types were collected from putting and bowling greens from around Australia. These were planted into a spaced plant nursery at Lakelands Golf Club and then selections made from these for further evaluation. Darren Moore (ex-Lakelands superintendent who is now in Beijing – see his article earlier in this edition) established a replicated trial to assess the morphological and genetic characteristics of the best 12 off-types, compared to Tifgreen (328), Tifdwarf and TifEagle as part of his Masters degree.

The trial plots were established in 2006 and have been maintained at putting green height following establishment and during this time there have been no pesticides applied, in particular fungicides. Current Lakelands course superintendent Phil Soegaard has provided most appreciated support in maintaining the trial plots since Darren left for China in 2007.

The trial plots have been assessed on several occasions and the data is provided in Tables 2-6. On 29 October 2008 we also had Phil Soegaard (Lakelands GC), Dr. Don Loch (QDPI&F), Matt Roche (QDPI&F), Jon Penberthy (QDPI&F) and Peter McMaugh assess the plots for us to provide a wider range

**TABLE 2: VISUAL TURFGRASS QUALITY (0=WORST, 9=BEST)**

Variety	30/8/07	13/9/07	16/1/08	29/10/08
ALT 6	7.8	6.7	7.5	7.7
ALT 2	7.7	6.5	7.3	7.5
ALT 8	6.5	6.0	5.8	7.5
ALT 4	6.7	5.8	7.0	7.2
ALT 7	7.2	6.3	6.5	7.2
ALT 3	6.5	6.7	6.7	7.0
ALT 9	6.8	6.7	6.7	7.0
ALT 12	6.8	6.3	6.8	7.0
Tifdwarf	6.2	5.5	6.0	6.8
ALT 1	6.7	6.2	6.0	6.7
ALT 5	6.5	6.0	6.3	6.5
ALT 10	6.2	6.0	6.2	6.5
ALT 11	6.0	5.7	6.3	6.0
Tifgreen 328	6.0	5.7	5.8	5.7
TifEagle	5.7	5.2	6.8	5.2
LSD (<0.05)	0.7	0.9	0.6	1.0



of views. In reviewing the data the following general conclusions can be made;

- Selections ALT 2 and 6 had a high turf quality and on occasions significantly better than TifEagle, Tifgreen (328) and Tifdwarf.
- Selections ALT 2 and 6 had very high turf density similar to or greater than TifEagle and Tifdwarf.
- Selections ALT 2 and 6 had high thatch production with ALT 6 being significantly greater than all other selections/cultivars.
- The different selections had varying turf colour depending whether they were from Tifgreen (328) (pale green) or Tifdwarf (dark green).
- Under a programme of no fungicide applications, ALT 4, 7, 8, and 12 and TifEagle demonstrated greater incidence of disease.
- The presence of mites was also identified by Peter McMaugh, with several of the selections (ALT 3, 6, 7 and 10) being susceptible to mites, as were TifEagle, Tifgreen (328) and 'Tifdwarf'.

## CONCLUSIONS

After seven years of research it appears that there are at least 2-3 cultivars that are performing well and worthy of further development. It is planned to take the better selections and develop a putting green where further assessments will be made.

**Correction:** In the last AGCSATech Update (Volume 10.6) under the heading 'Management guidelines for new warm-season greens grasses', the figure for the fertiliser treatment was incorrect. It should have read 1kg N, 2kg N and 4kg N/100m<sup>2</sup>/yr not N/m<sup>2</sup>/yr. 🌱

**TABLE 3: VISUAL TURFGRASS DENSITY** (0=WORST, 9=BEST)

Variety	30/8/07	13/9/07	16/1/08	29/10/08
ALT 2	7.7	6.7	7.3	8.0
ALT 8	6.5	6.3	6.0	8.0
ALT 3	6.5	7.0	6.7	7.7
Tifdwarf	6.2	6.0	6.0	7.5
ALT 4	6.7	5.7	6.8	7.3
ALT 6	7.8	6.8	7.7	7.3
ALT 7	7.0	6.7	6.7	7.3
ALT 9	6.8	6.8	6.8	7.3
ALT 12	6.8	6.3	6.8	7.3
ALT 5	6.3	6.2	6.3	7.2
ALT 10	6.2	5.5	6.2	7.2
TifEagle	6.2	6.8	6.8	7.2
ALT 1	6.7	6.2	6.0	7.0
ALT 11	6.0	5.7	6.3	6.8
Tifgreen 328	6.0	5.3	5.8	6.7
<b>LSD (&lt;0.05)</b>	<b>0.6</b>	<b>0.7</b>	<b>0.5</b>	<b>ns</b>

**TABLE 4: VISUAL TURFGRASS COLOUR**

(0 = VERY PALE GREEN, 9 = VERY DARK GREEN)

Variety	30/8/07	13/9/07	16/1/08	29/10/08
ALT 9	7.2	6.7	7.0	7.5
ALT 12	7.2	6.7	7.0	7.5
Tifdwarf	6.7	6.3	7.0	7.3
ALT 8	6.8	6.5	6.0	7.0
TifEagle	7.3	7.0	7.0	6.8
ALT 4	6.5	6.0	6.3	6.7
ALT 7	7.0	6.3	7.0	6.5
ALT 1	7.3	6.3	6.0	6.2
ALT 10	6.3	4.7	6.0	6.0
ALT 11	6.7	5.7	6.2	6.0
Tifgreen 328	6.3	4.7	6.0	6.0
ALT 3	6.0	5.3	6.0	5.3
ALT 5	6.3	5.3	6.0	5.3
ALT 6	6.0	4.7	5.7	5.3
ALT 2	6.2	4.7	6.0	5.0
<b>LSD (&lt;0.05)</b>	<b>0.5</b>	<b>1.1</b>	<b>0.4</b>	<b>0.8</b>

**TABLE 5: VISUAL INCIDENCE OF DISEASE**

(0 = NO DISEASE SYMPTOMS, 9 = VERY HIGH INCIDENCE OF DISEASE SYMPTOMS)

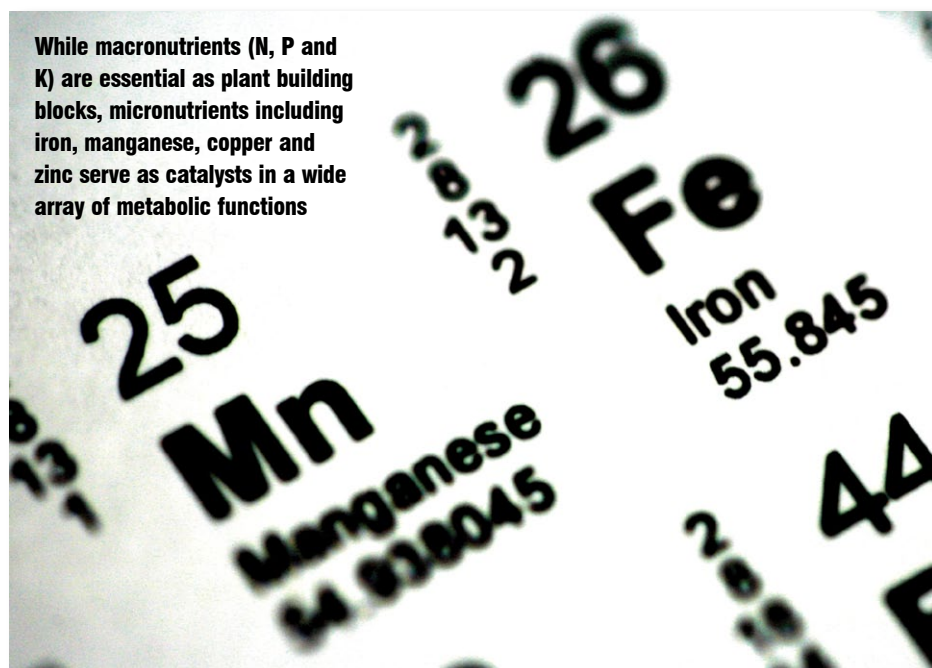
Variety	30/8/07	13/9/07	16/1/08	29/10/08
ALT 7	0.0	0.3	3.7	0.7
ALT 8	0.0	2.0	1.5	1.0
Tifdwarf	0.3	0.3	1.0	1.0
ALT 6	0.0	0.0	1.3	1.3
ALT 1	0.0	0.0	0.0	1.7
ALT 5	0.0	1.0	0.0	1.7
ALT 12	0.0	0.0	2.7	1.7
ALT 4	0.7	0.7	3.3	2.0
ALT 9	0.0	0.3	1.7	2.0
ALT 10	0.0	0.0	0.0	2.0
ALT 2	0.0	0.7	0.0	2.7
ALT 3	0.7	1.0	1.3	2.7
ALT 11	0.3	1.3	0.0	4.7
Tifgreen 328	0.3	2.0	0.0	4.7
TifEagle	5.0	6.5	0.7	6.0
<b>LSD (&lt;0.05)</b>	<b>0.8</b>	<b>1.7</b>	<b>1.7</b>	<b>2.2</b>

**TABLE 6: SUBJECTIVE THATCH RATING** (0 = BARE GROUND, TO 6 = SPONGY, EXTREME THATCH)

Variety	29/10/08
ALT 11	1.7
ALT 7	1.8
ALT 10	1.8
Tifdwarf	1.8
TifEagle	1.8
ALT 2	2.0
ALT 9	2.0
ALT 12	2.0
ALT 1	2.2
ALT 3	2.2
ALT 4	2.2
Tifgreen 328	2.2
ALT 8	2.3
ALT 5	2.7
ALT 6	3.7
<b>LSD (&lt;0.05)</b>	<b>0.7</b>



Trace elements are essential ingredients in the overall health of any turf species and managing their levels can be a delicate balancing act for turf managers. In this instalment of Tech Talk, AGCSATech senior agronomist Andrew Peart looks at four key micronutrients – iron, manganese, copper and zinc – and the important role they play in turf health.



## Managing micronutrients

**M**icronutrients, otherwise known as trace elements, are just as important as their well-known relatives the macronutrients (nitrogen, phosphorus and potassium). While macronutrients are essential as building blocks for amino acids, proteins, sugars and starches, micronutrients serve just as an important role as catalysts in a wide array of metabolic functions (Skorlowski, 2003).

Elements that fall into the category of micronutrients include iron, manganese, zinc, copper, molybdenum, boron, chlorine and nickel. Most soils generally have adequate quantities of these as very little is required by the plant. However, highly leached sandy soils or those with an alkaline pH may be deficient in one or more of these elements.

Due to micronutrients only being required in small amounts, a build up of these elements can often cause more problems for turf rather than if they were deficient. High levels are likely to cause toxicity and as Beard (1973) states, manganese, zinc, copper and boron are most likely to produce toxic effects on turfgrasses at higher concentrations.

### IRON

Iron is the micronutrient that is most commonly deficient in turf (Beard, 1973). However, the deficiency is usually caused as a result of the unavailability or insolubility of the element rather than an insufficiency or an absence.

The major function of iron is its involvement in the formation of chlorophyll. Iron is not a part of the chlorophyll, but chlorophyll will not be formed if iron is not there in sufficient quantities

(Christians, 2007). Being heavily involved in the production of chlorophyll, an iron deficiency is expressed in the plant as chlorosis, or a yellowing of the leaf. The yellowing of leaves in iron-deficient plants occurs in the youngest actively growing leaves whereas a nitrogen deficiency, which can also result in a chlorotic appearance, will first be seen in the older leaves. The chlorosis can extend to the older leaves if the deficiency persists.

With severe iron deficiencies the blades become nearly white or ivory in colour in the advanced stages. Beard (1973) states that chlorosis commonly appears when the iron content of the tissue is below 50ppm (mg/kg).

Iron is an immobile element meaning there is very little movement from the older leaves to the newer leaves and therefore if there is a soil deficiency a constant supply of iron must be applied.

Deficiencies of iron can be caused by alkaline soils (pH > 7.0), soils high in phosphate, manganese and zinc, severely thatched or waterlogged soils. Handreck and Black (2002) also state that high bicarbonate levels in the irrigation water can lead to an iron deficiency.

The most common remedy for an iron deficiency is through the application of a soluble iron product, such as iron sulphate or ferrous sulphate. On alkaline soils however, these types of applications must be intended to be absorbed through the leaf as it will quickly change to an unavailable form when it comes in contact with the soil. The other alternative to rectify iron deficiencies on alkaline soils is to apply iron in the form of an iron chelate.

Christians (2007) states that the dictionary defines the word chelate as 'claw' referring to the way in which the chemical chelating agent combines with the iron to hold the element and to improve its availability to the plant. The chelating agent is normally an organic compound that when combined with iron, or any other micronutrient, forms a stable organic complex that is readily exchanged with cations but has less tendency to leach or being transformed into unavailable compounds than the more water soluble sulphate form. Therefore, the other advantage it has over the sulphate form is it has a longer residual response in the soil.

### MANGANESE

Manganese, like iron, has a major role in the formation of chlorophyll and plays a role in photosynthesis (Christians, 2007). Beard (1973) states that manganese availability in the soil is controlled to a great degree by the solubility. Acidic soil conditions or an anaerobic soil environment results in increased manganese availability. Therefore deficiencies can be due to alkaline soils, dry weather and high levels of iron, copper and zinc. Like iron, its deficiency is usually due to its unavailability rather than being absent from the soil.

A deficiency is usually expressed again either as a chlorosis similar to iron. However, unlike an iron deficiency, small distinct necrotic spots soon develop on the affected leaves. The initial yellowing also tends to occur some distance from the leaf tip which remains green for some time before the entire leaf discolours.

To rectify a manganese deficiency manganese sulphate can be applied, however, the same limitations apply to it as does trying to rectify an iron deficiency with iron sulphate in alkaline soils. Manganese chelates are also available and therefore recommended on alkaline soils.

Increased levels of manganese have been shown to markedly decrease the incidence of take-all patch. Table 1 illustrates the effects of applying different rates of manganese every four weeks of the growing season to creeping bentgrass grown on a sandy turf soil.

## COPPER

Copper is involved in many chemical reactions that take place in the plant, as well as the synthesis of certain plant growth promoting substances. Again, deficiencies are seen on highly alkaline soils or heavily leached sandy soils (Beard, 1973). Handreck and Black (2002) also state that high levels of iron, manganese, zinc or phosphorus can lead to copper deficiencies.

Unlike iron and manganese, a copper deficiency will be expressed as a bluish discolouration at the tips of the youngest actively growing leaves. A continued deficiency results in death of the leaf tips and progresses toward the base (Beard, 1973). Overcoming copper deficiencies can be achieved with copper sulphate or copper chelate.

Copper, however, is probably more widely known for causing toxicity problems in turf rather than issues as a result of deficiencies. Beard (1973) states that copper is highly toxic to plants except when it occurs in very dilute soil concentrations. A major cause of copper toxicity is the excessive and repeated use of copper-based fungicides. Copper injury to turf has also been seen when using high rates of copper products in an attempt to kill moss.

Handreck and Black (2002) state that overcoming copper toxicity may be achieved

**TABLE 1. INCIDENCE OF TAKE-ALL PATCH AT DIFFERENT RATES OF MANGANESE APPLICATION**

Manganese added at each application (kg/ha)	Take-all incidence 10 months after first application (%)	Take-all incidence 23 months after first application (%)
0.00	21	19
1.02	15	10
2.04	4	6

Source: Handreck and Black 2002.

by raising pH, spraying plants with iron chelate solution or adding phosphorus, although a huge excess is difficult to overcome.

## ZINC

The most important role of zinc is in the production of plant hormones, especially auxins which promote stem and root elongation. Deficiencies are due to alkaline soil conditions, sandy soils and excessive use of phosphorus.

Due to its role in leaf and root elongation a zinc deficiency can be expressed initially in a stunting of plant growth. The younger leaves are thin and tend to shrivel, while at the same time they darken and become desiccated (Beard, 1973). As with the previous three micronutrients, deficiencies can be overcome by using zinc sulphate or zinc chelate.

## CONCLUSION

Soil pH probably has the largest impact on micronutrient availability with the four micronutrients discussed being deficient or unavailable to the plant in alkaline soils,

whereas molybdenum, like many of the macronutrients, is far less available in acid soils.

As well as soil pH, sandy soils or those generally with a very low CEC (heavily leachable) are also associated with micronutrient deficiencies. Therefore, testing for micronutrients becomes more important in these situations to ensure a micronutrient deficiency is not the limiting factor to the performance and longevity of the turfgrass.

Skorliski (2003) states that managing micronutrients is not an exact science. Soil and plant tissue tests can help chart the actual amounts within either the soil or plant. However, if there is still doubt whether deficiencies maybe present, a small test plot can always be undertaken. A visual plant response following the application will confirm the deficiency. Table 2 is a guide to application rates of actual amounts of micronutrients discussed in this article that can be used for test plots.

A full list of references for this article can be obtained from the AGCSA on (03) 9548 8600. 📄

**TABLE 2. APPLICATION RATES OF MICRONUTRIENTS USED FOR TEST PLOTS**

Micronutrient	lb/1000sq.ft	g/100sq.m	Fertiliser source
Iron	0.025	13	Ferrous sulphate (20% Fe)
Manganese	0.025	13	Manganese sulphate (26-28% Mn)
Copper	0.003	1.5	Copper sulphate (25% Cu)
Zinc	0.01	5	Zinc sulphate (35% Zn)

Source: Christians, 2007.



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## The Pulse

If time travel ever becomes a reality, golf course superintendents the world over will no doubt make a beeline for 1930 and one man – Charles Willock. Responsible for the development of the motorised golf cart, Willock's no doubt good intentions of making the game more accessible and enjoyable has presented superintendents an additional management headache which has only intensified as cart usage continues to grow. Seeing that they are here to stay, The Pulse wanted to see how big an issue golf cart management was for five superintendents and what strategies they have put in place to minimise the impact of cart damage to their turf.

### DARREN WILSON Wembley Golf Complex, WA



Wembley Golf Complex hosted 170,000 rounds last financial year with golf carts very popular. Cart wear is one of our major issues with most wear being around tees. We have managed to stop carts driving on tees by building limestone walls around the tee blocks to physically stop them and using concrete paths next to tees to manage wear. This has been very effective and is our only way to stop people driving on the tees. The use of signs, barriers and instructions proved fruitless.

Another effective measure has been the use of anti-compacting grass rings (see photo) placed on top of the turf. The trick is to lay the grass first then place the grass rings on top of the turf and peg them down. The rings don't allow the soil to be compacted and also keep the leaf blade from being damaged.

Management were skeptical at first because of the initial costs of building walls and installing grass rings but the end result has won them over as cart damage in these areas has been minimal with no ongoing costs. In fact, it has saved us money in the long-term by not having to replace the turf in affected areas. Trialling these methods on a small scale to show the results helped to win over management. Placing physical barriers to stop carts is the only way to stop them entering areas you don't want them to go because as we all know, once people jump in a cart their laziness takes over. 🌱



### PETER JANS Sanctuary Lakes Club, VIC



Once upon a time courses weren't constructed for cart traffic and their use was generally frowned upon as incongruous and their users indolent. How things have changed! Now courses are built with them in mind and people with carts are seen as affluent and a law unto themselves. Money is the main determining factor and with cart revenue a driving force to appease many budgets, a fleet is obligatory. It can also be noted that some new courses are so tediously long or spread out by estates that a cart becomes a necessity to negate five-hour, quarter marathon rounds!

Management of cart traffic is an absolute imperative. The first item on our agenda was to augment the path network and install bypasses for carts around tees and greens. Following this green posts and galvanised chain were installed tee side of the paths to protect tee surrounds to maintain a rugged, grass plain appearance. The chain sections are six metres long and are opened and closed to distribute foot traffic evenly. Most path edges were also turfed with a strip of couch which had been over-sown with fescues to improve wear tolerance around path edges.

Being an inherently rocky site we used this to our advantage by placing 'aesthetic rocks' at certain points around the path network where carts and other vehicles were cutting corners. These rocks were all different shapes and sizes to fit the particular area and partly buried to look as natural as possible.

To protect greens surrounds a dotted white line is marked 10 metres in front of the green towards the path. This line is accompanied with two cart direction signs and is moved up and down as needed to spread wear. As for other wear areas from cart traffic we use green, recycled plastic posts with a four metre section of rope that is easily moved, neat and tidy. 🌱



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## PETER LONERGAN Coolangatta & Tweed Heads GC, QLD



Having come from a Victorian club and industry in general that had the attitude that carts are a blight on the game, I now find myself in 'cart city' at Coolangatta and Tweed Heads.

With storage for more than 350 member carts, 36 carts operated by the pro and 45 members with 'trucking in rights', carts are a hot topic.

When I arrived here 10 years ago there were only pot-hole riddled road base paths that were a maintenance nightmare. A programme was implemented to install concrete paths adjacent to all tees and greens which still has three years to go. This has been a huge success and although from a purist's viewpoint paths may be unsightly, they are necessary when 70 per cent of golfers use carts.

To control traffic we employ a blue line sprayed across the front of the green approach past which carts cannot drive past. Amazingly it works well. We also use signs which are moved daily. Without doubt the biggest maintenance issue is the entry and exit points off paths. The course is heavily treed and a number of these points are in heavy shade making turf growth virtually impossible. These areas are turfed out at least once a year and I have tried just about everything to hold the turf, but to no avail. The entry/exit points that are in the open are fertilised and verti-drained frequently. Wear and tear and compaction on the fairways in general is not too much of a problem, in fact I find the constant traffic, actually tends to keep thatch under control.

Probably the biggest issue I have is the decision to prohibit carts due to bad weather. This rests entirely with me and is a huge responsibility. If I make the call to cancel carts quite often the competition will be cancelled. The problem is you then have an empty, non-profitable golf course with a loss of revenue up to \$6000, not to mention irate golfers. 🙏

## MICHAEL SWANWICK Yarrawonga & Border GC, VIC



Since the mid-1990s we have experienced a boom in cart use and from the good old days of 10-15 carts used by those who had a medical ailment, we now have over 200 used daily.

With such numbers, we have had to address a number of issues. To start with, the club has spent tens of thousands of dollars constructing storage facilities. Cart paths have also been an ongoing issue. From wood chips, granatic sands, scalpings, crusher dust to a polymerised path surface, we have tried just about everything. When cart numbers started hitting 140 we investigated a more permanent surface and some trial bitumen hot mix paths (40mm thick) with concrete edging were installed. These were initially a costly proposal but were low maintenance, aesthetically pleasing and practical.

Presently the club has installed three trial concrete paths on the Lakes Course, mainly alongside greens surrounds and tee surrounds. These have been in since August '08 and have made a huge difference to turf quality. The club will spend an additional \$100,000 this financial year on six paths. The club has also spent a great deal of time devising policies that govern cart use, fees, guidelines on what constitutes a cart, OH&S storage and refuelling policies. We notify users of all these through newsletters, information sessions, cart windscreen stickers, presentations at tournaments and signage in wash bays and cart refuelling areas. Other tools include painting a black perimeter line 10m away from the greens edge during autumn to late spring.

I am sure many supers have been down a similar road to us. Carts are here to stay and we have to manage their use and the turf management issues they bring as best we can. It does pose the question though, what constitutes too many carts at the facility? 🙏

## GARRY COLLINS Eynesbury, VIC



At Eynesbury we are a public pay-as-you-play golf course with no members. The course is only two years old and we have only had 40,000 rounds of golf to date. As you can

imagine, golf carts haven't been a major problem until the warmer weather hits. The most damage caused is to the fescue rough with cart tyres leaving burn marks on the turf.

A step that we have taken to prevent this from happening is keeping all golf carts on the fairways at all times. This is hard to police at times with no members to take ownership of the course's integrity. We find that some golfers need to be reminded quite often of the importance of keeping out of the rough. However, on the weekends we have a full-time marshal to guide the golfers around the golf course and keep them out of the rough. Below is a photo of some of the fencing we have placed around the course to direct cart drivers and keep them in the right places. Being a long golf course we need carts to move golfers around without holding up play and for lazy golfers, like me. Most golfers respect the course and keep the carts in the right places.

The revenue carts bring is substantial and out-weighs the damage they cause to the turf. In essence, we could not live without them. We started with 40 golf carts and have just purchased another 40. I am hopeful that in years to come players will continue to respect the course and use the carts wisely. 🙏



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A comprehensive literature review of the benefits of turfgrass has recently been conducted by Peter McMaugh and Dr Ross Higginson. Areas targeted for review included environmental impacts of growing turfgrass, social and health benefits, water usage and carbon sequestration capacity

# The environmental, social, economic and health **benefits** of turfgrass

In 1994 James Beard and Robert Green from Texas A&M University published the first study on the environmental, social and health benefits of turfgrass. Since that report, titled 'The Role of Turfgrasses in Environmental Protection and their Benefits to Humans', there have been major developments in most areas and this literature review is aimed at bringing that study up to date, expanding on its base and attempting to relate the findings within the context of the Australian turfgrass industry.

With recent severe water shortages and the fear of climate change, the general public within Australia and the USA is developing a negative environmental image for turfgrass (Robbins and Sharp, 2003). This is because turfgrass requires regular maintenance, involving mowing, fertilising and watering. These three practices utilise water, a limited resource, create greenhouse gas emissions and expose the environment to possible chemical pollution.

Areas in this study specifically targeted for review included;

- Potentially adverse environmental impacts of growing turfgrass, such as soil erosion, sediment movement and contamination of surrounding areas with fertiliser and pesticide leachates;
- Aesthetic, social and health benefits of growing turfgrass;

The turfgrass industry more than most has felt the full impact of climate change and water restrictions in recent times. It has also suffered considerably from a negative public perception in relation to water usage and its impact on the environment, which have in many instances been perpetuated by armchair agronomists within the media. Determined to prove such views as erroneous and unfounded, the Turf Producers Association commissioned Peter McMaugh and Dr Ross Higginson to conduct a comprehensive literature review on the benefits of turf in order to help build a more positive image for the industry.



- Water usage by turfgrass;
- Heat sink effects of turf use;
- Carbon sequestration capacity of turfgrass; and
- Turf's use on sporting fields, with special reference to surface quality and heat stress.

The final 67-page report that was presented to Horticulture Australia Limited included eight key references recommended for further reading and an additional 183 cited references.

This review, the first comprehensive update since 1994, produced a few notable surprises, especially in the area of health benefits. There is now a much greater volume and depth of information in the literature and many expanding programmes which are identifying areas of serious social concern.

The review also highlighted some new areas which have emerged as technical voids since Beard and Green's original study. Notable among these is the area of carbon sequestration and the role of grasses in this

area. Tied into this is the role of grass mulching machinery as while there has been some basic limited work in the past, there is a need to quantify its role in successful carbon sequestration.

Also highlighted is the lack of knowledge in the trees vs turf area of the total urban green space balance. The authors believe that it is useless and regressive to approach them from a divided point of view, that they need to be seen and researched together as a whole, and that there is a huge void of information in this area.

## WATER MANAGEMENT AND CONTAMINATION

Since 1994 there have been significant advances in most areas investigated within this review, but particularly in the management of pesticide and nutrient leaching from turfgrass (Clark J.M. & M.P. Kenna (eds.), 2000) and in water usage by turfgrass (Beard J.B. & M.P. Kenna (eds.), 2008).

Water issues were one of the driving forces for this review and it has clearly confirmed that there is no justifiable scientific basis for the bad press inflicted on the turfgrass industry by many commentators in the media. What it has illustrated is that these commentators

simply do not know the facts and we hope that by reading this review they will be able to access them.

The evidence clearly shows that gardens in general and grasses (lawns) in particular are not wasteful of water, using less than 30 per cent of total household usage. It also shows that the knee-jerk reaction of administrators in using the crude tool of restrictions is completely unjustified in the context of a burden which should be shared across the total community.

The scientific evidence is that contaminated waters, secondary effluent waters and waters with excessive levels of fertilisers will be stripped very effectively of their problems and will return to either ground water reserves or streams cleaner than when first applied to turfgrass areas.

It also shows that major users of water, such as golf courses and other large turfgrass areas, are actively moving away from using potable water sources to using lesser quality sources.

The efficient distribution of water in every garden and turfgrass facility can be greatly improved by the use of soil moisture monitoring which is now reliable, readily available and reasonably costed. It can be integrated into automated delivery systems and its technology

is capable of delivering savings of up to 60 per cent on current water use.

In the area of water usage by turfgrasses, there have been vast improvements, both within Australia and the USA, in the selection and breeding of new varieties and types of turfgrass with drought-avoidance or drought-tolerant characteristics. The use of these new varieties, in conjunction with improved irrigation technologies that apply water only when it is required by use of in-situ soil moisture monitoring systems, has led to savings of up to 40 per cent in water usage by sports fields in both Queensland and the ACT (ACTEW, 2008b; DPI&F, 2008).

In relation to contamination issues, a major research programme funded by the United States Golf Association, and undertaken within 12 universities across the United States, has significantly improved the knowledge and management of pesticide and nutrient movement from turfgrass environments to the extent that the problem is now a readily manageable one (Clark J.M. & M.P. Kenna (eds.), 2000). This information is directly relevant and transferable to Australia.

There are many studies of both soil erosion and water run off that show there is greater contamination of water bodies by



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runoff from hard scapes than from run off from turf. Indeed the contamination by runoff from turf is consistently below standards set by the World Health Organisation for dangers to personal health. Also clearly demonstrated is the ability of solid turf to control soil loss on construction sites which is a very real problem in areas of urban development.

As well, in the USA, new agrichemicals being used with increased specificity at lowered rates of active ingredients are enabling turfgrass systems to be maintained in a more effective manner without contamination of groundwater (Cisar, J.L., 2004).

In Australia in recent years, the number of new agrichemical introductions has been low. Those that have been introduced have relied on new active ingredients with much softer chemistry. The regulatory authorities have actively encouraged a safer, environmentally-friendly approach by phasing out many less desirable, older products.

## SOCIAL AND HEALTH BENEFITS

Both within Australia and overseas, there has been a considerable increase since 1994 in the amount of research undertaken by social and health scientists in assessing the value and benefits derived from urban green space in improving the public health and mental wellbeing of city dwellers (Maller C.M. et al., 2002; Pretty J. et al., 2007).

There is a lack of specific research related to the role that turfgrass plays within urban green space, but this is generally implied within the overall context of the research. Turfgrass, as an integral component of the park landscape, must play a major role in these health benefits.

The most important implications of this area of research was in the psychological and social health of the very young and developing adolescents and these findings carry very important messages for urban planners. While similar health benefits for the aging end of the social spectrum were also evident, probably the most important development was the 500m rule for access to green space from high rise housing.

## HEATING AND COOLING

Research on heat amelioration effects and on carbon sequestration by turfgrasses has not developed as much as the previous fields mentioned above. Enough is known, however, to make intelligent estimates of the benefits provided by turfgrasses in these two areas, although more research is needed.

Research on the use of turf on sports fields has progressed significantly in recent years. The selection and improvement in



**Both within Australia and overseas, there has been a considerable increase in the amount of research assessing the value and benefits derived from urban green space in improving the health and mental wellbeing of the public**

turfgrass varieties used for amenity purposes has increased the opportunity for improved performance with reduced usage of water.

Despite these improvements, community concerns over shortages of water and contamination of natural resources has led to restrictions on the management tools available to turf professionals. Such restrictions have raised the option that turf for sports purposes be replaced with artificial or alternative landscapes to reduce inputs of water and chemicals.

The newer generation of synthetic turfs (termed the "third generation") are far superior to previous types (Meyers, quoted in Fresenburg & Adamson, 2005). However, one very significant area where synthetic surfaces have not made up ground on natural turf is temperature.

This study unequivocally shows that alternatives to natural turf in all areas used for recreation have serious and potentially fatal consequences for users because of heat build up which rises quickly to dangerous levels. While the previous generations of synthetic turfs have been unsuccessful because of their hardness, the use of softer infills of crumb rubber and other softer by-products of industry has led to increased health risks from heavy metal contamination.

The use of sand infill to reduce the heat build up on synthetic turf is only successful if it is kept damp which has two negative effects. It ridicules the claim of less water use and it assists the germination of weeds in the sand

and the growth of mosses in shaded areas. This means greater not lesser maintenance.

Grasses are an essential component of the natural water cycle, which extracts water from the soil and recycles it into the atmosphere from which it is cycled back as rain or other precipitates. In this process only 3 per cent of the water is used for plant growth. The rest is part of the natural temperature control of the environment that only vegetation can bring about.

## CARBON SEQUESTRATION

There is mounting evidence that the disproportionate emphasis on planting trees over turf may be a step in the wrong direction. Trees are in trouble with forests in the Northern Hemisphere going into reverse and increasing evidence from the Amazon that trees are shutting down when carbon dioxide levels become excessive.

Grasses on the other hand seem to be coping more easily with higher atmospheric CO<sub>2</sub> levels. Carbon rich soils are the basis of all of the high yield crop areas around the world and these carbon rich soils develop under grassland rather than forest.

There is at present an incomplete picture of the level of carbon sequestration by turfgrasses. The level of maintenance and the carbon emissions involved may to some extent offset the value of turf as a carbon sink. However, it also seems clear that unless turfgrasses are growing at optimum levels, i.e. with inputs of water and fertiliser, that their ability to sequester carbon may be greatly reduced. There is a need to get a clearer picture of this balance and it is an urgently needed area for research.

The role of mulching mowing in assisting carbon sequestration also needs a much more thorough examination than it has had to date. Likewise, synthetic turf is often touted as an environmentally friendly solution to high wear problems in turf areas, however its real carbon footprint is unknown and there needs to be serious investigation of this.

## SOLUTIONS

From this review it has become clear that:

- Water is still a major issue and that xeriscaping, hard paving and other inert mulching systems are not the solution.
- Synthetic turf, while offering solutions to extreme problems, poses serious health problems for recreational users.
- Soil moisture monitoring is a neglected tool and needs a real boost in use to help better water use economy.
- Hydrogels are an almost useless tool for saving water.

- Breeding for improved grasses and better selection criteria for grass use is needed.
- A better selection of management tools is required to lessen the carbon footprint of turf maintenance. A high quality efficient push mower for the domestic market would see a much lower carbon footprint and a much physically healthier nation.
- Seeking solutions is not something that will work if done in isolation and planning laws must be formulated with the health needs of the community as a high priority.

In summary, claims that turfgrass utilises excessive water and contaminates the environment with chemical residues are difficult to justify when one considers the amount of progress in these two areas illustrated in published scientific literature. The turfgrass industry has responded very positively to overcome these perceived negative environmental impacts.

Together with the very positive benefits to public health and mental wellbeing of greenspace and turfgrass demonstrated by social and health scientists, and the very positive heat amelioration effects of turfgrass in the urban environment, the turfgrass industry in Australia is in a strong position, based on published scientific literature, to respond to any negative environmental criticisms that it may receive.

Furthermore, the carbon sequestration potential of turfgrass and related greenspace is another environmental benefit that can be utilised by the industry in a positive manner.

## ACKNOWLEDGEMENTS

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## REFERENCES

A full list of references for this article can be obtained from the AGCSA.

**Editor's Note: The AGCSA, through the recently formed Australian Golf Environment Foundation, has committed funds for Peter McMaugh and Dr Ross Higginson to extend this project with specific focus on golf courses to identify gaps in information that require further research. Their findings will be published in a future edition of Australian Turfgrass Management.** 🌱

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The UWA trial examined the impact of saline irrigation on four species of turf. Clockwise from left are plots of saltgrass, kikuyu, seashore paspalum and marine couch

Over the past two years researchers from the University of Western Australia have been conducting a study into the effects of irrigating halophytic turf species with saline ground water.



# Halophytic turfgrasses and their potential use on salt-affected areas

A two-year field study conducted at Wagin (230km southeast of Perth) has demonstrated the potential to use saline groundwater (salinity approximately one-quarter of sea water) to irrigate halophytic turfgrasses.

The research has been a collaborative project among the Shire of Wagin, The University of Western Australia (UWA) and the Rural Towns - Liquid Assets Program of the Department of Agriculture and Food WA

BY GHAZI ABU RUMMAN, ED BARRETT-LENNARD AND TIM COLMER

(DAFWA), with funding from the national ARC-Linkage Program.

The reuse of saline groundwater was concerning the Shire of Wagin where three bores are pumping up to 650 kilolitres per day to de-water areas of the town threatened by rising groundwater. Currently the water is disposed to a nearby salt lake. The potential

to use this saline groundwater to irrigate turf was determined in our research. Four turfgrass species were evaluated:

- *Distichlis spicata* (saltgrass)
- *Sporobolus virginicus* (marine couch)
- *Paspalum vaginatum* (seashore paspalum)
- *Pennisetum clandestinum* (kikuyu)

Three of the four species evaluated are halophytic grasses (saltgrass, marine couch and seashore paspalum). Halophytes are “salt-loving” plants and grow naturally in salt-affected soils. The plots were irrigated daily at 60 per cent replacement of net evaporation during September to May. The soil at the research site is a gravel-loam and we installed a drainage system leading to a sump, with this water also disposed into the nearby salt lakes. Thus, there was no significant rise of the water table during our experiments.

## RESULTS

The four species showed variation in tolerance to salinity. Colour retention was excellent in saltgrass, marine couch and seashore paspalum after imposing saline water irrigation. The colour of saltgrass was even increased under saline water irrigation. By contrast, kikuyu turned brown (Figure 1).

Soil salinity was assessed using an EM38



Soil salinity was assessed using an EM38 and also by collecting soil samples down to 50cm



(as shown in the photo left) and also by collecting soil samples down to a depth of 50cm. A strong correlation was found between the two methods ( $r^2=96\%$ ). Salts increased in the soil during the nine month irrigation season of this study, but then declined as salts were leached from the top soil to the sub-soil during winter.

The halophytic grasses demonstrate several mechanisms to tolerate high salt levels. Foremost is the ability to regulate tissue ion concentrations. Regulation of tissue  $\text{Na}^+$  and  $\text{Cl}^-$  is particularly important, as these ions can accumulate to toxic levels and kill leaf cells. The tolerant grasses also adjust the internal osmotic potential to suit the external one; soil water potential becomes more negative due to the use of saline water. Water becomes less available to most plants as soil water potential becomes more negative, but the "osmotic adjustment" enables the halophytic plants to continue to function.

The four species in this study differed in vigour (i.e. growth). Seashore paspalum produced almost four times more clippings than the slowest-growing species. Marine couch grass is very slow-growing, so establishment and recovery after wear would take longer than seashore paspalum. Clipping dry weights

in  $\text{kg/m}^2$  collected over six months were 1.5, 0.7, 0.5 and 0.3 in seashore paspalum, kikuyu, saltgrass and marine couch respectively.

Some other interesting observations were made during the trials. Plots irrigated with saline water during the dry period retained better colour during the cold winter months, than plots irrigated with fresh water. Perhaps solute accumulation during the saline irrigation phase helped protect against cold damage during the subsequent winter?

Use of saline water also cut down the requirement for weed control. There were no weeds within or around plots irrigated with saline water whereas 14 different weeds were present in plots irrigated with fresh water.

Daily water use was measured using weighing lysimeters. Measurements were taken three days after clipping the plants. Saline water use was highest in saltgrass at 75 per cent of net evaporation while it was lowest in kikuyu at 64 per cent.

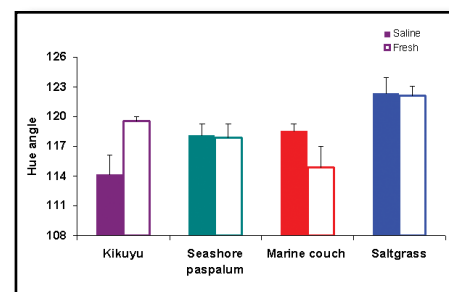
## CONCLUSION

In conclusion, halophytic turfgrasses could be used in salt-affected areas where fresh water resources are limited. Use of saline water, however, will require a well integrated management plan, especially with emphasis

to capture and appropriately dispose of drainage, so as to prevent off-site impacts. Well-designed drainage systems should also prevent waterlogging, as if waterlogging occurs with salinity the combined effects can be very damaging to poorly-adapted species.

## ACKNOWLEDGEMENTS

Ghazi Abu Rumman, Ed Barrett-Lennard and Tim Colmer hail from the UWA's School of Plant Biology. Ed Barrett-Lennard is also involved with the Centre for Ecohydrology, Agricultural Research Western Australia. 🌞



**Figure 1: Response of colour for four turf species irrigated with saline or fresh water during summer 2007. Colour was assessed by measuring hue angle using a chromameter (higher hue angle indicates greener turf).**

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# Long Reef set for **self-sufficient** future



Situated on Sydney's northern beaches, Long Reef Golf Club is a spectacular golf course established in the early 1900s on a headland surrounded by ocean on three sides. Over the past five years club management has put in place numerous initiatives which have given several options to provide a reliable source of good quality irrigation water without having to rely in any way on Sydney's potable water supply. In doing so this has ensured that the club is totally self-sufficient in its irrigation requirements now and into the future.

Long Reef Golf Club is also well known for its environmental stewardship of this unique area. The course is very exposed to the elements and water management along with environmental management is a very important part of the overall management of the Griffith Park area.

A Plan of Management for the entire headland has been established and has been in use for many years, as Griffith Park, as it is known locally, is a very important breeding ground for many rare and endangered migratory and local bird species. The headland also has many rare and endangered plant species which are protected under the plan.

In 1996 Long Reef Golf Club was successful in its application for a NSW Government grant to redirect stormwater from local roads and houses on to the course. Patterson Britton and Partners was appointed to design a wetland and pond system which was integrated with the reconstruction of a number of new holes.

This pond system consists of nine ponds with natural reed filtering allowing for irrigation and habitat purposes. The system which has been in place for over a decade has proved to be extremely successful. Each pond is interlinked with individual pipes which can be adjusted accordingly.

Originally flowing directly on to local

Together with his club directors and staff, Long Reef Golf Club superintendent Peter Donkers has worked tirelessly over the past five years to ensure that the NSW course is self-sufficient in its irrigation requirements for now and years to come.



PRINCIPAL PARTNERS

**RAIN BIRD**

**TORO**



**An aerial view of Long Reef Golf Club. The club is currently in the process of redirecting a 600mm stormwater outfall, which directly exits onto the local beach, back on to the course**

**Just five years ago it was not uncommon for Long Reef Golf Club to budget and spend over \$50,000 a year on potable water if or when required. Thanks to a proactive management and the efforts of course superintendent Peter Donkers and his staff this is now nil**

beaches causing severe erosion and pollution, this water is now naturally treated by the wetland and is substantially cleaner as it leaves the course than when it first entered.

The entire system has created a means for reliable irrigation as well as a means to encourage and increase fauna habitats for native frogs, birds and aquatic life. Studies show and prove that migratory bird numbers have increased markedly over the past decade and that all native fauna is constantly on the increase.

## FUTURE IN MIND

Although the wetland system is very successful, in summer or in drought conditions it could only supply water for the course for 8-10 weeks without rain, so it was still necessary to depend on Sydney's potable water supply to keep greens and tees alive.

The past five years have put increasing pressure on the industry to reduce its usage of potable water for irrigation on golf courses and although the original wetland system, created through the insight of past superintendents and directors of the club, has been instrumental in giving Long Reef Golf Club a secure future, some changes still needed to be made for future requirements.

In 2004/05 a complete new irrigation system was installed, with particular attention paid to system design and sprinkler placement due to the prevailing winds which can be constant at Long Reef. All green and tee irrigation installation was done in-house. Our local knowledge ensured that even in windy





conditions the sprinklers supplied water where it was required.

All fairway irrigation and main lines were installed by Hydro Technics Irrigation. A third pump was installed in the main dam to allow our watering window to be reduced significantly which gives substantial savings in electricity and water by sprinklers being less affected by wind during what can sometimes be only a short calm period at night.

In 2005 I fought hard with directors to allow me to sink a bore and search for underground water. A number of directors felt this would be money wasted as previous attempts had failed, but when pushed to show me details of previous attempts very little information came forward apart from a study done using a backhoe and placing 44 gallon drums in the ground to see how much water seeped into them. I organised meetings with hydrologists to discuss prospects and finally approval was given to test drill.

Since then two bores have been drilled with great success. No.1 bore was drilled to a depth of 105m supplying a constant 230,000 litres of water per day. No.2 bore was drilled to a depth of 85m and will be commissioned in the coming weeks (December 2008) after testing results showed this bore will supply around 180,000 litres of water per day. This gives us a total of over 400,000 litres per day.

Long Reef Golf Club is now totally self sufficient in its water supply for all its irrigation needs. Only five years ago it was not uncommon for the club to budget and spend over \$50,000 a year on potable water if or when required. This is now nil.

## UNTAPPED RESOURCE

But there was still more to come. Being located near the coastline, it was noted that major stormwater outlets running directly onto local beaches produced huge amounts of water,

even with the smallest of downpours, that were going to waste every time it rained.

In early 2006 the club, through the hard work of director and life member John Mullins, was again successful in an application for a \$240,000 Federal Government Community Water Grant providing for a major stormwater re-use pilot project. This grant is now being used to redirect these local stormwater outlets off the beaches and on to the course.

The project, which started in early November 2008, has stage one diverting major stormwater outlets from Anzac Avenue including houses in the immediate area and all runoff from the six-lane Pittwater Road. A 600mm concrete stormwater pipe has been installed from Anzac Ave through the club's car park to the course behind the 18th green.

Stage two will bring the pipe work into pond No.1, the start of the original wetland system. This stage is being completed as I write (late November 2008). Pond No.1 is currently being totally refurbished. The original pond level is being lowered by over one metre as the levels we are working with from Anzac Ave to the wetland have very minimal fall.

Stage three of the project will split the water diversion into two separate pipes – pipe one going to pond No.1 and pipe two flowing behind the 18th green to an outlet at the start of the 9th fairway. From this point the water will flow into a new wetland system which is currently being designed and incorporated into our new master plan put together by golf course architects Thomson Perrett. Dennis Jeffers from OzeEcoManagement will be used as consultant on the new wetland design.

The wetland will run through a number of holding ponds in front of the 9th tee block before flowing into an open rock swale drain which will cross the 8th fairway around 40m short of the green adding quite a degree of difficulty to what is currently an easy hole. At

**Although the original wetland system has been instrumental in giving Long Reef Golf Club a secure water source, more changes were needed to meet future requirements**

this point the water exits the 8th fairway and will flow into a new 40 megalitre storage dam at the current site of our maintenance facility. The DA for our new maintenance facility is in council and should be built in the next 18 months if all goes well.

Further major works are planned when the new storage dam is built as all the excavation material must be used on site. Thomson Perrett has redesigned a number of new holes in the master plan to accommodate all this material.

## SECURE TIMES

I am proud to say that over the past six years and more, many different initiatives have gone into place to ensure Long Reef Golf Club is totally self-sufficient in its water needs. The club is very proactive in its approach towards environmental issues which gives me great personal pleasure, as my staff and the club have worked very hard to ensure the future of the club is secure in these constantly changing times.

Griffith Park is a very important part of our local community for all who wish to enjoy the unique area. There are many volunteers, local community members and work groups who have put so much into re-establishing Griffith Park as a habitat corridor for many endangered species and our golf club works very closely with these groups to ensure the area stays as it is intended – a treasured gem shared by all for sporting and recreational use.

**Editor's Note: Peter was rewarded for his environmental management efforts at the 22nd Australian Turfgrass Conference in Brisbane (2006) where he was bestowed the AGCSA's Claude Crockford Environmental Award.** 🌿



**As part of the stormwater re-use project one of the existing wetland ponds is being refurbished while a new 40 megalitre storage dam is also in the pipeline**



Byron Bay Golf Club has undergone some dramatic construction, resurfacing and architectural changes, all of which has been made possible by a self-sufficient water initiative master plan. Pictured here is the 9th which houses a new storm water storage lake

# Bayside transformation

**B**yrone Bay Golf Club is situated in the north east corner of NSW and up until six years ago was a typical country style golf course. However, with a major developer constructing a five-star resort across the road, this opened the door for what was to turn this country track into the new home of the Australian Seniors PGA Championships for the next four years.

In that time the course layout has undergone some dramatic construction, resurfacing and architectural changes, all of this made possible with the upgrade of the irrigation system and infrastructure which was part of a self-sufficient water initiative master plan adopted by the club.

The transformation began back in 2004 when the golf club was approached by the resort developer looking to offload treated water from its onsite treatment plant for reuse on the golf course. However, with Byron Bay's environmentally sensitive council taking into consideration our current source of irrigation being supplied by the Byron Bay Shire Council (BBSC) Sewage Treatment Plant (STP), this was soon no longer an option for the developer.

With the resort in the construction stage and still without a viable option for the disposal of effluent, the club managed to agree and have pass through council the reuse of the water in our native garden areas, with the provision that the developer upgrade our main pump station and infrastructure for our turf areas. This was a win all round, with the resort offloading its effluent, the council seeing more

Byron Bay has a reputation as being one of Australia's more environmentally conscious townships and the same can be said of maintenance operations at Byron Bay Golf Club. In recent years the course has undergone a number of significant changes in relation to water management and here superintendent Shaun Cross reviews these works which have ultimately set the club up for a more sustainable future.



## PRINCIPAL PARTNERS

**RAIN BIRD**

**TORO**

turf areas under irrigation and the golf club ultimately lifting standards of its operation.

This saw the start of major course works with five new holding ponds excavated along with the installation of 14 kilometres of drip line. This lake system increased the club's holding capacity by 36 megalitres with three out of these five ponds capturing storm water runoff to be diverted to our main holding facility for primary use on turf areas.

The effluent water from the resort is contained in a lined irrigation lake, with the pump station fitted out with two Grundfos CRE 10 pumps delivering 4l/s to the drip system. The lake has three aerators set on timers to maintain oxygen movement and the filtration system is serviced by 130 micron filters governed by a Grundfos controller.

This water now services over 25,000 plants and native grasses screening the golf course boundary which has added considerably to the external appeal of the golf course along with providing a wildlife corridor. The final lake increased our current holding capacity of water coming from the BBSC STP.

## SYSTEM UPGRADE

The old irrigation system consisted of a single fixed speed end suction pump and a standalone controller operated in a semi-automated mode, with only the greens and five fairways under electric solenoid operation. We set about fully automating the infrastructure with a Rain Bird decoder system, along with bringing another eight fairways on line and all





**Irrigation system upgrades have enabled superintendent Shaun Cross and his staff to undertake a number of course improvement projects, in particular to greens surrounds, tees and fairways**

tee decks which were once manually operated by gate valves. This is now all controlled by the Stratus II irrigation software.

The main pump station was fitted out with a variable speed Rain Bird V-3300 package increasing our capacity to 30l/s. This is also operated by the Stratus II programme using Smart Pump software.

The water produced by the BBSC STP was once of an average standard, so the pump station was fitted out with the Rain Bird BSF8-3 screen filter with automatic backwash and ample capacity to filter the required flow rate. The water quality since installation of this system has improved dramatically, with BBSC constructing a totally new plant which now produces Class A effluent water.

## COURSE IMPROVEMENTS

With these fundamentals in place and 85 per cent of our playing surfaces now under automated irrigation, we were able to set about reconstructing and resurfacing some of our problem areas. These ranged from drainage problems through to unsuitable surfaces. Over the next few years we managed to:

- Build two TifEagle greens;

- Construct nine greens surrounds, including the addition of 30 new bunkers;
- Reconstruct three fairways (these were sprigged with Wintergreen, providing a superior surface in comparison to the old Queensland blue couch species); and
- Revamp 24 tee decks (these were planted with Wintergreen and TifSport on the par 3s).

Along with the new lake system providing an increased holding capacity, it has also provided a larger collection area for storm water runoff. This has assisted in the drainage of the front nine, minimising casual standing water on the golf course and providing a more all-weather playable golf course.

Without the irrigation system upgrades these projects would have been near impossible. With the quality of turf surfaces these new species have provided the golfer we are now in the planning stages of turning over another six fairways early next year along with reshaping and resurfacing the associated greens surrounds.

With the ever-growing demand for reclaimed water not just only for use on golf courses, next year will see the club construct



**Construction of the lined irrigation pond which stores treated effluent**

balance tanks in conjunction with BBSC to regulate usage as other users start to come on line.

As demand for effluent increases so does the cost of this precious resource and this has prompted the golf club to look at commissioning one of the three test bores on site to assist in maintaining self sufficiency of irrigation water, along with keeping our water usage expenditure at a minimum. This will effectively secure course water needs for the future with the club being able to call on four separate sources:

- Effluent from BBSC STP;
- Effluent from The Byron at Byron Resort & Spa;
- Storm water; and
- Ground water.

In 2005 we conducted an independent golf course irrigation audit and have been working at improving our system uniformity ever since. In the future we will be continuing to upgrade the old 80mm mainline to increase pressure to some of our elevated areas, which will mean the reduction of our irrigation window and more efficient use of the pump station. This will also assist in providing our turf surfaces with even distribution uniformity which has already been aided by the installation of new sprinklers across the course last winter. 🌧️



**Byron Bay Golf Club installed a variable speed Rain Bird V-3300 pump which increased capacity to 30l/s**

**Treated effluent from the neighbouring Bryon Resort and Spa is now used to water over 25,000 plants and native grasses which screen the golf course boundary**



**Bargara Golf Club and course superintendent Wayne Marshall (inset) have led the way in getting the local community behind an ongoing fight to help protect and improve one of the area's main natural hydraulic features – Moneys Creek Lagoon**



**B**argara is a seaside township 16 kilometres east of Bundaberg. Over the years it has become a popular destination for southern visitors and family holidaymakers with the 18-hole championship course catering for 55,000 rounds per annum.

I started as course superintendent in 2003 and it soon became a priority to source a more reliable water supply for the club. The club has two sources of water – a 2 megalitre dam on Moneys Creek that is reliant on good rainfall and 50M from the Burnett Water Supply Scheme (BWSS), which at times has reduced seasonal allocations as low as 3 per cent. In recent years we have had to survive on approximately 20M to irrigate the entire course and still maintain it to a high standard.

In 2005, the club produced a Land and Water Management Plan in the hope of purchasing more water from the BWSS. With the management plan in place we were able to calculate minimum and maximum irrigation requirements for each of the soil types on the course to optimise irrigation performance and could effectively argue our case with the Department of Natural Resources and Water that the course could accommodate up to 300M per annum. We have since purchased a further 20M to bolster our supplies, but with the current price for irrigation water at \$1000 per megalitre it is an expensive exercise, especially when seasonal allocations are inconsistent.

The club has recently entered into a memorandum of understanding with Bundaberg Regional Council to supply approximately 120M of Class A+ recycled water per annum from 2009 onwards. The club was successful in obtaining funding through the Federal Government's Community Water Grants Scheme to construct a 14M storage dam between the 14th and 16th fairways for this water.

David Hanby from Hydro Pumping and Controls has recently been appointed as the designer and consultant for a fully automated irrigation system for the course. The current irrigation system is a bit antiquated and consists of two travelling irrigators for fairways

## Building a better **Bargara**

Situated just east of Bundaberg, Bargara Golf Club has a reputation as a friendly natural resort style course built on rolling sand dunes behind the popular Kelly's Beach. It is also quickly gaining recognition as being an environmental champion thanks to the efforts of course superintendent Wayne Marshall, club management and staff.

relocating their storm water retention basins onto golf course land. There is the opportunity for the club to create wetlands and waterways on the course which would provide the opportunity to harvest stormwater, with the added environmental benefit of treating any excess stormwater that is high in nutrients and sediments before it is discharged to Moneys Creek.

### ENVIRONMENTAL IMPROVEMENTS

In 2005, we implemented the e-par environmental management system (EMS) and from this procedures were put in place for many of the day-to-day operations of the club. All staff now understand their OH&S and environmental responsibilities and are inducted and fully trained to abide by the club's EMS, with ongoing environmental awareness sessions conducted regularly. Staff all have Chemcert accreditation and are trained in spill response procedures.

Areas that are adjacent to waterways have been designated no spray areas and many species of native grasses and shrubs have been introduced onto the course to promote wildlife refuges as they mature.

One of the major focuses for the club in recent times has been on Moneys Creek Lagoon which adjoins the southern end of the golf course. It is an estuarine lagoon system typical of many small rivers and creeks along coastal Queensland and the club is in a unique position as it retains tenure over it.

It is one of the main natural hydraulic features of the Bargara area, covering a little over 12 hectares, and receives runoff from just under 6000ha of urban and agricultural land. Stormwater from the golf course, surrounding developments and local cane farms is discharged directly to Moneys Creek and ultimately into the Great Sandy Marine Park.



#### PRINCIPAL PARTNERS

Bayer Environmental Science



**TORO**

that require setting and repositioning each day, and pop-ups on greens and tees. The club is currently waiting to hear if it has been successful in another funding application for the entire irrigation system.

Negotiations with neighbouring developers are also ongoing with the potential for

**Major water quality issues facing the lagoon include sediment accumulation, nutrient input from land uses within the catchment and a lack of natural hydraulic flow**

The marine park provides protection for ecosystems and habitats, such as turtle rookeries, and some are located on the local beaches that border the club. This region supports the largest turtle rookery in the Southern Pacific for the endangered loggerhead turtle. Successful breeding and nesting in this region is critical for their survival.

Investigations into Moneys Creek highlighted some major concerns for the ecosystems of the creek, lagoon and the marine park. Over a number of years the lagoon has been subject to regular algal blooms and dramatic fish kills and is under intense pressure from surrounding land uses and current and past management actions.

The ecosystem within the lagoon is extremely vulnerable to excessive nutrient supply and sediment delivery. In the absence of extensive water quality data, the precise ecological and water quality issues of Moneys Creek Lagoon are somewhat difficult to determine, however, they are likely to have been caused by excessive amounts of nutrients within the system and/or the accumulation of sediment.

The main water quality issues facing the lagoon include the reduction in water depth resulting from sediment accumulation, nutrient input from land uses within the catchment and a lack of natural hydraulic flow (oceanic exchange). About 30 years ago a causeway was constructed and tidal exchange between the open ocean and the lagoon was reduced to the highest tides each month when the causeway gates are opened by Burnett Shire Council.

The golf club sourced the help of the Burnett Mary Regional Group which



commissioned Wetland Care Australia to conduct an evaluation and present future management plan options. This document was presented to the club in November 2007 and the club held a public forum in February 2008 to discuss the report and get input from the local Bargara community. The night was attended by federal and local government representatives, council representatives and many members of the community.

Although Moneys Creek Lagoon is within the land tenure of the Bargara Golf Club, its ecosystem health and sustainable future is a catchment-wide problem that needs the involvement from the entire community.

From this meeting a committee was appointed to investigate options to rehabilitate and sustain the lagoon, advise stakeholders and source potential funding. I was selected along with other members of the community to form the Moneys Creek Rehabilitation Group which is driving the environmental cause for the creek and golf club. Some of the group's objectives are:

- Long-term sustainability of Moneys Creek;
- Lagoon to serve as a natural floodway;
- Sediment and pollution mitigation;
- Healthy ecosystem for aquatic and avian populations;
- Native riparian areas to be established;

- Minimise sandfly and mosquito concerns;
- Swimming basin to be preserved as a tidal pool for safe use by the community.

Bargara Golf Club is determined to establish itself as one of the premier golfing destinations in Queensland and as well as all the above environmental improvements it is about to embark on a \$60 million project in partnership with CABA developments. This will incorporate 100-plus unit style apartments all with ocean or golf course views, a new clubhouse on the ocean front and a second smaller clubhouse/pro shop development on the course itself.

It is set to be an exciting time for us all and once the clubhouse development is complete a new course maintenance/workshop facility is to be constructed complete with washdown, chemical storage and mixing areas.

**Editors Note:** Wayne was presented the GCSAQ Environmental Award at the 2008 Queensland Golf Industry Awards and was a finalist in the 2008 AGCSA Claude Crockford Environment Award, sponsored by Syngenta. Wayne is currently enrolled at Central Queensland University where he is undertaking a Bachelor of Environmental Science which he hopes to complete within the next 3-4 years. 🙌

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**Toro's 2008 Parts and Service Professionals Meeting enabled Lake Karrinyup turf technician Rick Raison the opportunity to see first-hand Toro equipment rolling off the production line. Pictured is the Reelmaster 3100-D**

# Meeting of minds

The Toro 2008 Parts and Service Professionals Meeting was held in Minneapolis, Minnesota from 6-9 October. I, along with nine other golf course equipment managers and technicians from different parts of the globe were invited to this meeting. Attending were three from the United Kingdom, two from Holland, four from Canada and myself, the sole Aussie.

The intention of the visit was to meet and talk to Toro staff, including senior management, engineers, manufacturing, assembly, test and auditing personnel. I went with an open mind and few expectations and hoped it was going to be an interesting time. I wasn't disappointed. During the four-day visit we toured Toro's corporate headquarters where the company's product development division is located, the Shakopee parts manufacturing facility and the Commercial assembly plant in Tomah, Wisconsin.

After a long flight I arrived in Minneapolis where the tour started with an informal welcome reception with the other members of the party. Here we met our hosts for the next few days – Toro's international marketing manager Karine Watne, associate Monica Bringle and international service business manager Kris Lindstrom.

The tour kicked off the following day with a visit to Toro's corporate headquarters in Bloomington, a suburb in southern Minneapolis. Toro Motor Company was founded in 1914, beginning as an engine supplier to the Bull Tractor Company. In 1920 it changed its name to Toro Manufacturing Company which involved itself in farm equipment. Toro created the first golf course mower in 1921 and now produces golf course maintenance equipment boasting some 720 patents.

After signing a confidentiality agreement, we were given a guided tour of the engineering and test facility. Toro's headquarters covers

In October last year Lake Karrinyup Country Club's Rick Raison was one of 10 turf technicians to travel to the US as part of the 2008 Toro Parts and Service Professionals Meeting. As well as getting a first-hand look at Toro's major manufacturing and product development facilities, Raison was also able to talk shop and swap ideas with fellow technicians from around the globe.



about 4000 square metres and employs 1000 staff, 350 of them being engineers. We saw rooms dedicated to testing repetitious motion, extreme temperatures, sound emissions, impact and everyday stress.

During the tour I was privileged enough to be in the company of Dr Van Cline, Toro's manager of turf agronomics. Dr Cline spoke at the 24th Australian Turfgrass Conference in Melbourne about the foreseeable turf management needs for 2010 and beyond and commented that the turf techs at that conference were among the best he had talked to.

After lunch we were introduced to the head engineer of the Centre of Advanced Turf Technology (CATT), Dana Lonn. Dana has been with Toro for the past 40 years and from a turf technician's point of view has the best job in the place. CATT engineers are required to think outside of the box to explore and develop new ideas to advance golf course maintenance machinery.

We were able to chat with Dana and his colleagues about their work and they showed us examples of what was in the pipeline and some of the future ideas they were working on. With the world demanding cheaper and cleaner fuel alternatives, all manufacturers using internal combustion engines are being forced to examine their products and Toro is undertaking research and development in this field. Toro is also looking at the possibility of improving fuel efficiency of existing product lines.

Wednesday began with a short bus ride to Toro's parts manufacturing facility in Shakopee, Minnesota. Toro Shakopee produces nearly all the steel component parts for the company's product range. It runs 24 hours a day, five days a week and employs 230 people working in three shifts. It produces over 2.25 million parts a year and presently runs 7500 active part numbers. We were divided into small groups and taken on a tour of the facility. Our guide was a bright young engineer named Becca, however, the average age of the employees there was about 46 years.

We saw reels being made from scratch with the use of robotic welders and interestingly the steel used for the cutting blades comes from the United Kingdom. We were shown laser cutting equipment in action which was very impressive and massive stamping presses, the largest having a 600 ton capability. There were also auditing rooms throughout the plant for assessing part accuracy and quality.



Following lunch – at a Mexican establishment called, funnily enough, El Toro – we returned to the hotel for a ‘round table’ discussion moderated by Toro’s selling skills manager Steve Keating about our thoughts and experiences with Toro parts and services. At the back of the room were different Toro personnel from parts marketing to hydraulic engineers and hopefully the information we were able to give them will benefit their operations.

Our final visit was to the main Commercial product assembly plant in the town of Tomah, Wisconsin. Tomah was a three hour coach drive and we took the scenic route along the Mississippi. With autumn colours on one side of the road and the wide span of the river on the other it made for a very pleasant drive and it was also a good time to talk casually with the other members of the group.

The Tomah assembly plant was established 32 years ago and currently assembles 300 different Commercial models and 30 industrial models. On the product assembly floor my initial impression was the confined work areas but I later found out this was to increase productivity, reducing the distance a worker had to walk for a component which lessened manufacturing time. The assembly lines were

busy but no one looked rushed. The Tomah plant employs about 660 people with a mix of 50/50 male and female. From what I saw all the models produced here were hand built with a great deal of pride.

In summary, it was an extraordinary trip and I saw a lot in a short time and met many gracious and interesting people. Aside from getting the opportunity to view the steps from design to assembled product, one of the standout aspects of the trip for me was meeting the other techs.

It was interesting to note that we all had similar issues and thoughts and it was good to mull these over and hear different opinions and perspectives.

For instance, turf techs have always had grievances with bad operation of equipment

and there was discussion that an industry standard of competency for mower operators (like that for forklift operators) could reduce the number of budget-eating repairs.

Recognition of the turf technician role was also talked about at length and how the broad range of skills and knowledge we are required to have these days needs to be matched from a salary perspective as well. It was noted that only superintendents can address and support this issue on behalf of the tech.

From my own point of view, I was able to bring back a number of ideas. Our own grinding equipment has long been on my wish list and after talking with the other techs they all agreed that implementing a grinding programme is the best way to produce a consistent high standard of presentation. 🌱

### TURF TECHNICIAN STATE ASSOCIATION CONTACT DETAILS

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#### VTETA


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#### QTETA

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From the tranquil setting of the River Murray to the equally serene locale of the NSW south coast, golf course superintendent Aaron Miller certainly knows how to pick them. Having recently moved from Howlong Country Golf Club, where he was superintendent for six years, ATM catches up with Miller to see how he is settling in at Tura Beach.



Aaron Miller has recently opted for a coastal change, leaving Howlong Country Golf Club after six years to take over as superintendent at Tura Beach Country Club on the NSW south coast

## Aaron Miller - Tura Beach Country Club

**Full Name:** Aaron Miller.

**Nickname:** Milsky or Az.

**Age:** 37.

**Family:** Jo (wife of 11 years), children Ashlee (7), Charlotte (5), Phoebe (3) and Tom (1).

**Years as a superintendent:** 6.5.

**Years as an AGCSA member:** 6.5.

**Previous clubs:** Howlong Country Golf Club (6 years, superintendent); National Golf Club (2 years); Capital Golf Club (5 years); and Kingswood Golf Club (5 years).

**Current club:** Club Sapphire – Tura Beach Country Club and Merimbula-Imlay Bowling Club (6 months).

**Number of staff:** 12.

**Course specs:** Tura Beach – 18-hole, 6018m. Tees – Santa ana; greens – Poa/Pennncross bent (50/50); fairways – kikuyu; two Greenlees Park bowling greens, two synthetic grass tennis courts. Merimbula-Imlay Bowling Club – four Greenlees Park bowling greens.

**Qualifications:** Recreational Turf Management, Associate Diploma of Applied Science (Sports Turf Management), Advanced Certificate in Sports Turf Management.

**Congratulations on your recent appointment as superintendent at Tura Beach. Tell us a bit about your background and how you came to get the top job there.**

I started my career at Kingswood Golf Club after realising that going to university wasn't for me. After five years at Kingswood (which included a six month stint at Blairgowrie Golf Club in Scotland) learning all about maintaining a golf course, the opportunity came up to work at Capital Golf Club which gave me the chance to experience course construction. Once that

was completed I was given the opportunity to be a part of the maintenance team which was amazing working on such a world class golf course.

Construction was great to be involved with and another opportunity came up at The National Golf Club working on the construction of their two new golf courses. After working there for two years I was offered the superintendent job at Howlong on the River Murray. Howlong was a great place to live and work but I realised that I missed living near the coast and so I decided to apply for the Tura Beach job which I was lucky enough to get.

**What have been some of the main challenges in making the move, both from a personal and professional point of view?**

Personally, it has been quite difficult leaving behind everything we know and love at Howlong and starting over again not knowing anyone. However, Merimbula has a lot to offer us all. Professionally, having to adjust to a different climate to what I was used to and getting to know the staff that I will be working with. The biggest adjustment I've had to make would be making the most out of the machinery and equipment that I have at my disposal to maintain the golf course, which is not great to say the least.

**What do you hope to achieve during your time as superintendent there?**

To instil a professional attitude in the staff toward presenting and maintaining a golf course and bowling greens, and to improve the turf surfaces and presentation of both venues.

**The one thing you miss about your old job and the one thing you don't miss?**

I miss the staff I had at Howlong as they were a great team and made it enjoyable to come to work. I'm not going to miss the 40 degree days we would regularly get in summer.

**Take us through your operations at Tura Beach. Where is the club at in regards to its turf management practices?**

The club had a very severe outbreak of pythium in the greens last summer so there are still some areas of concern there. All the surfaces have a poor root system and are very thatchy, so we will be doing regular verticutting, aerating and dusting once we have purchased certain machinery. A fertility programme is in place for all surfaces to improve the overall health of the turf, as is a pesticide programme to prevent unwanted disease or insects. Greens are renovated twice a year and surrounds, tees and fairways will be done annually.

**What are some of the major turf management issues there and how are you and the club planning to meet those challenges?**

Keeping some turf areas alive in the warmer months is quite an issue at Tura Beach as the irrigation system is quite inadequate to say the least. We have a 30l/s Southern Cross pump run by a 75 kilowatt motor with no VSD. With the topography of Tura (there is an 80 metre difference across the site), the highest part of the course is 60m above the pumping station and our pressure at that part of the course is about half that compared to the lower end of the course.

If we don't have about 22 sprinklers operating at once we blow pipe as the pressure just builds up on the lower part of the course. As a result the sprinklers don't perform as well on the higher parts of the course due to this lower pressure and some areas really struggle. We are hoping to replace our pumping station next winter in order to solve our pressure problems.

Another issue is kikuyu creeping into our greens. Just about all our greens have kikuyu around them and starting to send runners into the bent. I'm planning to build a bent nursery and returf the collars of the greens in order to have a barrier to stop kikuyu encroachment.

### Are there any plans for the course in the coming years?

The club has a 'Master Philosophy' drawn up by the course's designers Thompson and Wolveridge that it is following. The course is a great layout with some terrific holes so nothing major is required. The 9th and 13th tees need rebuilding and we need some more water storage.

### Water is obviously a critical issue around the country. How is Tura Beach off in terms of its water supply, quality and quantity?

We have three sources of water supply at Tura Beach. Effluent is our main supply and is of pretty good quality. We also have a bore which is of pretty good quality but only gives us around 180,000 litres in a 24 hour period. Our third is storm water and when it rains our dams fill up pretty quick. We have three dams collecting storm water and they have a capacity of around 30 megalitres.

The effluent gives us around 500,000 litres a day, depending on the time of year. With no irrigation taking place in winter, our effluent lake, which has a capacity of around 2M, doesn't take long to fill up and the excess overflows into the sand dunes. Hence the reason for more water storage capacity, especially when last year the Tura Beach treatment plant pumped out 187M which is more than enough water to irrigate the golf course with for the year.

### Any other management issues which the club is actively looking at?

The course has a number of creeks and wetland areas running alongside a few holes that are home to all sorts of animals and vegetation, so environmental management is of great importance. The e-par EMS is something that I'm intending on getting.

### One thing you would change about the job?

Increase my budget by about \$500,000!



**Tura Beach's 8th which offers some spectacular views of the Pacific**

### Best advice you have ever received on the job and who gave it to you?

"Work hard and keep things simple." That was from my boss in Scotland, Alan Holmes.

### Best part about being a superintendent?

Being responsible for improving the turf quality and the overall presentation of the facility you work at and the satisfaction that brings.

### What's the best part about being involved in the turf industry?

Being able to play some fantastic golf courses.

### Favourite spot on your course?

13th tee. A par 3 with an elevated tee looking straight at the Pacific Ocean. A great hole with scrub wetland that you have to hit over.

## OFF THE COURSE

**Any claims to fame outside of turf management?** I used to play tennis on a regular basis with Leigh Mathews, if that passes.

**Favourite movie?** Caddyshack.

**Three CDs you couldn't live without.** INXS – Kick; H&C – Cut; and Hoodoo Gurus – Crank.

**If you could be any musician, who would you be?** Gene Simmons.

**Food you could not live without?** My wife's cooking.

**Favourite sporting team?** Carlton.

**Sporting team you like to dislike?** Collingwood and Essendon equally.

**Dream car?** Ferrari.

**Irritations?** Golfers who are expert greenkeepers.

**What book are you reading now?** Dr Seuss, a Mem Fox or a Mr Men.

**Golf handicap?** 10.

**What do you do to get away from it all?** Play Twister with the kids or go for a walk with the family on the beach.

### Favourite piece of machinery?

Probably our Toro GM3500D sidewinder rough cutter as it is new. All our other machinery leaves a lot to be desired.

### What has been your most embarrassing moment as a superintendent?

Driving the work ute at Howlong across the practice fairway heading back to the shed. It was just after rain (not that we got much of that in Howlong) and I was probably going a bit too fast.

I was looking to the left and when I turned to look straight ahead there was a tree that had popped out in front of me. I slammed on the brakes but as it was wet, I just skidded and T-boned the front of the ute. I didn't hit it that hard but I did bend the whole front bumper. John, my mechanic, became a panel beater and a couple of days later had erected some 'danger' tape around the particular tree for everyone to see it.

### Funniest moment you have seen on course?

It would have to be watching the caddies at Capital Golf Club taking out the remote control golf buggies to learn how to use them. One of the caddies was unable to stop his and it ended up in the lake. It was hilarious seeing a brand new set of clubs bobbing up and down in the water.

### Worst excuse from a staff member?

An apprentice who didn't turn up to work one Saturday morning used the excuse that his mum had gone away and he couldn't get to work.

### Career highlight?

Attending the 2006 Golf Industry Show in Atlanta and also going to Farm Links. The US conference is massive and Farm Links is a great place for the industry.

### The overseas course you'd most like to visit?

Augusta National or any US Open course. 🌳



# STORMS WRECK HAVOC FOR SOUTH EAST QUEENSLAND SUPERS



Staff at Indooroopilly clean up after four storms ripped through Brisbane in six days during November

South east Queensland golf course superintendents and their maintenance staff earned their keep in mid-November after severe storms ripped through the region leaving a trail of destruction. Many courses faced extensive clean up operations after four storms in the space of a six days caused widespread flooding and tree damage.

The carnage began on Sunday 16 November when a super storm cell descended on Brisbane bringing with it torrential rain and winds up to 200kph. Rain continued to fall throughout the week and peaked again on the Wednesday night when upwards of 250mm fell in some areas to the west of Brisbane thwarting many clean up efforts. If that wasn't enough a further storm front passed through later on Thursday night and while rainfall was much less, gale force winds again left a trail of debris.

Two of the region's worst affected courses were Keperra Country Golf Club and Ashgrove Golf Club in Brisbane's western suburbs. Keith Johnson, superintendent at the 27-hole Keperra Country Golf Club, has been at the club for the past 23 years, including the past 11 as superintendent, and says he has never witnessed so much destruction.

"It's the worst I have ever seen it here," Johnson told ATM. "I now know what the guys up north were going through earlier this year. I was at the course on Sunday afternoon just before the storm cell hit. All the warnings were suggesting that it was going to pass to the south of us but before I left work, around 4.30pm, I had a quick squiz at BOM and could see it was coming right for us. I left to head

home - I live a kilometre away from the course - and by the time I got there the wipers were going flat out. It was incredible."

Before the maintenance facility rain gauge clogged up with leaves, debris and hail it had recorded 85mm in very short time but Johnson figures the amount was greater. Combined with 130kph winds the scene that greeted Johnson and his staff the following morning was one of devastation.

"We probably had between 300-400 trees down," says Johnson. "Some of the older trees which were 15-20 metres high were just ripped right out of the ground or snapped in half. The water cleared pretty quickly and we went out on the Monday morning with blowers and rakes to clean silt off the greens. We had about 40 volunteers helping and we managed to get a 20 tonne excavator, truck and chipper in to help with the clean up.

"There wasn't a huge amount of silt damage, but we had large chunks of fairway turf scalloped out. A retaining wall was washed away and we [had to] repair some of the bridges which were also damaged. All the bunkers [were] scoured severely too, but there's not much you can do about it - that's nature for you."

Johnson and this crew had the front nine cleaned up by the end of Wednesday but that night the course copped another 70mm, which combined with the 65mm received on Tuesday night meant that the course was again under water on Thursday.

The clubhouse also suffered extensive flood damage after a foot of water ripped through the establishment.

Over the hill at Ashgrove Golf Club and "trashed" was the word Daniel Breen used to describe the state of the course he has been superintendent at for the past eight and a half years. Breen and his staff of five took nearly a fortnight to clean up the course and at one stage after the storms had 40 SES volunteers and trucks helping out.

Situated in The Gap, which bore the full front of the first storm, the heavily tree-lined course copped 92mm of rain in 25 minutes, cricket-ball sized hailstones and wind gusts of up to 200kph. That was followed up on Wednesday night by a further 112mm which saw Fish Creek, which runs through the course, burst its banks. Normally about 6m across and a metre deep, Breen estimates the creek at one stage was about 70m across and seven metres deep.

"We've had a couple of good storms over the years but nothing quite like this," says Breen. "More than 300 trees were uprooted and some of the bigger ones looked like they were twisted right around. A number of bridges suffered extensive damage and the new practice nets the club installed recently ended up four kilometres downstream.

"We're quite a hilly course and we also had a lot of landslides too so we had a big clean up. We lost our pumps too and [early on] we weren't able to get hold of a wood chipper because they were all being used to clear debris everywhere else. Compounding matters was that we back on to Army land and damaged trees at that end of the course ripped up an extensive network of fibre optic cables."

Elsewhere across the region many superintendents had to deal with widespread surface flooding to parts of their courses and faced lengthy clean-up operations. A few kilometres south, Indooroopilly Golf Club staff were mopping up after receiving nearly 230mm from Sunday-Thursday, Brisbane Golf Club had 203mm for the same period, while recently appointed Helensvale Golf Club superintendent Alan Mulcahy was cleaning up after copping 195mm in three days.



Brisbane Golf Club copped 203mm in five days resulting in widespread flooding

# BAYER ENVIRONMENTAL SCIENCE AND TORO BACK GOLF ENVIRONMENT FOUNDATION

The Australian Golf Environment Foundation (AGEF) has received a major boost with the announcement that Bayer Environmental Science (BES) and Toro have confirmed as principal partners. Demonstrating their ongoing commitment to improving industry environmental management practices, both BES and Toro have made significant five-figure contributions to the foundation which aims to use science and education to benefit golf in the area of environmental management, protection, and enhancement.

"Bayer Environmental Science is proud to be principal partner of the Australian Golf Environment Foundation," says BES business development manager Justin McBeath. "Bayer is committed to sustainable development and we are engaged in a number of global environmental initiatives to achieve this."

"Being involved with the Australian Golf Environment Foundation is yet another way of fulfilling our vision of 'Protecting Tomorrow... Today' and we look forward to being able to further enhance and promote the environmental benefits of golf."

The AGEF was established by the AGCSA mid-way through 2008 to administer funds derived through the Environmental Initiative which was set up in 2005 as a partnership between the AGCSA and Golf Australia.

The Environmental Initiative generates funds through commissions from the sale of the e-par environmental management system and also receives donations and grants from golf clubs, organisations and trade groups involved in the golf maintenance industry.

All funds are directed to the AGEF for the express purpose of funding research projects, education programmes and study bursaries related to managing the golf course environment.

An advisory board, chaired by AGCSA Board member and Royal Sydney Golf Club superintendent John Odell has identified a number of research priorities for the foundation to tackle including the undertaking of a pilot study, in partnership with the University of Melbourne, to measure the carbon footprint of Australian golf courses. The project, which is earmarked to begin in mid-2009, will aim to study a range of golf courses from heavily treed to links style in a variety of climates and with differing levels of resources.

"The golf industry is an important part of our business and the relationship we have with superintendents is key to this," adds Cameron Russell, managing director of Toro's Commercial Equipment business unit.

"By supporting the Australian Golf Environment Foundation Toro hopes to help superintendents achieve their environmental management goals to ensure a more sustainable future not only for the golf course maintenance industry but for the game of golf in general."



Bayer Environmental Science



## ON THE MOVE



Ex-pat Australian Steve Marsden (formerly the superintendent at Lakelands GC) has moved on from the spectacular

Nicklaus-designed Kinloch Club just outside of Taupo in New Zealand's North Island. He hasn't moved far, however, and is now the resident superintendent at the equally stunning Cape Kidnappers situated in Hawkes Bay on the east coast of the North Island. Marsden, who started his new posting just 11 days before Christmas, replaces Paul Delaney who is returning to Sydney.

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Jason Kelly is the new assistant superintendent at Fremantle Golf Club, replacing Andrew Fortune. A former bowling greenkeeper who worked at Royal Fremantle earlier in his career, Kelly most recently spent time at Collie Golf Club and is now back under superintendent Jeff Allen.

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Stuart Barker has taken over from Aaron Wilkinson as superintendent at Hope Island Resort in Queensland. Barker has appointed Daniel Foote as his new assistant. Wilkinson is understood to have moved into turf production.

~~~~~

Former Mona Vale Golf Club assistant superintendent Greg Burgess has skipped the country and is now superintendent at the idyllic-sounding New Kuta Golf Course in Bali, Indonesia. Mona Vale superintendent Andy Huggill has appointed Rob Sain as his new 2IC.

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## TORO GREENSMaster 14-BLADE REEL A CUT ABOVE

Toro has unveiled the industry's first 14-blade reel for its Greensmaster Flex 21 and Flex 18 walk-behind greens mowers.

The new blade reel cuts below 2.5m without damaging turf, providing golf course superintendents with a quicker and more consistent playing surface.

The 14-blade reel is now available to retrofit existing Greensmaster Flex 18 and Flex 21 units and new units can be ordered with either an 11-blade or new 14-blade cutting unit.

"By adding more blades and keeping reel-speed constant, we found grass blades to be metered into the reel more efficiently and sheared off more cleanly, resulting in fewer stragglers, healthier turf and a superior ball roll," says Toro's marketing manager for Greensmaster products Helmut Ullrich. "The new 14-blade reel is the perfect answer for superintendents looking to achieve the

best cutting-performance, particularly at low heights of cut."

Released in the US last July and launched for the first time in Australia at the 24th Australian Turfgrass Conference Trade Exhibition in Melbourne later that month, the 14-blade reel has already proved popular.

After testing the 14-blade reel for a few weeks at The Woodlands Country Club in Texas, superintendent Russell Birkhimer noticed a significant increase in clipping-yield compared to the Flex 21 using an 11-blade reel at the same bench setting.

"The quality of cut below 2.5mm was a lot better than I expected," says Birkhimer. "The 14-blade reel will provide us with a more constant ball roll. At the lower height

of cut, the amount of stragglers was minimal, which resulted in faster green speed."

**For more information about the 14-blade reel and features of the Toro Greensmaster Flex 18 and Flex 21 units visit [www.toro.com.au](http://www.toro.com.au) or contact your local Toro distributor.**

**The new 14-blade reel which is now available in Australia for the Greensmaster Flex 21 and Flex 18 walk-behind mowers**



## CLEAN UP ON THE QUIET

With noise problems from maintenance practices an issue for many golf courses and turf facilities, Honda has released its HHB25 blower which will provide turf managers with a quieter and more productive means of cleaning up their facilities.

Standing out from the traditional two-stroke blowers currently available on the market, the HHB25 features Honda's mini four-stroke GX25 engine. The new engine not only has quieter operating levels but also eliminates the mess and time it takes to mix oil and petrol (it runs on normal unleaded petrol) offering greater fuel efficiency, reduced exhaust emissions and minimal vibration.

The HHB25 Blower is also 360 degree-inclinable for use on flat ground to undulating embankments and weighs 5.3kg. It has a wind velocity of 70m/s (252kph) and a noise output of 75 decibels.

**For further information regarding the range of Honda power equipment contact your local Honda dealer on 1300 146 632 or visit [www.honda.com.au](http://www.honda.com.au)**

## REDEXIM GETS HEAVY

Redexim has expanded its Verti-Drain range with the heavy duty 7612HD for operators who need to undertake major decompaction jobs. Designed for contractors who find the demand for aeration produces a massive workload or for superintendents looking to tackle hard compacted fairways, the Verti-Drain 7612HD has a working width of 2.1m and weighs in at 1650kg.

Penetration depth is up to 40cm to relieve the deepest compaction, improve drainage and rejuvenate the sward, while a heavy duty gearbox has been incorporated to withstand the significant force needed for this kind of work. Side plates on the 7621HD have been reinforced to ensure smooth running and adjustment of the working depth is carried out hydraulically from the tractor seat (tractor power requirement is 55hp, with 1900kg lift capacity).

**For more information on the 7621HD visit [www.redexim.com](http://www.redexim.com).**



## IAL APPOINTS NEW CEO

Irrigation Australia Limited (IAL) has appointed Chris Bennett as its new chief executive. Announced in late October, Bennett replaces Alison Carmichael who was acting chief executive for three months following the departure of Jolyon Burnett in mid-2008.

"With a history of association management in both aquaculture and horticulture industries, as well as a very strong background in industry training and in working with government

agencies and funding bodies, Chris is well qualified to take on the CEO role," says IAL national chair Peter Toome.

Prior to the IAL appointment Bennett was chief executive of the Almond Board of Australia. Among his achievements are the establishment of a processing and marketing co-operative for the NSW oyster industry to overcome product quality issues, establishing an RTO to provide specific industry training needs and developing and managing a research programme which doubled the almond industry's strategic productivity objectives.

## SIMPLOT EXPANDS SALES FORCE



**Thorsborne**



**Duncan**

Simplot Pro-Line has expanded its team in Victoria and Queensland following the appointments of Colin Thorsborne and Ash Duncan.

Thorsborne has accepted a position with Simplot's Gold Coast office and brings over 20 years' of industry experience to the company. Most recently Thorsborne was superintendent at The

Montgomerie in Dubai and prior to that had stints at Denarau Golf Club (Fiji), Hope Island Resort and The Glades. Thorsborne will be help service the Gold Coast and Brisbane regions and can be contacted on 0419 768 161 or by email [colin.thorsborne@simplot.com.au](mailto:colin.thorsborne@simplot.com.au).

Down south, former Yering Meadows assistant superintendent Ash Duncan has

accepted a sales role servicing the Melbourne metropolitan area and regional Victoria areas. Duncan also brings a wealth of knowledge and experience to Simplot with over 13 years in the industry. He can be contacted on 0419 768 025 or by email [ash.duncan@simplot.com.au](mailto:ash.duncan@simplot.com.au).

### CONTROL EVAPORATION, MOZZIES AND ALGAE

Australian company Ultimate Agri-Products has recently launched three new products to assist turf managers with water storage issues. The first product is Aquatain, a silicone-based liquid for the control of evaporation. It spreads rapidly across the surface of the water, forming a very thin film which helps reduce evaporation by around 50 per cent.

The second product, Aquatain AMF, is also a silicone based liquid but it is formulated for mosquito control. It also spreads across the surface of the water, forming a very thin film which disrupts the mosquito lifecycle. One of its key advantages is that its action is physical rather than chemical and unlike conventional mosquito control products contains no toxic chemicals.

Trials have been conducted on Aquatain AMF by the Laboratory of Entomology at Wageningen University in The Netherlands and

by the Department of Medical Entomology at the University of Sydney. Results show that no egg rafts were laid in containers with Aquatain AMF and there was a 100 per cent mortality rate of pupae.

The third product, Triple Strike, is a treatment for blue-green algae. It is a liquid suspension which has an immediate impact, causing the algae to 'curdle' into fluffy lumps and to drop to the bottom of the water body. In addition Triple Strike also reduces future algal growth by absorbing phosphorous from the water.

**For more information contact Graham Strachan on 0409 250 240 or email [graham@ultimateagri.com.au](mailto:graham@ultimateagri.com.au)**

### REEL MOWER RAISES THE BAR

MowMaster has announced the successful trialling of a new walk-behind reel mower that can handle cutting grass up to 60mm. Available in six sizes, the new general purpose mowers are powered by engines from Honda's GX range and will be available from January 2009.

The WA company's new range allows users to manicure taller grasses such as fescues and buffalo, which are often grown high to keep the plant healthy and save water.

"The design came about by a need to manicure longer cut grasses with the unique reel mower finish," says company owner David Harrison. "Our previous range of mowers cut up to 20mm, so this is a huge advancement for us and the mower industry in general. We trialled these machines over several months with contractors who work these products to the extreme."

MowMaster specialises in turf equipment and is celebrating its 60th birthday this year. Its mowers are used at the Melbourne Cricket Ground, Sydney Cricket Ground and the WACA as well as golf courses across the country.

**For more information on its new reel mower, visit [www.mowmaster.com.au](http://www.mowmaster.com.au)**



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|                                                                      |          |          |
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## BEST SELLERS FOR 2008

Turf Managers Handbook for Golf Course Construction and Grow-In – **B. Charles**  
 Destructive Turfgrass Insects, Biology, Diagnosis and Control – **Daniel A. Potter**  
 Discovering Donald Ross-The Architect & His Golf Courses – **Bradley S. Klein**  
 Growing Media for Ornamental Plants and Turf – 3rd Edition – **K. Handreck, N. Black**  
 Golf Course Management & Construction – Environmental Issues – **James Balogh and W. Walker**  
 Golf Course Irrigation System – Design and Drainage – **Edward Pira**  
 Keepers of the Green – A History of Golf Course Management – **Bob Labbanace**  
 Turf Managers Handbook for Golf Course Construction, Renovation and Grow-In – **B. Charles**  
 Turf Management for Golf Courses – **James B. Beard**  
 Turfgrass Soil Fertility & Chemical Problems – **R. N. Carrow, Waddington & Rieke**

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Postage: \$9.90 for first book and \$1.10 for every book after.

# Turf Maintenance Facility Design and Management

By John R. Piersol and Harry V. Smith

WILEY 2009

As any superintendent will tell you, the maintenance facility is the heart of golf course operations. The 'shed' can say a lot about a golf course, its superintendent and its workers, and a functional, organised facility not only improves workplace efficiencies but reduces costly downtime. Paramount in all of this too is the role of the turf technician.

In 2006 Australian Turfgrass Management ran an extensive feature on the construction and design of maintenance facilities, getting a number of superintendents from around Australia who had recently constructed a new facility to impart some advice for colleagues about to go down a similar line.

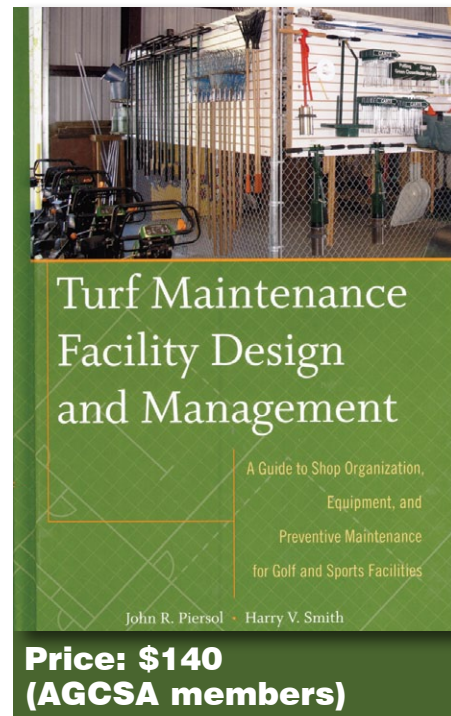
Of the many comments made, superintendents all had one key recommendation in common – do your research. Whether it was talking to fellow superintendents, trawling the internet or scouring through books, sound research was imperative to making sure that the end result was a functional facility that would not only serve the club in the immediate future but 20-30 years down the line as well.

One such tool that superintendents may find handy is John Piersol and Harry Smith's book titled 'Turf Maintenance Facility Design and Management: A Guide to Shop

Organization, Equipment, and Preventative Maintenance for Golf and Sports Facilities'. Aimed at turf technicians and turf managers alike, the 180+ page hardcover book examines a range of proven techniques that will enable them to design, build and manage an efficient and safe turf maintenance facility or overhaul an existing facility. Calling on nearly 50 years' combined experience, the authors look at how to develop and implement cost effective maintenance programmes to help maximise the performance of plant equipment.

The book begins by examining the role of the turf technician and the importance they play in the smooth running of golf course maintenance operations. The second chapter looks at maintenance facility and workshop design, covering key areas such as site selection, layout and equipment storage areas. It also looks at how to remodel older facilities and emphasises the importance of planning for the possibility of future expansion.

Following chapters deal with preventative maintenance strategies, reel technology, how to select tools for the workshop (which includes a handy list of 'must have' equipment) and diagnostic techniques to help isolate equipment problems. There are also later chapters on training equipment operators and



filling the role of the turf equipment technician. (It is interesting to note that the authors lament a similar situation in the US with a shortage of skilled turf technicians coming through.)

Although entirely black and white, the book has an extensive number of photos of actual maintenance facilities and equipment as well as drawings and concepts. The appendix contains a handy reference list of company websites, although many of these are US based. Likewise chapter nine concentrates on workplace safety, although a lot of the regulations pertain to US policy. 🌱

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## GCSAQ

**M**other Nature certainly unleashed her fury on south east Queensland in mid-November with Brisbane bearing the full brunt of the storms. GCSAQ members Keith Johnson and Daniel Breen and their respective staffs are to be congratulated on their hard work in restoring their courses following almost complete destruction. Many other supers and their clubs were affected as well and it again reinforces the resilient nature of golf course superintendents and staff as we constantly battle against the forces of nature, be it violent storms or horrific drought.

Our recent meeting at Indooroopilly Golf Club had a very healthy attendance of over 50 and a couple of interesting presentations by course designer Ross Watson and Dave Hanby (Hydro Pumping and Controls), followed by a Verti-Drain demo by Murray Swindles (Complete Turf Management). Indooroopilly business development manager Jon Mathias then enlightened us with the simplest personnel management system you could imagine and had the entire audience enthralled and asking for more.

An extensive course walk followed. As 'Indro' is in the middle of a course re-development it was a great chance to hear from designer Ross Watson in the flesh and on the course together with host super Charlie Giffard. An attentive group of over 20 toured the course admiring some of the works already completed and descriptions of what is to come.

Our annual golf day to raise funds for turf research was held at Glenn Beauclerc's Robina Woods Golf Club and was well attended with over 30 teams competing. Congratulations to Mark Hauff for his organisational skills on the day and Glenn and staff on the condition of the course.



**Immediate past president of the AGCSA Jeff Gambin (left) presents Doug Robinson with his GCSAQ life membership**

Winners of the day were Warren Green's Peregrine Springs Golf Club with Ben Cavanagh's Brisbane Golf Club team coming in second. Peregrine Springs' cause was certainly helped when club manager Graeme Nicholls holed a 90 metre pitch shot for eagle on the 3rd. Recent Simplot recruit Col Thorsborne, Randal McNeill and Dave Hanby picked up the nearest the pins and James King won the straightest drive. Old warhorse Penbo tried to lift his team but alas someone has to come last.

Lucky door prizes were then handed out thanks to the generous contributions of our trade members. Toro donated a Foley Dial Precision height bar which was picked up by Danny Brown (Royal Queensland GC), while Royal Pines superintendent Paul M(ow)clean scored four 800S series Toro sprinklers. Ray Duffy from Tru Turf donated the use of a greens roller and Michael Robertson from Logan City GC will now be rolling his greens for the next month.

The East Coast Renovations 'Dust Up' (a complimentary greens dusting) was snared by Richard Phillips from Ocean Shores, while Gainsborough Green's Brad Butler picked up a 5l jug of Heritage donated by Syngenta for the longest drive. Maxwell & Kemp donated two



**One of Gainsborough Greens' maintenance staff off for a hit after the recent storms**



**Royal Pines super Paul McLean looking smug with his Movember effort**

10l containers of Remediator as an NTP prize which was won by Ben Cavanagh.

We were finally able to catch up with Doug Robinson at the turf research day and Jeff Gambin had the honour of presenting him with his GCSAQ life membership. Jeff also took the opportunity while on the mic to educate a few of the golf club directors that were in the room! Jon Penberthy also gave us an update on research happenings at the QDPI&F and it is our intention to hold a GCSAQ meeting at Redlands in 2009.

**PETER LONERGAN  
PRESIDENT, GCSAQ**

## STA NSW



**L**ooking back on 2008, it was a big year for the NSW Sports Turf Association. The name change and new logo were well received and have set the direction for the association for the years to come.

Our final event for the 2008 was our Sportsman's Charity Luncheon which saw 200 people from the wider turf industry gather for a great day of entertainment and socialising. Many thanks to all the companies who supported the day and to those who attended.

This year's line-up included sports commentator and radio personality Ray

Hadley and Parramatta Eels tough man Nathan Hindmarsh. The most talked about presenter, however, was Professor Max Livingston from the UK. Max surprised many of our guests with his insight into the world of management and consultants and no doubt many were wondering why on earth he was presenting at all. It took a little while but they did eventually get it – Prof Livingston was in fact comedian David Cummings, a hoax presenter.

We are in full swing for 2009 and the events schedule kicks off on 17 March with our annual golf day which will be held at the

top class Magenta Shores on the NSW Central Coast. The day will also include a presentation by course manager Kenton Boyd who will focus on the environmental issues faced there. Booking forms are available on the website.

Best wishes to everyone in the industry for a happy, healthy and safe Christmas.

**GRAEME LOGAN  
PRESIDENT, STA NSW**

Well my tomatoes are going great, the birds are loving my daughter's strawberries and turf managers across the ACT and surrounding region will be enjoying the rain and the cooler weather we are experiencing at the moment. While it's a busy time for turfies, it's very quiet on the news front with no significant happenings.

One great positive, however, is the progress of the couchgrass trial being conducted at Royal Canberra Golf Club. TGAA committee member and Royal Canberra superintendent Michael Waring has been showing volunteers how to use a shovel and the site is almost fully prepped and ready for turfing, sprigging and line planting. By the time this goes to print I'd assume that all the dirty work will be complete and real trial work will be underway.

Some other great news is that the ACTEW Water Conservation Office has accepted a proposal put to them by the TGAA ACT to allow parks, sporting facilities and golf courses irrigation exemptions to help with the conversion of existing cool-season surfaces to warm-season turf varieties. This is a fantastic initiative and congratulations must be



The TGAA ACT has been able to gain irrigation exemptions for those Canberra turf facilities switching from cool-season to warm-season varieties

forwarded to all involved in lobbying to get this off the ground. Well done!

With Christmas just around the corner the apprentices currently studying at the Canberra Institute of Technology will be winding up their studies for another year. Those students in their final year of formal training will be in the running for the prestigious Living Turf - Turf Apprentice of the Year Award.

This highly sought after award is proudly sponsored by Rob Cooper of Living Turf. The

TGAA are very pleased to have Rob on board as a sponsor. The students interviewed for the award will be invited to a special dinner along with their families, with the winner announced on the night. Good luck to all apprentices involved! On behalf of the TGAA ACT I'd like to wish all a safe and happy Christmas. See you next year.

**BROCK WESTON**  
COMMITTEE, TGAA ACT

## TURF PRODUCERS AUSTRALIA - EXPO MARCH 2009

### CROWNE PLAZA HOTEL, MELBOURNE

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#### Tuesday 24th

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The year has certainly disappeared very quickly and I hope that the summer so far has not been too harsh on everyone. Our last meeting of the year was at Longford Golf Club, just outside Launceston, and a big thank you must be extended to superintendent Ricky Barr and the golf club for putting on such a great day. Also thanks to Dave Westall from Scotts for his attendance.

Construction of more water storage areas continues to be the main focus for many golf courses in Tasmania. With continuous below average rainfall figures, runoff water and recycled water is becoming very important for golf club survival.

Here at Royal Hobart Golf Club we have recently constructed a new 35 megalitre dam. The club has been receiving recycled water since October 2007 through the Clarence Recycled Water Scheme which is currently stored in a pond adjacent to the pump station. It only holds a capacity of 5M and due to limited supply of recycled water during the summer months is not large enough, which means the club has to use a combination of potable water and recycled water for irrigation.

To solve the high usage of potable water the club has just completed installing the new dam which means irrigation water can be gravity fed to the smaller pond and then pumped out onto the course. The total cost of the dam was \$98,000. The club received payment for the sand that was taken away before the clay was brought in to line the dam. The cost included a roadway into the dam site, all the automatic valving for transferring the



Royal Hobart is currently in the process of constructing a new dam

water and an irrigation system around the top wall of the dam to irrigate the outside walls for grass and native plant establishment.

The larger capacity dam will be filled during the winter months and combined with the weekly allocation off the Clarence Recycled Water Scheme will go a long way to securing the irrigation requirements for the club into the future.

Up on the north coast, work continues to progress on the construction of the second course at Barnbougle Dunes. Designed by US architects Coore and Crenshaw it is hoped that it will be completed come spring 2010. The new course will be completely public access and additional accommodation will at this stage consist of a small lodge style retreat of between 40-60 rooms.

The new course will be known as Lost Farm. The site on which it is being developed is a strip of coastal farmland which is surrounded by rugged sand dunes alienating it from the majority of the remaining farm. The dunes were stabilised with marram grass almost a century ago in an attempt to hinder their movement onto the arable farmland, which buried pastures in sand as a result of the prevailing coastal winds.

When stock would graze the land the animals would often venture into the dunes and become lost in the rugged terrain. When the farmhands later went to collect the stock and move them to alternative pastures, they would frequently spend hours searching the dunes for livestock that had found hidden paddocks that had been 'lost' among the dunes.

The second course, which is situated on the opposite bank of the Forester river will be set among more dramatic coastal dunes, which has been described by Coore and Michael Keiser (brainchild of Bandon Dunes in the US) as being "as good, if not better" than the site of the current Barnbougle Dunes course.

The project to date has five holes cleared and shaped. The irrigation main line was to be installed in early December with hydroseeding starting early 2009. We wish superintendent Phil Hill and his staff all the best with the project and look forward to regular updates of its progress. The TGCSA wishes everyone a very happy Christmas and a prosperous 2009.

**STEVE LEWIS**  
PRESIDENT, TGCSA

## TGAA WA

To address the ongoing shortage of skilled workers in the turf industry in WA, our association is supporting the development of a Workforce Plan through the Chamber of Commerce and Industry. This will be a strategic plan to deal with the labour force issues affecting all segments of our industry. Federal government funding is currently available for projects that support workforce development through the Workforce Innovation Program, the aim of which is to increase the pool of available skilled labour.

The University of WA turf research field day was held in November to provide industry partners with an overview of the recently established water-repellent soils project and an update on the turf renovation project. With the increased focus on water use efficiency in

turf irrigation, water repellence is an important turf management issue on the sandy soils of the Perth region. This study follows on from the three-year kikuyu research project that



The University of Western Australia recently conducted a turf research field day

investigated nitrogen fertiliser management and turf water usage.

The annual TGAA WA social event was well supported again this year, with about 80 members attending the Ford Ranger Cup match between WA and Victoria at the WACA in November. It was a good opportunity for members to catch up with each other in relaxed surroundings. We are most grateful to WACA curator Cameron Sutherland for hosting a ground inspection at the end of play.

Next year we are planning to hold the President's Breakfast at Kings Park in February, followed by a workshop on soils and drainage at Guildford Grammar School in April.

**PETER RUSCOE**  
PRESIDENT, TGAA WA

**W**ith the lowest rainfall for September/October in the state's history, Victorian superintendents are in for an extremely long summer with 3A water restrictions in place. If you are feeling the pressures of the drought, call a fellow colleague and share your problems – they are probably doing it just as hard.

It was great to see the Turf Research Day at Woodlands Golf Club with a full field of superintendents, trade members and guests. The course was in fantastic condition and full credit must go to superintendent Glenn Stuart and his team. The talk after golf was the coverage of pure bentgrass on the greens and it was a shame that Glenn couldn't make the day to hear his peers compliment the quality of the greens surfaces.

Overall winner on the day with 34 points was Mark Findlay from Sunshine Golf Club. Mark collects a \$2000 cheque to utilise on any turf registered conference. Without the support of our sponsor Bayer Environmental Science we couldn't offer such a great prize so the next time you are purchasing chemicals remember those who support your industry.

We have now allocated golf clubs to host our 2009 meetings and I would like to thank the entire VGCSA sponsor group for supporting the association in the coming year. The 2009 schedule is as follows:

- **Education Meeting** (23 February): Settlers Run (sponsor Nuturf)
- **Country Meeting** (6 April): Leongatha Golf Club (sponsor Globe)
- **VGCSA AGM** (26 May): Yarra Yarra Golf Club (sponsor Toro)



Settlers Run will host the first VGCSA meeting in 2009. Pictured is the 16th

- **Education Meeting** (24 August): Medway Golf Club (sponsor Active Safety)
- **Turf Research Day** (12 October): Commonwealth Golf Club (sponsor Bayer Environmental Science)
- **Christmas Function** (5 December): Huntingdale Golf Club

To all our trade members, letters have been distributed in regards to VGCSA sponsorship for 2009. I thank you all for your generous and continued support of our association. Our calendar will be delivered in December, so if any members do not receive a copy please contact one of the committee members and we will send one out straight away.

We are all busy with running of our own golf course, but at next year's AGM at Yarra Yarra Golf Club at least two vacancies will be available on the VGCSA committee. If you would like to be part of a committee that

has been running for over 80 years and give something back to the association that has supported you, please contact any committee member for further details.

On a final note, it was disappointing to see Michael Picken and Riversdale Golf Club part company in late October. Michael had given Riversdale 12 years of service during which time he implemented significant changes to the club. Michael spent 10 years giving his time to our association during this period and I was fortunate to get to know him on a personal level. Michael is a committed professional dedicated to the turf industry and we all wish him and his family good luck for the future.

**MICHAEL FREEMAN  
PRESIDENT, VGCSA**

**I**n contrast to the rain that has been making headlines elsewhere in the country, South Australia has remained very dry over the past few months. At the time of writing Adelaide was on track to record its lowest spring rainfall on record and many courses already have taken on the appearance that you would expect in late summer. We have seen a lot of potential rain-bearing systems moving through the state but we are yet to have one produce any significant rainfall. Most SA supers are preparing for a very long summer.

The SAGCSA was planning to hold a November meeting, however, availability issues with our proposed speakers has meant that we have had to postpone the meeting until early 2009. We are now aiming to have three

meetings between January and June 2009 and are working hard on securing interesting and relevant speakers for these meetings. Any suggestions on meeting topics would be welcomed by the SAGCSA executive.

Our sincere congratulations go to Wayne Hinton who has recently retired as superintendent of the Links Lady Bay Golf Club. Originally coming across the border from Victoria, Wayne has had a successful career as superintendent of both the Wirrina Cove Resort Golf Club and Links Lady Bay. Wayne also contributed to our industry at a national level and in 1994-1996 served as AGCSA president. We all wish Wayne a long and enjoyable retirement and congratulate him on his career.

We have had a few changes on the SAGCSA executive committee with the recent departure of Digby Grayston who is now working for T-Link in a sales capacity. Thanks go to Digby for his contribution to the executive. Digby held the treasurer position on the committee which Gary Day has now taken on while retaining the secretary role. Stuart Gillespie has assumed some extra duties by taking on the role of sponsorship coordinator.

As we all prepare for the festive season I would like to wish everyone a merry and safe Christmas and a prosperous new year.

**ANDREW BLACKER  
PRESIDENT, SAGCSA**



## GCSAWA

would firstly like to wish all GCSAWA, AGCSA and state superintendent association members a merry Christmas and prosperous New Year.

The GCSAWA committee is busy planning the 2009 Margaret River state conference to be held between 3-5 May with many local and interstate superintendents speaking about their golf courses and experiences. The interest and response from members has been very positive and we expect the couple of days of informal seminars and events to be very popular.

Details of this event will be sent out early in the New Year with costs kept to a minimum as per previous years, so please confirm your attendance ASAP as numbers will be limited. This state conference is also open to AGCSA members and details will be available through the AGCSA website in early January or February 2009.

The Golf Master's Cup is also planned for 2009 with more events in the south west scheduled and other courses that have not been played before. The prizes, networking opportunities and course inspections the Golf Masters Cup affords are exceptional so please make sure you bring yourselves along with your 2IC to check out the other courses around WA.

I must congratulate and applaud all GCSAWA members and sponsors who participated in 'Movember 2008' and putting up with a tickle under the nose for the month of November. The GCSAWA's registered team – Golf Mowmen – which comprised 10 clubs and trade sponsors raised a total of \$1200 for the Movember cause. There were lots of

**The GCSAWA's Golf Mowmen raised \$1200 during Movember**



amusing comments on the appearance of many participants, but as the saying goes sticks and stones may break the bones but names, even as harsh as some of them were, will never hurt us.

Perth has seen some unusually cool November weather with no maximums in the 30's which could be a first for at least 30 years. This has had a considerable impact on reducing our water use as November rainfall has been higher than average as well, with 70mm falling over nine days which has relieved the reliance on irrigation. Hopefully more rains can continue over summer to boost the dams and keep water use down to a minimum.

Congratulations to former Royal Perth 2IC Aaron Patrovski in his new position as superintendent at Nedlands Golf Club. Aaron takes over from Bill Kilmurray who has left after 20 years at the helm and we wish him all the best. In other news it was great to hear



**Collie GC super Darren Morphett got into the Movember spirit as well**

that the boys from Bunbury won the John Deere Challenge in New Zealand in what were described as bloody freezing conditions. We are still wondering how Devo managed to be there but he seems to be everywhere lately.

**DARREN WILSON  
PRESIDENT, GCSAWA**

## NSWGCSA

The Board of the NSWGCSA met at Carnarvon Golf Club on 24 November.

New members Ryan Fury (Killara Golf Club), Kenton Boyd (Magenta Shores Golf and Country Club) and Steve Jacobsen (Carnarvon Golf Club) are all settling into their positions and portfolios and are contributing some great fresh ideas that will continue to move our association forward in a positive direction.

The majority of our time has been confirming and finalising events for 2009 and at this stage the calendar for next year will include:

- Rube Walkerdon Trophy Day: 23 April
- 2IC Education Day: 25 May

- Annual Ambrose Event: 15 June
- NSWGCSA Annual General Meeting: 17 August
- NSWGCSA Education Day/AGCSA Workshop: September TBC
- Christmas Harbour Cruise: 2 December

Our final education day for 2008 was held at Concord Golf Club on 13 October and had communication and time management as its theme. A special thank you to course superintendent Mark Parker and club management for hosting the event. Presenters on the day included Mark himself, Gary Beehag (M. Collins and Sons), Graham Logan (ANZ Stadium), Craig Easton (Nuturf) and

Daryl Sellar from AGCSA. Once again our thanks must go to our joint sponsors of the day M. Collins and Sons and Nuturf for their great support of the event.

The final social event for the year was the always popular Christmas Cruise on 3 December. It was a great day and gave NSWGCSA members a chance to enjoy and relax on the best harbour in the world (no bias here!) before summer stresses really take hold of our lives. Have a safe Christmas and a happy New Year.

**CRAIG WRIGHT  
PRESIDENT, NSWGCSA**

# An easier way to deliver

a trusted solution against Kikuyu & Poa

Just add water



\*Product is not yet registered. An application is currently lodged with the APVMA.

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"The growing-in phase of a new golf course is critical and requires detailed planning, particularly when it comes to irrigation.

When the new Settlers Run Golf Course at Cranbourne was in the early stages of planning we had no hesitation in recommending a Lowara pumping system because of its better control, long term reliability and ease of maintenance.

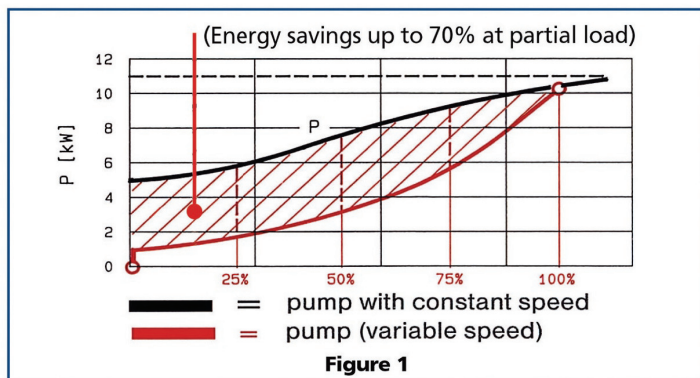
The Settlers Run pump installation incorporates 4 variable speed Hydrovars which are uniquely linked to Toro Irrigations' Sitepro software which delivers to the Superintendent precise information on the performance of the total pumping system, which is absolutely critical to the grow-in phase.

Combine that with Brown Brothers' exemplary after sales service and Settlers Run couldn't be in better hands."

**Brendan Graham, A&M Watering**

## How the Hydrovar reduces energy consumption.

Most applications involve the pump operating either along its full speed performance curve or the pumps performance is throttled or regulated by a valve. The Hydrovar eliminates these operating methods by regulating pump speed and hence output to match the system demand. This saves wasted energy traditionally lost in these conventional pump systems. Energy savings of up to 70% can be realized. (figure 1)



## What is Hydrovar?

Hydrovar has gained a reputation as THE pump mounted microprocessor pumping system controller. But it does much more than just change motor speed.

It actually manages the performance of the pump to match a wide range of system conditions and requirements.

Hydrovar is fully programmable on site as it incorporates the microprocessor and the variable drive in one compact and unique package

## How Hydrovar reduces maintenance cost.

Hydrovar software is designed specifically for centrifugal pump operation, control and protection. Hydrovar can thus be setup to protect the pump from operating under various unfavourable conditions eg. cavitation, operating against closed head, low NPSHa or operation past a pumps maximum flow rate. Hydrovar will automatically shut down and alarm if adverse conditions occur.

Hydrovar provides the Golf Course Superintendent with the flexibility of watering required with substantial savings on installation, power usage and maintenance. For details about the experience of some of Australia and New Zealands most prestigious Golf Clubs who have installed Hydrovar pumping systems, contact the Lowara distributors nearest you.

## What is Flowlink?

To assist green-keepers and Superintendents in the golf course, turf and irrigation markets, Lowara and TORO Irrigation teamed up together to develop a link between the Toro Sitepro software and Hydrovar.

The link operates with up to 4 Hydrovar pump systems and monitor running / fault conditions and measures pressure and flow of the pump system.

All these parameters are displayed on the central irrigation control computer

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