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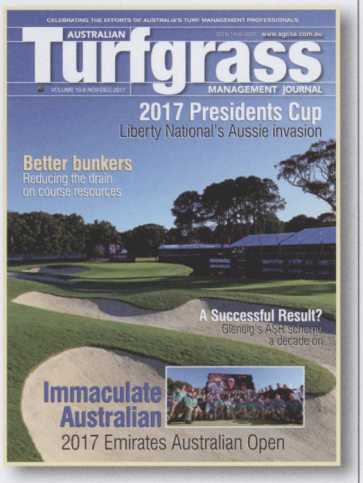

COVER

The Australian Golf Club: The 18th hole at The Australian Golf Club, host of the 2017 Emirates Australian Open. **Photo:** Brett Robinson, AGCSA.

Also in this edition...

Contributors to Australian Turfgrass Management Journal Volume 19.6 (November-December 2017)

Phil Beal (The Australian GC); Will Bowden (STANZ); Barry Bryant (SAGCSA); Mat Campbell (Numurkah G&BC); Vicki Crowe (PGA of Australia); Prof. Mike Fidanza (Penn State University); Russell Fletcher (St Michael's GC); Richard Forsyth (Royal Melbourne GC); Tony Guy (STA WA); Dean Hardman (Killara GC); Blaine Knox (Palm Meadows GC); Billy Koopmans (Ballarat GC); Todd Lowe (USGA); Steve Mallyon (Bexley GC); Craig Molloy (Cypress Lakes Resort); Mat Poultney (VGCSA); John Neylan (Turfgrass Consulting and Research); Kristy-Ann Pratsch (STA Qld); Daryl Sellar (Glenelg GC); STA Victoria; Mark Unwin (AGCSA); Bob Vavrek (USGA); Brian Vinchesi (Irrigation Consulting Inc.); David Warwick (Avondale GC).

Farewell to an industry staple

I was going to use this edition's column to wax lyrical about the plethora of movements and retirements the industry has witnessed in recent months. I was going to kick off by lauding Tom Parker for signing off after 20 years as Sydney Cricket Ground curator, just the eighth in the ground's 160-year history. I was going to say how refreshing it was to read his comments about the inflated expectations of those involved in the modern game and the resulting pressures he faced in such a high profile role which had, unfortunately, detracted a little from the love he had for the job.

I was then going to commend Royal Sydney Golf Club on its decision to promote Adam Marchant to the role of course superintendent, just three weeks after the surprise announcement that Steve Marsden was departing in early 2018. While there was no doubt pressure to cast the net far and wide to find a replacement, it was fantastic to see the club promote from within and back a hard-working lad from Mudgee who has developed into one of the industry's finest. And finally, I was going to ponder some of the questions I'd fire at Gary Dempsey after he recently revealed his impending retirement as NSW Golf Club superintendent next July. Finishing what will be one year shy of 30 years at the La Perouse coalface, I'm sure the 'exit interview' will elicit some classic tales and industry home truths.

All this, however, was put to the side when news filtered through in late November that the industry had lost one of its true standard bearers. This time, however, it wasn't another superintendent or curator, rather a publication that had become an important part of the fabric of the Australian turf industry for the past three decades.

In the November-December 2017 edition of TurfCraft International, long-serving editor Alastair Dowie revealed that it – the magazine's 177th – would be the very last. Owners Fairfax Media were closing the publication down. It was certainly a sudden and very sad way to end such a distinguished tenure and as a fellow journalist and editor I can only imagine how difficult it would have been for Alastair to pen his final editorial.

Being an editor of a small, niche industry publication like ATM or TurfCraft is unique. Just as a superintendent or turf manager develops an affinity for their patch of turf while in charge, as an editor it is also hard not to become personally invested. For the past 20 years TurfCraft International was Alastair's and he successfully built on the solid foundations laid by outspoken predecessor and founder Ted Drinkwater. Under Alastair's editorship, the magazine continued to steadfastly deliver on its original remit of being "a national forum for the interchange of knowledge between all elements of the recreational turf industry".

One of the things the Australian turf industry prides itself on is its fraternal nature and the manner in which it works together for its betterment. While TurfCraft may have been a rival (trust me, on more than a few occasions over the years I would let rip with a few expletives upon discovering Alastair had scooped ATM), at the end of the day both publications always had the same principal focus and motivation – to acknowledge, promote and highlight the efforts of the industry and its skilled practitioners.

Through the pages of TurfCraft International, Alastair was a passionate advocate for the industry and provided a vital medium through which members could tell their story. Its breadth of coverage of all sectors of the turf industry can only be admired and the abruptness of its departure leaves a significant hole. The passion and pride it always carried for the industry could never be questioned and to Alastair we indeed owe a great debt of gratitude. His presence, and that of the TurfCraft International masthead, will be sorely missed.

Brett Robinson, Editor

MARK UNWIN, AGCSA CHIEF EXECUTIVE

Getting down to business as busy 2018 schedule looms

AUSTRALASIAN TURFGRASS CONFERENCE & TRADE EXHIBITION WELLINGTON 2018

For many, this will be my first opportunity to introduce myself after joining the AGCSA as chief executive in late September. Over a busy first few weeks I have had the opportunity to meet a number of members and supporting partners, during which time I've seen and heard some great success stories and also learned what a challenging time the past few months have been.

This is also my first opportunity to publicly thank the AGCSA team, members and those in the industry for the warm welcome I have received, and to the Board for their support in appointing me to be a part of this industry-leading association. The coming weeks and months will be spent meeting as many members, partners and industry supporters as possible, continuing to develop a more in-depth understanding of the industry and commencing working through planning for 2018. The AGCSA has a long and proud tradition of leading the development of initiatives, research and information to support its members and these remain areas of focus for myself and the team over the coming year.

As mentioned, it has been a challenging few months weather-wise, with variable weather conditions in the early weeks of Spring creating a few headaches for superintendents and their teams. Queensland experienced its lowest monthly rainfall in over 15 years, while in New South Wales and the Murray Darling region as a whole, September rainfall was the lowest on record. Quite the opposite was experienced for others throughout WA, some coastal regions of SA and Victoria and parts of Tasmania, who saw a wetter than average September and October.

Following on from low rainfall and some of the warmest winter temperatures on record across parts of Australia, there is now the prospect of facing a hot summer with the dual issues of low dam levels and next to no existing soil moisture. It is worth noting that among all the discussions I have had with superintendents, such challenges were being meet with an approach of simply getting down to business and working through it, which is a testament to the people we have in this industry.

PROMOTING THE GAME, EDUCATION

Over the last few weeks I have also spent time with the PGA of Australia, Golf Australia and Golf Managers Association examining the approach and challenges for golf in Australia over the next few years. We discussed the importance of all areas working together toward a common objective of promoting the game of golf and those who work in the industry.

On the topic of those employed in the industry, planning and preparations are well underway for the inaugural **Australasian Turfgrass Conference and Trade Exhibition** in June 2018. In what will be an industry first, the AGCSA has partnered with the **New Zealand Golf Course Superintendents Association (NZGCSA)** to expand the reach of this industry-leading event further throughout the Pacific region.

To be held in Wellington, New Zealand from 24-29 June 2018, the conference promises to be an event not to be missed. I know many of you have expressed great interest in the event being staged with the NZGCSA, as it allows for a wider range of presenters, topics and significantly increases the event's exposure to a worldwide audience.

As a brief overview, a range of international and local speakers has been lined up, coupled with guest presenters and extensive educational programmes, not to mention a series of expert

panel discussions and workshops across a variety of course management, sports turf, leadership and climate related issues. Make sure to check out the dedicated conference website – **www.atc2018.com** – for further details and register to take advantage of AGCSA member Early Bird specials.

The AGCSA has also recently spent considerable time in discussions with a range of industry and education bodies to ensure alignment at a national and state level regarding the level of education provided across turf related courses. The work and commitment coming out of these sessions has been great and our aim is to continue this to safeguard the quality of education provided to the turf professionals of tomorrow.

Continuing on the education theme, some of the preliminary discussions undertaken with various industry bodies have been with a focus on putting programmes in place to ensure the role of superintendents (and their teams) is recognised for the value they bring to the game. Additionally, that appropriate development and education pathways are made available to superintendents, assistants, 3IC's, groundstaff, technicians, turf managers and all other associated roles in order to provide a platform to enable continuous learning and development.

This is a priority of the AGCSA heading into next year and we will continue to work with members, partners and the state associations to deliver this programme of work. More information will be available early 2018 as these discussions and our approach evolve.

The final few weeks of this year will see the AGCSA focused on finalising events and activity plans for 2018. Following tremendously successful events in regional Victoria and NSW, we will be expanding our free 'walk 'n' talk' sessions to more states and courses across regional and metro areas, as well as rolling out health and wellbeing and business networking sessions in conjunction with supporting partners.

Also in the pipeline for 2018 is a range of increased member services, including environmental initiatives, governance and compliance, and education and professional development seminars. We will continue to ensure the delivery of these sessions is planned to reach as many members as possible and will keep you updated through ATM, The Cut and the AGCSA website.

In addition to continuing (and expanding) our agronomy and research programmes, industry representation and updates to Best Practice initiatives throughout 2018, the AGCSA will be actively working with members for ways we can assist you further. If there is anything you would like to discuss or feel the AGCSA should be providing, please don't hesitate to get in touch with myself or the AGCSA team.

It certainly has been an interesting first few weeks.

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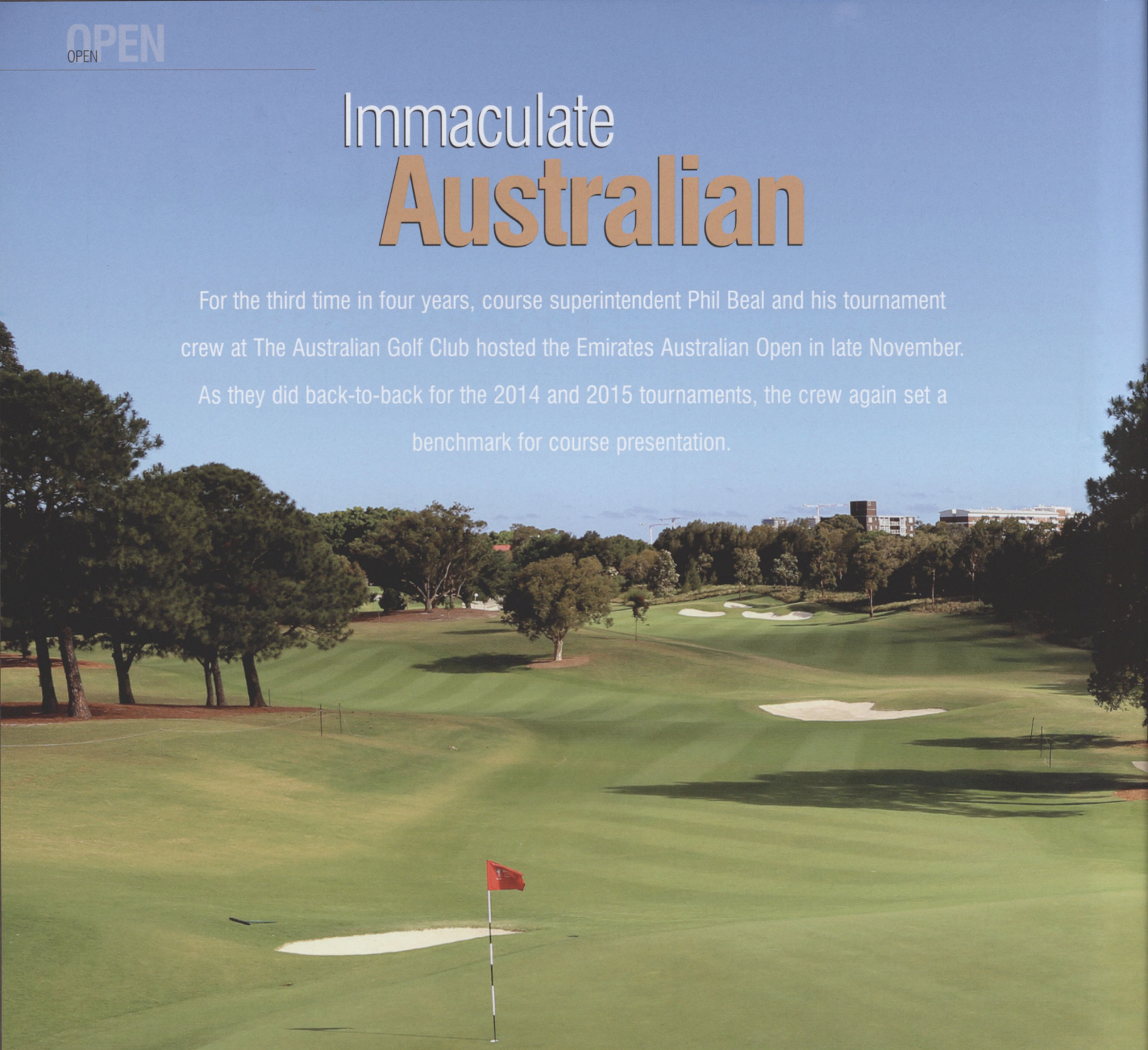
Immaculate Australian

For the third time in four years, course superintendent Phil Beal and his tournament crew at The Australian Golf Club hosted the Emirates Australian Open in late November. As they did back-to-back for the 2014 and 2015 tournaments, the crew again set a benchmark for course presentation.



Phil Beal is the first person to admit that he has a tendency to get a little tense when an event like the Emirates Australian Open lands in his back yard. No surprise in that really. The collective eyes of the golfing public, the players, the media, worldwide television audiences and, of course, the members are all on you. Your skills as a course superintendent are under the microscope for four physically and mentally exhausting days.

Come the Saturday before the tournament's 102nd instalment in late November – the 20th occasion The Australian was hosting it – Beal found the tension levels rising for a very different reason. It had nothing to do with the weight of expectation or the turf surfaces. All that was well in hand. Rather, it was the gentleman who'd just come into his office and was now sitting on the other side of the desk who was giving Beal cause to stress.

Josh Cuch (those who know him will probably be laughing about now) is, well, a character. The Australian Golf Club's larger than life turf equipment technician is an ideas man and in the weeks preceding had been in his boss's ear about doing something different when welcoming this year's crop of Open volunteers – all 30 of them – at their first gathering on the Saturday.

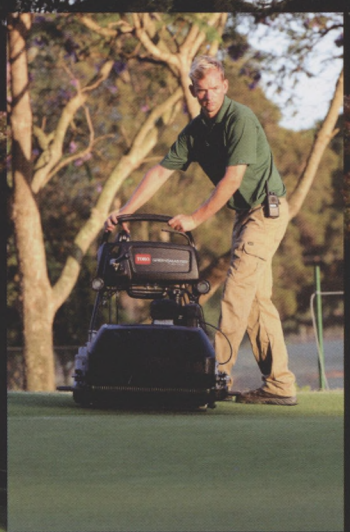
Cuch had it all choreographed – Beal, along with assistant superintendent Dave Smith and 3IC Chris McCulloch, would make a grand entrance to music – and with the volunteers having just arrived at the maintenance facility it was show time.

Beal, ever the demure Englishman, was having none of it. A few minor things hadn't gone to plan that day and when Cuch purposefully strode into the office and asked "Right! What music do you want?", Beal turned to him and said bluntly, "I'm not doing it." Cuch ignored him and continued talking animatedly about it to Smith and McCulloch before Beal interrupted and reiterated, "Josh, we're NOT doing it!"

WA volunteer Daniel Breadmore cuts the approach on 16

WORDS AND PHOTOS: BRETT ROBINSON

Few could fault the conditions presented at The Australian Golf Club for the 2017 Emirates Australian Open. Headline act Jason Day described the efforts of superintendent Phil Beal and his crew as "phenomenal"



The Australian's Steve Croucher cuts the 2nd green at 2.8mm

Cuch isn't one to give in easy, however, and had one final trick up his sleeve. Upon looking up, Beal caught the eye of a now somewhat emotional 6'5" turf tech – Beal swears there were a few tears welling up – and knew he was done. "How the hell can ANYONE live with you Josh! Fine, let's do it!" Score!

A few moments later a rather sheepish looking Beal, Smith and McCulloch were walking the few metres from their shared office to where the volunteers had assembled inside the maintenance facility. The unmistakable opening bars from Survivor's 'Eye of the Tiger', made famous in the film Rocky III, were blaring out of the stereo and there grinning, laying down a shroud of CO_2 gas from a fire extinguisher, was the mastermind Cuch himself! Tournament preparations could now commence.

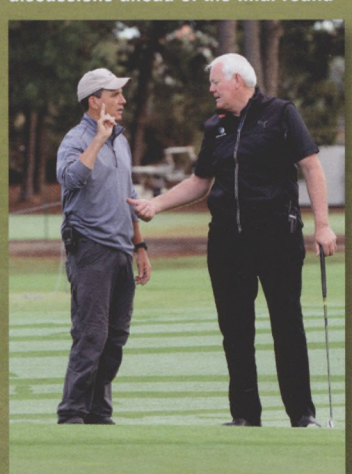
"It was brilliant," reflects Beal seven days later from his office as the third round of the 2017 Emirates Australian Open is in full swing. "I was a bit stressed that day – the most I had been for the whole week – and I just didn't want a bar of. But it was the best thing we could have done. Everyone just fell about and loved it. It was a great way to break the ice and it set the tone for what was a fantastic week."

ON POINT

The 2017 Emirates Australian Open was The Australian's third in four years and Beal will attest to the notion that the more you do something the better you get at it.

While the playing surfaces presented in 2014 and 2015 were top notch, this year it was about learning from those past tournaments and getting everything on point before the circus rolled into town. Whether it was better coordinating the volunteers, not pushing the crew as hard or just being more in control of where his turf surfaces were at, there was definitely a more relaxed and seamless feel to preparations this time around.

Phil Beal (left) and tournament director Trevor Herden deep in discussions ahead of the final round



Open volunteer Trevor Ridge shaves the 7th fairway at 8mm

The Australian 3IC Chris McCulloch monitors moisture levels on the 2nd green during final round preparations

As Beal describes it, the way the course presented this November was "different" to versions 2014 and 2015. The roughs for a start were vastly different, almost non-existent. Having learnt from the pain of previous tournaments, where promoting the roughs beforehand made the course almost unplayable for members post-tournament, Beal deliberately didn't try to push any growth. Combined with what he suspects was a bit of couch mite damage and dry conditions, the roughs presented somewhat brown for the tournament. Beal admits he actually preferred the look and reckons it gave the course "a gnarly" look on its flanks.

Most pleasing for Beal, however, was the presentation of the Santa Ana couchgrass fairways. Cut at 8mm, down from 10mm at the last Open, the aggressive attention they received as far back as last December made them the talk of the tournament. So tight and pure were they, that it even prompted Golf Australia to post on Twitter – "It's very rare that fairways are in such good condition that they can be cut to 8mm. But that's what we have right now #AusOpenGolf #Mint."

Tournament headline act Jason Day, was also in high praise of the surfaces. After Wednesday's Pro-Am he commented: "The course is in great shape; the superintendent and his staff have done a phenomenal job getting the course ready."

"They were sensational," says Beal. "I think we took the presentation of the fairways and greens surrounds up another level this tournament. They were a lot firmer than in the past and we had some great feedback from the players and tournament officials. It is something we have worked on since the course redevelopment and hosting the 2014 and 2015 tournaments. Every year we've been going very hard on them – not the most popular decision with the members – but you could see out there this year it has really paid off.

"Last year we bought a Koro field topmaker and put some scarifying units on it and went really hard in December which I feel really helped achieve the density and firmness we were able to get during the tournament. Then in September, as part of our normal renovations, we went back out and put the verticutting heads over them, scalped them down 6-8mm and topdressed heavily. They took a long time to come back but I think we nailed it with what was presented.

"We didn't apply any Primo to the fairways this time. We had used Primo in 2015 and they were sensational and I really thought I needed to get some applications out again this time around. But it was too cool and the grass just seemed to be under control anyway – it just did its own thing. We foliar fed when necessary and by two weeks out we knew we had them right so we just left them as they were. We cut them at 8mm for the first time and the tightness and firmness we achieved was pretty cool.

"The only thing I didn't nail, again, were the tees. Every tournament I have struggled with the tees and it's fair to say they're driving me nuts. I don't know what's going on. It's a different grass – Grand Prix couch – and I think maybe I need to do a bit more homework on it, maybe see what some of the guys down in Victoria do. We do get a fair bit of ERI-type disease through them and it's not for the lack of preventatives. There's something that I'm obviously missing and need to adjust."

CONTINUED ON PAGE 11

The par three 15th gets one last trim before the final round

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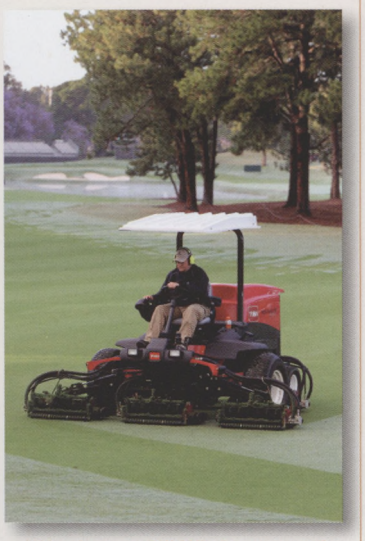
AT A GLANCE - 2017 EMIRATES AUSTRALIAN OPEN – THE AUSTRALIAN GC

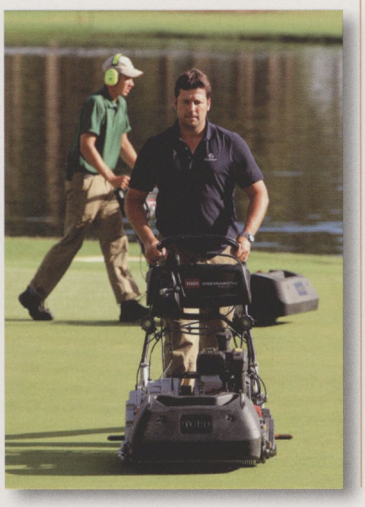
The Australian's 3rd hole with the par three 4th green across the water



UK volunteer Bill Whybrow cuts the 16th fairway

Toro's customised Workman livery for the 2017 Australian Open

Volunteer Stuart Gill (foreground) and Australian GC crew member Thomas Meunier cut the 17th green



THE CREW

- **Superintendent:** Phil Beal (turned 50 in July). Appointed superintendent of The Australian GC in September 2010. Prepared the course for the 2014 and 2015 Emirates Australian Opens.
- **Assistant superintendent:** Dave Smith.
- **3IC:** Chris McCullough.
- **Spray tech:** Jacob Smith.
- **Head horticulturalist:** Mathew Kappos.
- **Turf tech:** Josh Cuch.
- **Staff:** Six qualified greenkeepers, three apprentice greenkeepers, three casual greenkeepers, three horticultural crew members.

THE VOLUNTEERS

Thirty volunteers assisted The Australian crew for the 2017 Emirates Australian Open. Among the volunteers were:

- Three superintendents – **Stuart Gill** (Terry Hills G&CC, NSW), **John Nelson** (Grafton District GC, NSW) and **Andrew Lothian** (Fox Hills GC, NSW).
- Two from England – **Simon Wells** (Pyecombe GC) and **Bill Whybrow** (Garon Park GC). Wells and Beal are friends from their school days and were each others Best Man at their weddings.
- Three past employees of The Australian GC – **Dean Hardman** (assistant superintendent, Killara GC, NSW), **Peter Blain** (foreman, Royal Canberra GC, ACT) and **Gary Clark** (assistant superintendent, Eastlake GC, NSW)
- Four greenkeepers from Perth – **Daniel Breadmore** (assistant superintendent, Mosman Park GC, WA), **Lance Knox** (foreman, Mount Lawley GC, WA), **Tom Tristram** (retic/spray technician, Hartfield CC, WA) and **Jonathan Nash** (apprentice, Sea View GC). Furthest volunteer from the north of Australia was **Nathan Lindsay** (assistant superintendent, Hamilton Island Golf Club, Qld) and furthest from the south of Australia was **Shannon Toyne** (assistant superintendent, Geelong GC, Vic).
- Other golf clubs represented – Royal Melbourne, Metropolitan, Kooringal and Club Mandalay (all Victoria); The Lakes, Royal Sydney, Penrith, Bermagui and South West Rocks (all NSW); Pacific Harbour and Sanctuary Cove (Qld).

THE COURSE

- 6589 metres, par 71 (1st hole played as a par 4)
- **Greens:** Penn A1/A4 creeping bentgrass.
- **Surrounds:** Santa Ana couchgrass.
- **Tees:** Grand Prix couchgrass.
- **Fairways and roughs:** Santa Ana.
- **Total maintained area of fine turf:** 47 hectares.
- **Bunkers:** 77
- **Course changes since 2015 Open:**
  - New 4th championship tee installed;
  - New fairway bunkers installed LHS 7th fairway and RHS 12th fairway;
  - Behind the 13th green, surround extended and turfed with new landscaping;
  - 11th RHS greenside bunker and surround reshaped; and
  - 16th and 17th fairway joined by the lake.

THE PREPARATION

- **Greens (2.8mm):** Double cut morning. Tournament Stimpmeter readings: 11.5-12 feet.
- **Tees (8mm):** Single cut (stripe pattern) morning.
- **Fairways (8mm):** Single cut (stripe pattern) morning.
- **Roughs (44mm):** Not cut during the tournament.
- **Bunkers (77):** Full rake every morning (two teams of six staff).
- **Turf management:** Regular foliar fertiliser applications were applied to all fairways, surrounds and tees leading up to the tournament. Renovations on fairways and tees began early September and included scarifying and applying amendments. Fairways were also topdressed in late September. Greens aerified with ½" hollow tines, core holes removed, topdressed and soil amendments applied first week in September. Ongoing foliar nutrition, Primo and preventative fungicide/insecticide programme to greens in lead-up. No Primo applied to fairways.
- **Machinery: Greens:** 6 x Toro Greensmaster Flex 2120 walk-behind mowers; **Collars:** 2 x Toro Greensmaster 1000 walk-behind mowers; **Fairways:** 4 x Toro Reelmaster 7000D units; **Approaches:** 2 x Toro Reelmaster 3550D units; **Surrounds and step cut:** 2 x Toro Reelmaster 3100 units; **Tees:** 4 x Toro Greensmaster 1000 walk-behind mowers; **Transport vehicles:** 26.

CONTINUED FROM PAGE 8

Mother Nature too played her part for the tournament and Beal readily admits their preparations were aided significantly by the weather. Despite a sodden Pro-Am on the Wednesday, conditions for all four tournament rounds were perfect, with the wind raring its head a little to provide some defence of the course. The greens were a little soft on the Thursday thanks to that rain and the scores reflected that, but as the course dried out there was ultimately just a three shot difference between the leading score after round one and Cameron Davis' championship-winning total of 11-under.

"I was very happy with the greens," states Beal. "Every year beforehand I think they'll beat the place up and maybe they do for the first round, but then the course comes into its own. We definitely jagged the weather this year and Chris (McCulloch) and Dean (Hardman) did a great job hand watering to keep moisture levels where we wanted them.

"They were a little soft for the opening round, but after that they were great and rolled to a speed that (tournament director) Trevor Herden needed (mid to high 11s) and they didn't shift all weekend. One thing I like to do is go out after each round and look at the greens and have a bit of a putt on them. It was so pleasing to see there was very little difference from the morning, with the putts still tracking beautifully and rolling true.

"We renovated the greens in the first week of September and went quite heavy with the sand, dusting every 10 days until about 2.5 weeks out. They took a while to come back. It was fairly dry and windy during that period and I think I missed a trick on the higher areas. We didn't have the moisture levels quite right and you could see the core marks in a few of those areas during the tournament. But I deliberately didn't push them – you're just wasting your time. If you fertilise them they just thatch up and you get to a place where you don't want to be.

"We double cut every day at 2.8mm and didn't have the rollers on them at all. I'm not a great advocate of using rollers on these greens. I just feel that it irons them out and the grass just stays there – it looks lazy. While you get greater speeds, to me you lose the consistency and I don't like that."

Now the assistant at Killara, Dean Hardman returned to his former club to assist with handwatering greens during the Open

The 12th looking a picture. A new fairway bunker on the right hand side further towards the green was installed in between the 2015 and 2017 Opens

ON AND OFF COURSE

While the presentation of the course was a little different this time around, there were also a few other subtle differences both on and off the course. A new championship tee (which had actually been constructed ahead of the 2015 Open but which hadn't got up in time) was in play on the par three 4th, while a new right hand side fairway bunker on the short par four 12th saw plenty of action by snaring wayward drives.

Down in the shed Beal also had to contend with a few staff changes. Just a month out from the tournament 3IC and spray technician Dean Hardman departed to take up the assistant superintendent role at Killara Golf Club, while earlier former senior staff Peter Blain and Gary Clark, both part of the 2014 and 2015 tournaments, had moved on to new roles at Royal Canberra and Eastlake respectively.

There was also a change during the tournament itself. No sooner had the players finished their third round, a nine-hole corporate event teed off on the back nine around 5pm. Modelled on similar events at overseas tournament, it is believed that this is the first time such a feature has been trialled during the Open. While given plenty of warning about it, Beal's initial reaction wasn't exactly positive, but as it transpired there was little disruption to their normal afternoon routines which included tidying bunkers, divotting and hand watering. The crew worked in tight behind the last group and despite having to go back and hand water some greens, the event provided no concerns.

Changes in personnel and a few minor tweaks on course aside, the biggest change to Beal's operations since the last tournament came with the construction of a new satellite maintenance compound. After more than six years of planning, the first of a two stage project to upgrade The Australian's tired maintenance facility was completed in September, with the second stage, which will see the existing facility demolished and rebuilt, due to get underway in early 2018.

The new satellite facility, located in between the 5th and 6th fairways and about 200m further into the course from the existing facility, contains 400m^2 of machinery storage, a washdown bay, fuel tank and refill area, a chemical storage and handling facility, a fertiliser store, water treatment facility and five sand bays. It means The Australian no longer has to store equipment out in the open and once the second stage is constructed – it is hoped the crew will be in their new digs by next November – the club will have a shed befitting its stature.

"The construction of the satellite facility has been fantastic," says Beal. "We don't have a lot of space and splitting the maintenance facility isn't ideal, but it works for the limited space that we have and has already made a huge difference.

"It has been a long process to get to this point, including a lot of discussions with the members and with the committee. We had days where the members could come through the shed, have a BBQ and view the plans which we had on display. As soon as they saw the existing facility I think the majority realised that it needed doing.

"A project like this costs a lot of money and it's a massive investment for the club. It's fantastic that they have committed to doing this especially considering there's still stuff to do in the clubhouse. But the club realises the importance of having good facilities for the staff in order to keep the high standards we strive for out on the course."

The real winners – the 2017 Emirates Australian Open tournament crew with Scott Cowell holding the coveted Stonehaven Cup

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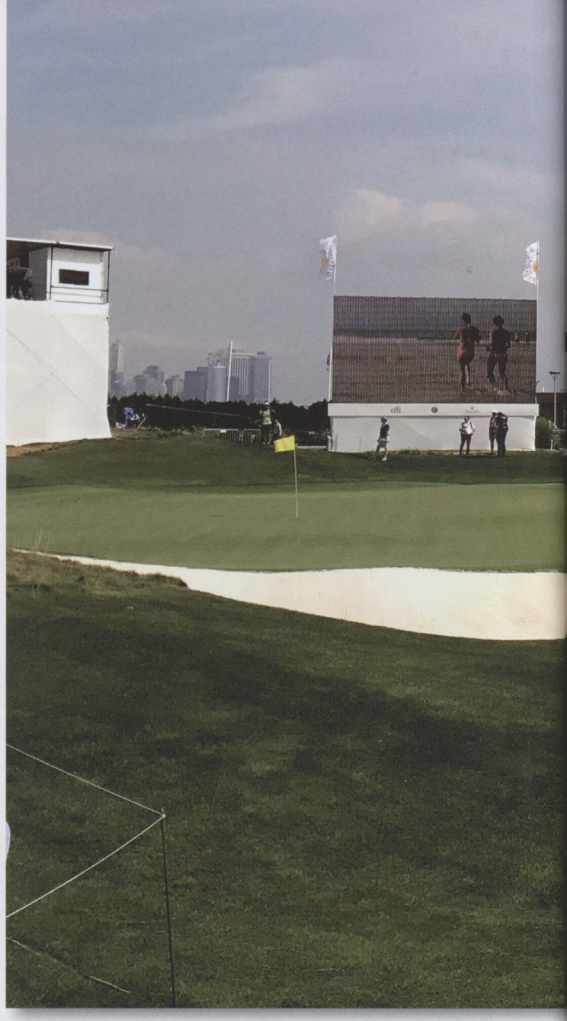


2017 will be a year that 2016 AGCSA Graduate of the Year Award winner Billy Koopmans will not likely forget in a hurry. A nine month Ohio internship at Liberty National Golf Club culminated in the 2017 Presidents Cup where he was one in a small army of Aussies assisting with tournament preparations.

Above: Billy Koopmans (left) with fellow Aussie intern Brad Foster (centre) and Presidents Cup volunteer Keegan Mead

As an experience of a lifetime has come to an end and quite possibly the most intense nine months of my life, it has been great to finally reflect upon how fortunate I have been this past year. From January to the start of October I was enrolled in the Winter School for Turf Managers at the University of Massachusetts, attended the Golf Industry Show in Orlando, toured Toro's manufacturing facilities in Minneapolis and finished it all off with an exhilarating internship at Liberty National Golf Club, home of the 2017 Presidents Cup.

After receiving the AGCSA Graduate of the Year Award at the 2016 Australian Turfgrass Conference in Melbourne, I was determined to make the most of the opportunities that would come from it. I had always wanted to experience what all the hype was about in the US, so applied for an internship through The Ohio Program. I struck up a great relationship with programme manager Mike O'Keeffe and was blown away when he informed me I had successfully landed an internship at Liberty National, especially considering it was hosting the Presidents Cup from 26 September to 1 October.

My first impressions upon arriving at Liberty National, located in New Jersey, were just as I expected – absolutely awesome! One side of the course overlooks New York City, the other the Statue of Liberty. As spectacular as these backdrops are and for which the club is renowned, it really was the course itself and the incredible turf surfaces that stood out and something I came to appreciate fully during my time there.

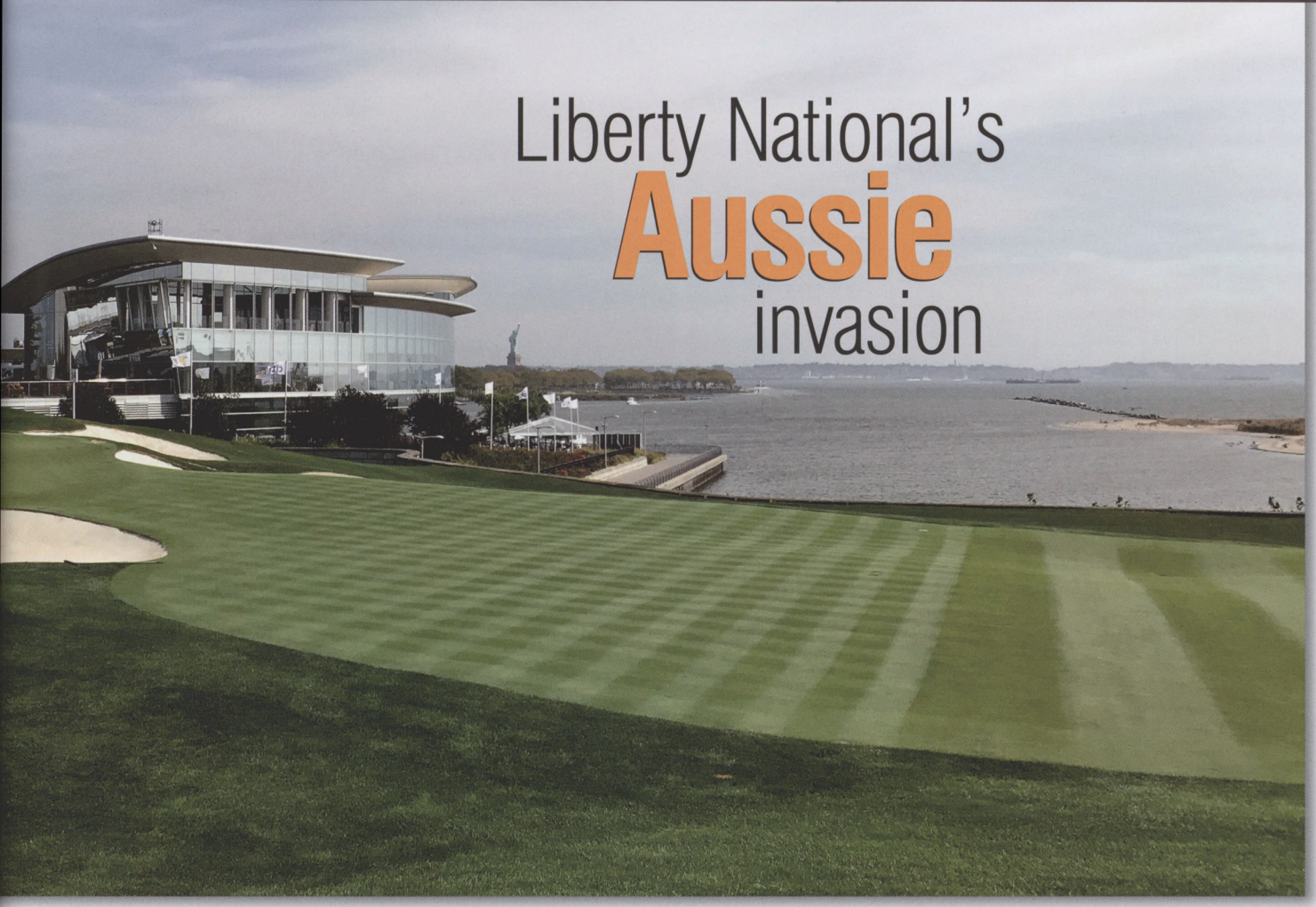
In charge of operations at Liberty National is course superintendent Greg James who is as good as they come. He is highly respected in the US and has earned every bit of it. Greg has been a turf manager since the age of 14 and has slowly but surely worked his way up through the ranks. Greg oversees a team of 30 at Liberty National that comprises three assistants, one mechanic, three interns (of which I was one along with fellow Aussie Brad Foster from Merimbula, NSW) and 22 seasonal staff (Guatemalans).

One of the things I loved most about Greg was that he wasn't about working 80-90 hours a week every week. It was all about balance. Instead, he liked us just to work a normal week, enjoy our weekends and only do extra when it was required. I learned many things from Greg and have taken that knowledge back to my day-to-day life since returning home.

NO LIBERTIES TAKEN

Having served my apprenticeship at Ballarat Golf Club in Victoria, I'm pretty accustomed to cold weather during winter, but arriving at Liberty National and being greeted by a foot of snow and -10°C temperatures was quite a shock. It wasn't the worst thing in the world though and I quickly got to have my first ever snow plough experience, moving snow and salting areas to prevent black ice from forming. After a week or two of adjusting to the cold and watching the snow slowly melt, I finally got a chance to check out the course properly. It was still

Liberty National's Aussie invasion



closed for a few more weeks and all the seasonal guys were in to get the course ready for the golfing season ahead.

Once the season started and the course had been fertilised and greens sprayed (not to mention cleared of all the geese crap), as the weather warmed up attention turned to renovations. This took a few weeks to complete due to the meticulous process of aerating, processing the cores, rubbing the remainder of the cores in, picking up the leftovers (thatch), then topdressing and rubbing in one more time.

After this the turf really started to perk up and the season was well and truly underway. It was quite a privilege to work at a course as high profile as Liberty National and it was not uncommon to see some big name celebrities such as Mark Wahlberg, Ray Romano and Justin Timberlake teeing up regularly alongside some of the biggest names in NBA, NHL, MLB and NFL.

Due to the hot, wet climate in New Jersey, disease pressure was always through the roof. Liberty National has A4 bentgrass greens, L93 bentgrass tees and fairways, Kentucky bluegrass roughs and a blend of fine fescues in the natural rough. Spraying was an integral part of turf management operations and one of the main jobs during my time there was 'spray-hawking' greens.

This walk-behind sprayer was preferred over a conventional boom sprayer due to its reduced weight and also more effective coverage. I was one of the interns who formed part of the 'spray team' and we would go out with fungicide applications every 12-17 days on all surfaces (including greens and approaches, tees and rough fill-ins). This was accompanied by insecticides, fertilisers, wetting agents and herbicides when needed. A fertiliser application was also made after every topdress (usually every 3-4 weeks) and additional sprays were carried out if anything unexpected popped up.

The Toro irrigation system at Liberty was extremely complex and with more than 5000 sprinklers across the entire course there were plenty of things to keep an eye on. I was lucky enough to be one of the team members to problem solve and fix anything that went wrong. This included anything from a broken solenoid, foot valve, pilot valve or O-ring, through to ensuring the contractors

CONTINUED ON PAGE 17

Liberty National Golf Club, home to the 2017 Presidents Cup, was also home to 2016 AGCSA Graduate of the Year Award winner and Ohio intern Billy Koopmans

The Presidents Cup crew at Liberty National numbered an impressive 130, including 12 from Australia

LIBERTY NATIONAL OPPORTUNITY KNOX TWICE FOR BLAINE

Just under two years since my last day as an Ohio State University intern at Liberty National Golf Club, I found myself on a plane heading back to New York for the 2017 Presidents Cup. The week that proceeded will definitely go down as one of the most memorable and rewarding experiences of my life. Upon arriving on the Saturday night before the tournament week, I managed to get a quick glimpse of the course on our way out to a volunteer dinner. As soon as I saw it I couldn't wait to get out there the next morning.

After meeting fellow Aussies and Liberty National interns Brad Foster and Billy Koopmans, I grabbed a hose and helped them out touching up some dry spots on the bentgrass fairways and in the bluegrass roughs (something I was very familiar with during my time at Liberty back in 2015). As the day went on, all the great memories came flooding back and it felt like I'd never left. I still don't think you'd ever get used to how surreal it is to be casually going about your work and looking up to see the sun rising over the Manhattan skyline or the Statue of Liberty.

At the orientation I was blown away to see the amount of staff on the agronomy team – 130 in total – and all of them beaming at the chance to get out there and be part of preparing an immaculately manicured facility for an event that would be viewed by a massive worldwide audience. The first couple of days were basically putting all the finishing touches on the place – edging cart paths, snipping, lake clean-ups – as well as the normal watering crews which I was generally a part of.

One of the biggest things I took away from the week was watching how everything was orchestrated to perfection by superintendent Greg James and assistant Jesse Dowdy. There were never any signs of rush or stress and that flowed through the whole team. Everyone just swept through the course knowing exactly what was required of them.

My morning job was rolling the greens using, somewhat uniquely, a water-filled roller. The rollers were Paul Latshaw's concept from Muirfield Village where Presidents Cup agronomist Paul Vermeulen does the Memorial tournament each year. Paul likes them as you can adjust weight for the conditions and control speed more, with the added benefits of no scuffing or bruising of the leaf that can sometimes happen with a ride-on roller.

The rollers were filled about a quarter, measured six inches from ground to plug. This weight was established after having them half full earlier in the week and increasing green speeds a bit more than what was needed. We were very carefully instructed to mark out every run with a water bottle, even if we could see where it was, to ensure there was no room for error and every green was rolled exactly the same way to keep speed and firmness consistent.

On the last morning of the tournament I'd be lying if I said I wasn't a bit sad that it was almost all over. I think most of us felt the same. The whole crew got together for a team photo on the 14th hole which runs alongside the Hudson River with the glamorous clubhouse and one of those breathtaking Manhattan sunrises in the backdrop. After our final round preparations, we finished off by having a couple of beverages and watching the last round and presentation ceremony where President Trump awarded the cup to a dominant USA team. It was one hell of a week and I can't say how proud I am to have been a part of it.

- Blaine Knox

Above: Blaine Knox returned to the course where he interned in 2015 to assist with President Cup preparations

Below: Blaine Knox (left), Billy Koopmans and 'Big Leftie' Phil Mickelson

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putting up the scaffolding for the Presidents Cup grandstands didn't damage any of the irrigation infrastructure.

One of the more unique irrigation jobs I was involved with in the lead-up to the tournament was working alongside the inventor of the 'sprinkler head lifter' Tom Wait. We were instructed by Greg to go around all the greens and approaches and lift and level the heads so they looked aesthetically pleasing. Tom's piece of equipment is quite unique, using water to lubricate the soil and loosen up the swing joint, then lifting, levelling and packing sand around the head to ensure it sits solid in its new position. Although a time consuming process – each green took about a day to complete – the end result was flawless and left no seams or cut marks on the surface.

PRESIDENTIAL PREPARATIONS

As the Presidents Cup drew closer, the anticipation among the crew was palpable. All our hard work throughout the year was finally going to get rewarded with over a billion TV viewers worldwide watching and critiquing our work.

Having the tournament so late in the season meant we had to be on our game the whole time. Leading up to it, turf management practices were pretty straight forward – fertilising, spraying and general touch ups here and there to keep everything in tip-top shape. But as soon as contractors started rolling in to build all the tournament infrastructure, that's when it finally hit home that something big was about to happen.

Having so many structures (and large ones) around the course made it important to locate where all the sprinklers were and determine whether they were going to be impacted. The last thing we needed was to have poor sprinkler coverage in the lead-up to and during the tournament and as a result many had to be relocated. Hand watering also increased to ensure areas of turf impacted by the stands remained healthy.

CONTINUED ON PAGE 19

Pictured with Ohio Program manager Mike O'Keeffe (black jacket) at the 2017 Presidents Cup are (from left) Aussies Brad Foster, Ryan Stores, Richard Forsyth, Blaine Knox, Keegan Mead, Geoff Seath, Josh Forster, Daniel Lavelle, Chris Gibson and Gareth Hammond

The 1st tee stadium grandstand at Liberty National which will be of a similar scale to the one proposed for Royal Melbourne Golf Club when it hosts the Presidents Cup in 2019

ROYAL MELBOURNE SIZES UP FOR 2019 PRESIDENTS CUP

With the 2017 Presidents Cup done and dusted, attention now turns to 2019 with Royal Melbourne Golf Club set to host the event for the third time in the tournament's history. Royal Melbourne superintendent Richard Forsyth was part of a club delegation that visited Liberty National to get a first-hand look at the scale of the tournament infrastructure, meet with PGA Tour officials, understand the volunteer programme and consider security requirements for the event.

Earlier this year Royal Melbourne had visits from PGA Tour staff including Presidents Cup agronomist Paul Vermeulen and Steve Wenzloff from the PGA Tour's design services. Vermeulen inspected the course to get an understanding of the layout and turf types, while Wenzloff looked at tee positions in relation to the building of grandstands.

The Tour proposes to build a 1600-seat stadium around the 1st tee (3 West), so to accommodate this Forsyth and his crew will need to build a new tee further back to provide the necessary space. Some other minor adjustments are also planned elsewhere on the Composite Course, including moving a maintenance track, extending the 16th (18 East) back 30 metres and a slight alignment adjustment to the 14th (16 East) tee. These works will be undertaken over summer by Royal Melbourne staff.

"The number and size of hospitality structures and stands at Liberty National was enormous," says Forsyth. "They require significant planning and organisation to minimise damage to the course during construction. We were able to meet with Steve and have him show us the scale and footprint of the structure at Liberty for everyone to understand the amount of space required. On the back of the 2017 event, the PGA Tour expect the structures at Royal Melbourne to be about 30 per cent bigger than the 2011 event, with a number of two storey structures which makes it a very large build."

"Another challenging issue we'll face is the likely number of golf carts and utility vehicles on site. There were 360 such vehicles at Liberty National manoeuvring their way around the course each day, which will be a significant issue at Royal Melbourne with no cart paths and substantial native rough where carts are forbidden."

On the Wednesday and Friday of the tournament, Forsyth had the opportunity to travel around Liberty National with Vermeulen which provided an insight into the interaction he had with superintendent Greg James and his team. They were able to discuss the expectations for preparation and set-up, in particular daily data collected on moisture and firmness of greens which was communicated to set-up officials to assist in the selection of daily hole locations. According to Forsyth, the process for the 2011 tournament was similar, but there is now a higher expectation for data collection and keeping to the pre-set high and low ranges for speed and firmness.

"The turf quality Greg and his team produced was first class," says Forsyth. "The A4 greens were very smooth and true, only requiring a single mow in the mornings and a hand roll with water-filled rollers to achieve the target of 13 feet on the Stimpmeter.

"Greg had a total of 130 on the crew for the week. Our plan for 2019 is to limit volunteer numbers to about 30, giving us a total number of 70 staff. When I mentioned this to Paul he was surprised and questioned whether it would be enough to complete all of the tasks each morning. I assured him it would be more than adequate for our operation.

"There was great atmosphere around the event at Liberty National. The home crowd was very vocal and it was amazing to see the scale of security when the US President arrived on Sunday. We are very much looking forward to hosting the event at Royal Melbourne in 2019 and having 24 of the world's best players will be a thrill for all of us."

Superintendent Richard Forsyth (centre) with Royal Melbourne staff members Kerrod Tuckett (left) and Nic Staff who were among the course volunteers at Liberty National

CONTINUED FROM PAGE 17

'Advance week' was our last chance to put the finishing touches on the course before the big week following. We had a handful of guys in to help us for the week including Royal Melbourne Golf Club crew members Nic Staff and Kerrod Tuckett. Royal Melbourne superintendent Richard Forsyth was also on site to view preparations ahead of the Presidents Cup returning to Melbourne in 2019 (see more opposite page).

Since member play had only finished on the course a week before the Presidents Cup, one of the projects we undertook was to fix all the pitch marks in the greens. We would take a small plug in the centre of the pitch mark, fix the pitch mark as per normal and then finish off with a special green sand. This worked a treat and you could hardly even notice they were there.

Advance week also consisted of mowing every day to keep the surfaces nice and tight and rolling to keep them at a steady speed. We had a designated moisture team of two for the week to keep an eye on the greens and approaches, trying to keep them as consistent as possible (by the start of the tournament they were coming in at 10 per cent).

On the Sunday before the tournament all the volunteers arrived and crew numbers swelled to an incredible 130. Among them was a healthy contingent of fellow Aussies and all up there were no less than 12 of us, many of them current or past Ohio interns. Among the Down Under contingent joining myself and Brad were Ryan Stores, Keegan Mead, Geoff Seath, Josh Forster, Daniel Lavelle, Chris Gibson and assistant superintendents Blaine Knox (Palm Meadows, Qld) and Gareth Hammond (NSW Golf Club, NSW).

With everyone's jobs designated for the week, on Monday we had a practice run to see how smoothly things ran and to iron out any issues. My role for the week was 'bunker captain'. It was fantastic to be entrusted with such a role and I was in charge of a group of 10 whose job it was to prep one half of Liberty National's 90 bunkers.

PGA Tour agronomist Paul Vermeulen directs rolling operations. Liberty National used water-filled rollers to achieve the desired greens firmness and speed

'Team Long Blow' fly the flag for the Internationals during the 2017 Presidents Cup

Two guys would first go through blowing out leaves and debris (the tournament was held in autumn so there was a lot of leaf litter), with two more following behind them to smooth and level out the bases. The rest of the crew would then come through and rake. Because we started at 5am and relied on headlamps to help us see, as the sun came up I would do one final check of the bunkers to make sure that they had hit the high standards that Greg expected.

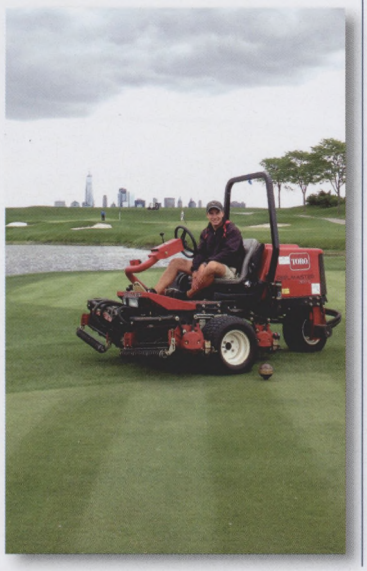
After our morning jobs were completed, six of us stayed on and were part of the blowing team that went back out on course to ensure the greens and other turf surfaces were kept free of leaves and debris. We used electric blowers instead of ordinary backpack blowers to negate any noise issues. As four of the six were Aussies and it was the Presidents Cup, we decided to have a bit of fun and fly the Aussie flag and show our support for the Internationals. We nicknamed ourselves 'Team Long Blow' and we certainly got plenty of reaction from the one-eyed and somewhat sensitive US Team supporters who didn't have much of a sense of humour.

As each round finished we all had our afternoon jobs. Mine changed from day to day, whether it was hand watering fairways or roughs, leading the clean-up crew or fixing up ropes around the course. After everyone had completed their jobs, they then went back to the shed and helped set up the mowers and equipment for the next day. This included 14 tees and approach mowers, 12 greens mowers, eight rollers, two blowers, two collars mowers and emptying the Workman utilities for clipping clean-up.

The weather could not have been better for both the lead-in week and week of the tournament. Dry conditions with warm to mild temperatures provided ideal conditions to dry down the greens and get them firm. It also made our preparations a lot more enjoyable not having to contend with any wet weather.

As Sunday rolled around we could finally relax, unwind and enjoy what was a very successful tournament (the result for the Internationals aside of course). It was an incredible week, working over 100 hours and getting to see some of the best golfers in the world battle it out.

A spectacular golf course and a pretty spectacular backdrop as well. The Liberty National experience has helped to set up Koopmans for the next step in his turf management career



NO LOOKING BACK

2017 has been an unforgettable adventure and has opened my eyes up to what the turf industry has to offer. I had an extremely enjoyable internship through The Ohio Program and was fortunate enough to work at one of the biggest tournaments there is. Liberty National provided a great learning environment for an intern and I took so much away from the experience and have put it to good use back home. I also gained many good friends and great contacts that I look forward to keeping in touch with.

The knowledge that I have taken away from Liberty National has been a great kick-start for my career as a turf manager. Since arriving home I have landed the assistant superintendent role at Ballarat Golf Club and I am loving every second of it. Working under a boss like Jeff Powell (superintendent) who is so motivated, knowledgeable and experienced, will only benefit me and inspire me to one day be as good as he is. Since being back, I have helped the team prepare the course for a PGA Futures Trainee event and the club's annual tournament in November.

My time away from Australia and being away from family matured me immensely. In fact, one of the things I loved most about my internship wasn't actually to do with the golf course – it was needing to be self-sufficient and not having the luxury of mum doing it all for me! Although I must say, having to use public transport was frustrating at the best of times and I certainly missed having a car!

Looking back before all of this, as an apprentice I was just your average Joe who didn't really know what he wanted to do with life. However, upon being shown what The Ohio Program had to offer I was instantly interested and knew it was an amazing opportunity that I had to grasp.

If there is one piece of advice I would give to those who may be in the same position as I was a few years ago, it's don't think twice! You may be hesitant, unsure or scared that you're not good enough, but I can assure you it will be the best decision you will make in a long time and, like me, you won't look back.

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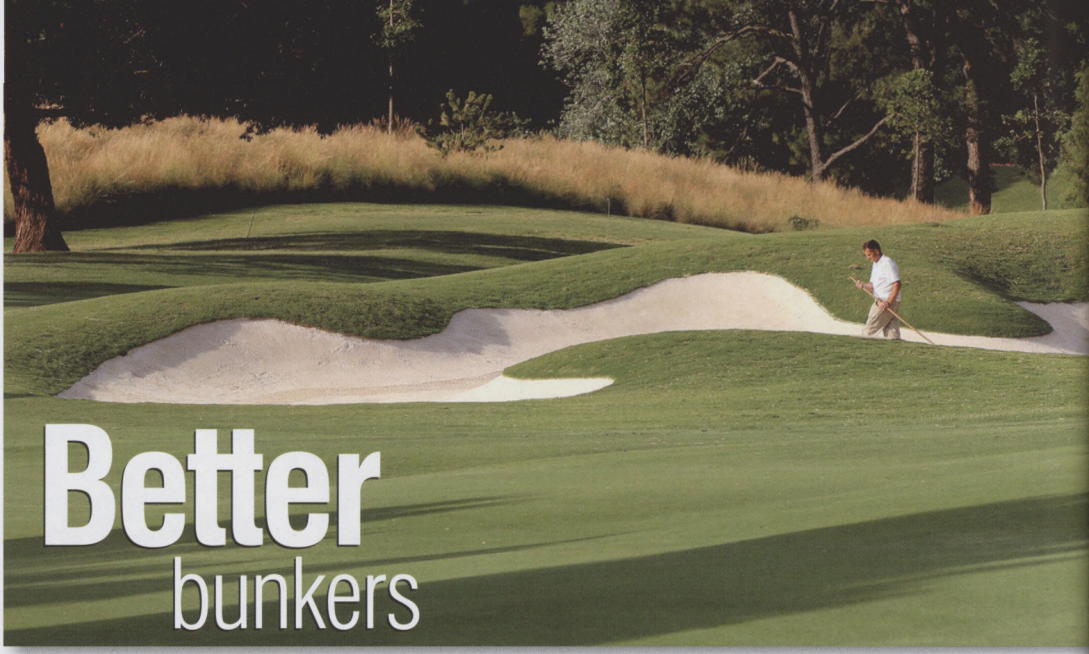
From their simple origins, bunkers have experienced considerable evolution of design, construction and maintenance over the years. So too have golfer expectations for playability and consistency



Better bunkers

Bunkers are the bane of a superintendent's existence and what were once hazards now consume significant resources to maintain. USGA agronomists Todd Lowe and Bob Vavrek look at common bunker management issues and provide some tips to reduce their drain on course expenditure.

The USGA defines a bunker as a hazard consisting of a prepared area of ground – often a hollow – from which turf or soil has been removed and replaced with sand or the like. The term 'sand trap' has been used to describe bunkers but should be avoided, especially when dealing with rules officials. The terms 'waste bunker' and 'grass bunker' have also been used, but these areas are not hazards according to the Rules of Golf.

When describing bunkers, it depends on who you ask. Golf course architects might describe them as aesthetic or strategic features, whereas golf course superintendents might describe bunkers as 'money pits' that consume endless resources. Furthermore, golfers may view bunkers as dangerous areas to be avoided or safe havens that provide easy recovery shots.

However they are perceived, bunkers are areas that receive an inordinate amount of attention at most golf facilities. From their simple origins as hollows on the leeward sides of sand dunes that sheltered livestock from cold sea winds, bunkers have experienced considerable evolution of design, construction and maintenance over the years. So too have golfer expectations for playability and consistency. The objective of this article is to address common bunker issues and offer tips to conserve resources.

'BUNKER DESIGN 101'

Bunkers come in all shapes and sizes. The golf course architect has the greatest influence on bunker design, but it is important to consider golfer skill level and required maintenance when designing bunkers. Some bunker features that may be more visually appealing can be difficult to play from and costly to maintain.

Flat bunkers have little to no exposed sand faces. As such, sand in flat bunkers is rarely displaced by heavy rain and flat bunkers generally provide a more consistent playing surface. The face of a flat bunker may roll gently down toward the base of the hazard and be constructed with steep grass mounds or revetted with sod.

Flashed bunkers consist of steep sand faces that create a certain architectural appeal. The height and slope of such bunker faces affect the potential for downward displacement of sand and maintenance costs required to redistribute sand onto bunker faces following displacement. Often, sand that is redistributed onto flashed bunker faces is softer, creating a greater likelihood of fried-egg lies.

As sand repeatedly migrates downward in bunkers with high, flashed faces, the underlying soil becomes exposed and can eventually contaminate the bunker. Bunkers with white sand develop a discoloured or stained appearance as they become contaminated with silt or clay and eventually develop poor drainage and firmer playing conditions. As a result, bunkers with flashed faces typically require more frequent renovation than flat bunkers.

Other architectural features that affect bunker playability and maintenance are the type of mounds and contours surrounding bunkers. It is sometimes impossible to advance from a revetted bunker – the only option may be to hit the ball sideways or backward. Revetted faces also require more frequent restoration as they collapse or become unsightly. Large, steep mounds surrounding bunkers and bunkers with numerous capes or intricate edges are more eye-catching but also require more manual labour for trimming, irrigation and fertilisation.

High, flashed bunker faces provide a certain architectural appeal but require more maintenance to relocate sand that washes downward following significant rainfall

Resource management should be an important factor for all areas of the golf course, including bunkers. In a 2012 article for golfcourseindustry.com titled 'Design for maintenance', US course architect Jeff Brauer listed several helpful tips to reduce maintenance costs when designing bunkers, including:

- Avoid soft fabric liners that are pulled up by mechanical rakes;
- Have multiple access points for motorised rakes;
- Match the turning radius of the motorised rake – normally 7-8 feet – to the edge of the bunker to reduce the need for hand-raking;
- Make bunkers flat enough to reduce sand wash from rain – varies by region but maximum slope of 25 per cent;
- No surface drainage flows into bunkers;
- Extensive herringbone drainage system recommended;
- Match mower turning radius and maximum slope for bunker capes – varies, but about a 9-foot radius and 33 per cent slope – to reduce the need for hand mowing;
- Narrower capes should be wide enough to allow for down-and-back mowing with mechanical trim mowers.

CONSTRUCTION

Simply removing turf, excavating a hole and filling it with 4-6 inches of sand may be an acceptable type of bunker construction, but only for a small percentage of golf courses. A great deal more thought and planning is necessary when constructing most modern golf course bunkers, particularly when it comes to drainage, sand selection and deciding whether or not to line bunkers.

Drainage: Poorly draining bunkers are a headache to maintain and must be pumped repeatedly following rain events and are prone to algae and overly firm playing conditions. Trenched, herringbone drainage systems with 4-inch, perforated pipe – or tile – surrounded by gravel are still the most common bunker drainage method. Drains can become clogged or collapsed if improperly constructed or damaged and may require reconstruction if they do not function.

It is not only critical that bunkers drain well, but that surface drainage around the bunker is diverted away from the hazard. Bunkers that receive runoff from surrounding areas are prone to continual bunker sand erosion during rain events. Repeatedly repairing washouts can be labour intensive and creates softer playing conditions. Mounding or interceptor drains can be installed in upslope areas to divert water away from bunkers.

Sand Selection: There are several factors to consider when selecting bunker sand with the most important being those that affect playability. Bunker sand particle size, particle shape, crusting potential and uniformity all affect playability, but it is impossible to predict bunker sand performance based solely on its physical properties.

Evaluating several bunker sands with an on-site test bunker is recommended so that golfers can compare several different types of sand side by side. There may be differing opinions on bunker playability, but developing a consensus from your golfers will reduce future complaints about sand selection.

Subangular to angular sands create firm playing conditions and fewer plugged lies. The use of angular bunker sands has increased greatly over the past few years. It is important to work with your sand supplier to get the desired specification that works well for your facility.

Liners: Liners can be installed between the bunker sand and the underlying soil to reduce washouts. Liner technology has advanced dramatically in recent years and there a number of different products on the market today, each with their own advantages and disadvantages. Among them are:

- **Soft liners:** Geotextile fabric liners (e.g.: BunkerMat, Sandtrapper) have been used more often over the past few decades and consist of a permeable material that is stapled to the base of the hazard. Fabric liners do reduce sand erosion from flashed faces, but some issues have occurred. These include fabric tearing by mechanical rakes, staples being displaced and the loss of permeability due to an increasing percentage of silt and clay.

When restoring or redesigning bunkers, make certain that there are ample resources, particularly staffing, to maintain the new designs. Flashed faces, steep mounds or small, narrow capes are features that require considerable labour

Poorly draining bunkers are costly to maintain and provide undesirable playing conditions ▶

Drainage is a key factor to bunker performance, both inside and outside bunkers.

- **Durable liners:** More sophisticated techniques for lining bunkers have been developed over the past five to 10 years and are gaining popularity. Products like KustomBind, Capillary Concrete and StaLok consist of a gravel base held together with a polymer, while The Matrix liner uses asphalt. Each system drains well and reduces washouts and soil contamination. The costs of newer methods are steep and rival those of some modern-day putting greens, however, modern bunker liners can help mitigate the expense of bunker maintenance and refurbishment. Since some of these technologies are rather new, it is unknown how they withstand time, the stress of daily maintenance and weathering.

Reconstruction: Some type of bunker refurbishment generally occurs over time, whether in the form of sand replenishment, restoration, redesign or bunker removal. Bunkers age and some courses simply remove old, contaminated sand, repair drainage when needed and install new sand. Depending on the level of golfer expectation, bunker renovations may never occur, or may occur as frequently as every five to seven years.

Bunkers change in size and shape from processes like sand accumulation from play, weather and maintenance. Some facilities choose to restore bunkers to their original design, whereas other facilities may redesign bunkers to change aesthetics and playability completely. When restoring or redesigning bunkers, make certain that there are ample resources, particularly staffing, to maintain the new designs. Flashed faces, steep mounds or small, narrow capes are features that require a considerable amount of hand labour.

There may be too many bunkers on a golf course and selectively removing or replacing them with grassy hollows or other features may be warranted. While this may take architect approval, consider removing bunkers that have less impact on the strategy of the hole and bunkers that see little play. Also, consider reducing bunkers that affect high-handicap golfers, which should improve pace of play and player enjoyment.

Geofabric liners can be installed between the bunker sand and the underlying soil to reduce washouts

MAINTENANCE

Bunkers require maintenance practices such as raking, edging, debris removal, weeding and trimming to maintain good aesthetics and playability. Many golf course officials do not realise the resources required to maintain high-quality bunkers, but it is an important topic, especially as some facilities are forced to conserve resources.

Raking: Bunkers are raked to remove footprints, fix washouts and improve playability. At some golf courses, every bunker is raked daily, either by hand or with motorised bunker rakes. Hand raking is the norm for small bunkers and along bunker edges. Motorised rakes are used to reduce labour and help soften bunker sand with cultivation tines when necessary.

Bunker raking techniques can be changed to be more or less aggressive based on bunker sand firmness. Deeper cultivation tines help loosen bunker sand, while leaf rakes or skirts merely smooth the upper sand layer. Raking techniques may also need to be altered depending on the weather.

To conserve resources, minimise daily raking to bunkers that see a high volume of play and only touch up low-play bunkers. A technique used at some courses is the 'Aussie' method of mechanical raking bunker bases and sparingly raking perimeters with the smooth side of a rake. Several golf course superintendents that use the 'Aussie' method report firmer conditions on bunker faces and fewer washouts than conventional raking techniques. Some superintendents feel that this method requires just as much labour as conventional raking techniques, but others have seen a considerable reduction.

Sand depth: The USGA recommends an average sand depth of 4-6 inches at the base of a bunker and 2-3 inches on bunker faces. This recommendation reduces plugged lies on bunker faces and allows for a full swing through the sand without digging into the liner or subsoil. Bunker sand migrates over time from processes like heavy rain and motorised raking. The maintenance staff should periodically measure and redistribute sand to maintain consistent depth throughout the bunker.

More sophisticated techniques for lining bunkers have been developed over the past five to 10 years with durable liners gaining popularity

Sand is lost due to wind and play, so bunkers should be topped off with fresh sand when needed. Sand is also added to improve appearances, as sand colour changes due to contamination from soil or organic debris. This practice, often referred to as 'capping', includes removing the upper 1-2 inches of contaminated sand and replacing it with new sand. However, capping only improves short-term bunker aesthetics and may not be a sustainable practice at some facilities.

Adding fresh sand usually makes bunkers soft for a period of time. Practices such as watering and compaction with cement finishers help improve bunker firmness, but some bunkers may simply require time for the sand to settle and firm up.

Mowing/edging: Maintaining turf surrounding bunkers can be quite costly. Bunkers with gradual slopes and large capes can accommodate efficient riding mowers, but steep mounds and small or narrow capes require more mowing and trimming by hand. At many courses, string trimming around bunkers takes place on a weekly basis, and bunkers with intricate edges can escalate labour costs.

Also, bunkers are typically edged every two to four weeks, depending on grass type and climate. Aggressive grasses like bermudagrass have aboveground runners (i.e., stolons that must be trimmed more frequently than some cool-season grasses). Plant growth regulators, such as trinexapac-ethyl or mefluidide, are sometimes applied to bunker faces every two to three weeks to reduce mowing and edging frequency. Backpack blowers are used on a regular basis to remove clippings, leaves and other debris from bunkers.

Irrigation/fertility: Steep grass bunker faces dry out faster and are more difficult to fertilise than bunker faces with more moderate slopes and, as a result, they can become unsightly. Supplemental water and nutrients are often applied by hand to bunker faces to help maintain good turf quality. Steep faces with exposure to the sun are especially prone to soil drying and installation of low-volume irrigation heads, while costly at first, may ultimately reduce labour and improve water use efficiency.

When it comes to conserving resources on bunker maintenance, much depends on bunker design and golfer expectations. Daily raking and

The USGA recommends an average sand depth of 4-6 inches at the base of a bunker and 2-3 inches on bunker faces

bunkers that require more hand labour due to intricate designs, can significantly increase maintenance costs. However, labour can be reduced by not raking every bunker on a daily basis, as long as golfers are accepting of occasional footprints or inconsistent lies.

PLAYABILITY

Inconsistent playing conditions can occur even in properly constructed and maintained bunkers. Bunker playability often is contingent on sand firmness which is most affected by moisture. Therefore, factors that affect sand moisture strongly affect bunker playability. Some factors affecting bunker sand moisture can be managed with daily maintenance practices, while other factors cannot. It is important to understand the impact of each factor on playability to help determine the degree of bunker consistency that is achievable and sustainable at your facility. Some factors affecting bunker sand moisture include:

- **Sand depth:** Bunkers with more sand are generally drier (softer), while shallower bunkers are generally wetter (firmer). It may be possible to change bunker firmness by simply adding or removing an inch or two of sand.
- **Weather:** Rainy periods keep sand moist and firm, while droughty weather can result in dry, soft sand (depending on irrigation).
- **Irrigation coverage:** Bunkers that receive additional water from sprinkler overlap remain wetter and firmer.
- **Shade:** Shaded bunkers dry out slower and remain firmer than bunkers in full sun.
- **Sun angle:** Bunkers on south-facing slopes receive less direct sun, dry out slower and are firmer than north-facing bunkers.
- **Topography:** Elevation affects bunker moisture and firmness. Low-lying bunkers that are near the water table may remain saturated and firm, despite having a functional drainage system.

The term 'consistency' is often used when discussing bunker playability, but bunker consistency might be an impossible standard. Bunkers can be raked the same way and maintained at the same depth, but it is impossible to account for all of the above factors to maintain consistent playability in every bunker on a daily basis. It should be remembered that the game of golf is enjoyed outdoors and it is rewarding to make good shots from bunkers that are affected differently by outside elements. Golfers should understand how to recover shots from firm and soft playing conditions and perhaps take a few lessons from their local golf professional.

Golf is a self-governed sport that encourages each player to use etiquette on the course and rake bunkers after each use. Another bunker etiquette issue occurs when golfers damage steep grass faces by attempting to traverse them instead of exiting the low side of a bunker. Signs can be posted to educate golfers on this issue and encourage them to protect bunker faces.

Lastly, the placement of bunker rakes following use is another common topic with golfers. Bunker rakes can be placed either inside or outside of bunkers and it is up to each facility to develop their own policy. However, placing rakes outside of bunkers, in areas where they are least likely to affect play is generally recommended.

Many golf course officials do not realise the resources required to maintain high-quality bunkers, but it is an important topic, especially as some facilities are forced to conserve resources

CONCLUSION

Bunkers come in all shapes and sizes. Some bunkers are neglected and some receive intensive maintenance. High standards for bunker quality and consistency usually require increased inputs. The amount of labour and resources required to achieve desired bunker playability and appearance depends on factors such as bunker construction method, design and the physical characteristics of bunker sand.

Golf course superintendents strive to provide consistent playing conditions on all playing surfaces. However, maintaining consistent bunker playability on any given golf course can often be an impossible, or financially unsustainable, task. At the end of the day, bunkers are considered hazards and are areas that should be avoided. Have golfers ever complained that the water was too wet in a lake or pond…?

ACKNOWLEDGEMENTS

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Cypress Lakes Resort in the Hunter Valley spent $1 million upgrading its bunkers this year to improve playability and aesthetics, as well as reduce maintenance costs

Resort refurb

Following on from the previous article on bunker management, Cypress Lakes Resort superintendent Craig Molloy looks back on the $1 million project to refurbish the impressive bunkers at the Hunter Valley course.

Cypress Lakes Resort in the NSW Hunter Valley started construction in 1990. Prior to being transformed into a golf course, the land was used for cattle and sheep farming. The original farm owners decided to sell as the site had very little topsoil, no water and was on an iron stone rock shelf. Two hectares of the site was used as a rock quarry where the current clubhouse and conference centres reside today.

Steve Smyers, a Florida-based golf course architect, was engaged to design and construct the first resort course in the Hunter Valley wine region. The course was built over two stages and was opened in 1992. A par 72, 6467m championship course, each tee and green offer stunning panoramic views of the Hunter Valley's famous vineyards and the surrounding Brokenback mountain range.

The course was planted with Wintergreen couch on fairways and green surrounds, Greenlees Park couch tees and greens seeded with Penncross bentgrass. The course and clubhouse surrounds are currently managed by 13 staff with the original layout comprising 60 bunkers with 1.2 hectares of sand, 17ha of fairways and closely mown turf and 1ha of greens.

The golf course and clubhouse surrounds are irrigated with treated effluent water from an onsite treatment plant, with additional water supplied via private irrigation distribution (PID) from Hunter River and an onsite storm water runoff storage. In peak irrigation season, the resort uses 1.3 million litres per night.

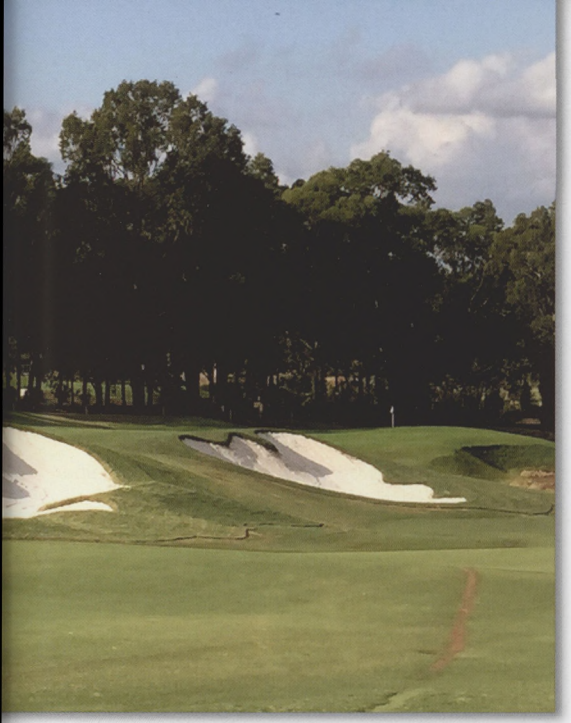
In October 2013, Oaks Hotels and Resorts purchased the management rights of the resort villas, purchased outright the reception building and conference facilities and lease of the golf course for two years until they purchased it in 2015. Since the change of ownership, Oaks Hotels have invested $5 million into the golf course and resort.

As part of Oaks Hotels' acquisition of the resort, Golf Business Advisory Services engaged Turfwise Consulting to undertake a review of the course operations at Cypress Lakes Golf and Country Club, with the objectives of;

- Assessing the turf and asset condition, as well as human resources;
- Identifying and reporting on the areas of course operations that required investment to enhance course quality, efficiency of maintenance and management, meet key market demands, maximise participation and optimise return on investment; and
- Make recommendations for implementation of necessary investment or change.

The findings clearly indicated a need to take immediate action on upgrading the irrigation system ($1.6 million staged over three years), purchase of essential equipment ($1 million) and undertake a review of bunker design in consultation with a course architect to determine strategies to reduce maintenance demands ($1 million).

It was decided to upgrade the turf equipment and irrigation control system immediately and review the bunker design, economic, social and environmental dimensions over the next two years to develop a bunker improvement programme. The challenge



was to deliver a balance between playability, sustainability, safety and course aesthetic, while at the same time maintaining Cypress Lakes' high standard for bunker quality. Raking, edging, debris removal, weeding, mowing, trimming and wash-out repairs were high maintenance inputs required of the existing bunkers.

SMASHED

In April 2015 the Hunter Valley was hit by a severe super storm, a one-in-100-year event which resulted in a state of emergency being put in place across the Pokolbin area. Cypress Lakes Resort took the full brunt of the storm. The course copped 260mm of rain in 24 hours and recorded wind speeds in excess of 110kph which brought down over 300 mature gum trees. Loss of power to the resort for nine days combined with the storm damage meant the resort had to be evacuated.

The storm caused major damage to the course – three bridges were washed out, 700 metres of bitumen pathways were destroyed and the sand on all 60 bunkers washed from the faces which contaminated the subsurface drainage. The bunker drainage silted over and required repeated pumping out following rain events. Any rain event over 5mm would flood the bunkers and over a 12-month period we pumped over 12 million litres of stormwater from the bunkers. We were becoming concerned that the cost of maintaining our bunkers was approaching the cost of maintaining our greens!

An insurance claim was made soon after the clean-up had finished in May 2015, but approval wasn't given until late 2016. While we were waiting on the insurance claim to come through, it was decided to make a start on Stage 1 of the irrigation system upgrade.

Total Irrigation Designers (Matthew Wilson) was selected to design the irrigation master plan which would be installed over a three-year period. Toro Infinity 835 heads were chosen for greens, greens surrounds and tees and Toro infinity DT54s on fairways. With the bunker project approval imminent, we expected a short installation window for Stage 1 of only 10-12 weeks. Hydro Technics Irrigation were successful in winning the tender and started work on 3 November 2016.

As they say 'when it rains it pours' and just a week after Stage 1 of the irrigation project got underway we were given approval to start the bunkers, nearly 18 months after the storm. We now had two major projects on the go! The irrigation installation went very smoothly and fortunately we didn't lose a day for wet weather with the project completed on 25 January 2017, a week before we were to start on the bunkers.

BETTER BUNKERS

Our insurer undertook a review of the original bunkers, with the objectives of minimising surface water runoff into the bunkers, raised turf rolled lips and installing a liner to the clay sub-base to reduce future contamination. In early 2017, Flemming Golf was awarded the contract to restore three bridges, all bunkers and the 13th tee as part of the insurance brief.

Like every project, it started with a budget and from there we realised we needed to rationalise not only the number of bunkers, but just as importantly the area of bunkering. There was in excess of 1.2ha and with that came the potential of a ballooning budget just to keep them playable.

As we set about redesigning the bunkers we wanted to make the majority of them contribute

Opposite page and below: In April 2015, Cypress Lakes Resort was hit hard by a super storm cell that uprooted 300-plus trees and washed out all bunkers on the course

Bottom: The storm led to major sand contamination issues which compromised the drainage of almost all the course's bunkers

All contaminated bunker sand was removed and stockpiled on each hole and then reused as a final trim sand for the bunker surrounds

strategically to a round of golf. There will always be a few bunkers that will have a greater aesthetic appeal than strategic, but a happy balance was what was sought to re-establish the course as a high-end resort facility. So, after a thorough review we decided to remove some, reduce the size of others, shift others closer to the line of play and add a few extra where we felt they would positively contribute to the golfing amenity.

SHIFTING SANDS

Construction started on 30 January 2017 with a proposed completion of 20 weeks subject to agreed delay days. During the project we lost 16 days due to wet weather and a further two days due to excessive heat above 46 degrees.

The process started by reviewing the number and location of the bunkers. Generally, the project team – consisting of James Wilcher (architect), Kirk Flemming, Vince Flemming and Craig Brown (construction shapes) and myself (superintendent) – collaborated on a style of bunkering that we felt would suit the site, but at the same time have its own distinctive character to set it apart from other courses in the Hunter Valley. We wanted Cypress Lakes to look grand and encourage golfers back to the resort; we weren't going to do that if the bunkering didn't have some sort of 'wow' factor!

We settled on a style that made the most of the contrast that bunkers offer the golfing landscape, yet fitted into the topography across the whole site, flat or challenging. Of course, retrofitting bunkers into pre-existing greens was a challenge. We felt that if we could do this, control surface water and reduce the drainage burden on the bunkering generally, we could achieve something that was distinctive but also take some pressure off maintenance costs.

The construction process went as follows;

- Concept master plan and on-site modification;
- Transfer design from the GPS onto the ground;
- Remove existing contaminated bunker sand and stockpile;
- Bulk shape new design;
- Replace stockpiled sand around bunker edge;
- Detail machine shaping and drainage;
- Detail hand work ready for turf and liner installation;
- Drainage and sand installation;
- Irrigation head modification; and
- Turf.

Golf by Design (James Wilcher) provided the construction team with a detailed concept bunker plan. This plan was used to tender the project and to provide a starting point for each of the holes. The concept plan was loaded into the GPS system and transferred onto the ground in draft format.

All of the contaminated bunker sand was removed and stockpiled on each hole to be used. During the stockpiling process we noticed that the contaminated sand's characteristics would form a very good final trim sand. The sand dried firm but once water was applied it become workable without collapsing, saving us thousands of dollars not having to import topsoil.

Bulk shaping was carried out using a CAT 314D excavator with a power tilt bucket. We selected this machine over the dozer to keep as close as possible to the confined work zones. These works zones were extremely important as we had to ensure they didn't extend too far as all pricing was based on these areas. As bulk shaping finished, the stockpiled sand was roughly placed around the finished GPS line ready for the detailed machine shaping.

Detailed machine and hand shaping involved spreading and shaping the trim sand to the agreed architectural design, spading the final edge and then shelling out the clay subbase to a 60-degree slope and cutting in subsurface drainage ready for liner installation.

What type of liner to use? That was the question we kept asking ourselves from the start of the project and we eventually choose a fabric liner from Polyfabrics Australia – Terra Stop non-woven Grade TASIF. The liner decision became financial. We could install the fabric liner for $15 per square metre which was in our budget, whereas other products we looked at would have increased the overall construction price by $540,000.

The liner was wrapped 300mm over both front and rear lips and encased all drainage trenches. Oiled pins were hammered in every 300mm around the bunker edges and joins and every 350mm-450mm on the bunker faces and subbase. A 200mm line was dotted below the edge to indicate the finished turf line.

The project team wanted to ensure Cypress Lakes' bunkers were grand and had a 'wow factor to them, but at the same time designed with reducing maintenance issues in mind

Bunker sand selection was limited. We chose to have two white bunker sands independently tested through AGCSATech. One of the sands was locally sourced, but consistent quality couldn't be guaranteed over the 20-week project. We selected a crushed sandstone from Maroota, west of Sydney. While, the sand didn't meet all the requirements of the bunker sand specification, experience of bunker sand performance would indicate that those with ball penetration results higher than 1.8kg/cm^2 are generally acceptable, especially if the sand within the bunker isn't allowed to become excessively dry. From the findings we decided to install additional irrigation heads around bunkers.

Like most projects we had a few challenges early on, most of which we couldn't plan for. During the first four weeks we received 204mm of rain which delayed the project 11 days. Fortunately, April was dry and we were able to get back on track.

Over the 24-week project thorough communication from the construction team made the process seamless. James Wilcher was on site each week and any changes were agreed to a week ahead. Communication to Oaks management occurred via monthly reports, with these then forwarded to the insurer. Members and guests were also kept up to date with designated noticeboards displaying plans for each hole. Communication was perhaps the biggest lesson that I took from this project – providing as much written and visual information as possible to members and guests.

CYPRESS SUCCESS

Planning of the project took 18 months and proved to be a key factor in the overall success of the project. Careful shaping and improved bunker design and drainage has allowed us to now collect runoff and subsurface bunker drainage water in on site storage lakes.

As we assess the success of the bunker project, we have experienced a significant labour reduction, our energy and water management has improved and we are now collecting over 7.5 million litres of stormwater from our bunkers. This stormwater is directed from our bunkers to our dams for reuse on the course for bunker irrigation.

Based on four environmental indicators – greenhouse gas emissions, primary energy use, water use and land management, our bunkers now have significantly lower environmental intensities. Our labour inputs have decreased by 10 per cent, safety to staff and golfers has considerably improved, and, from a corporate governance perspective, our new bunkers have added valve to the business.

One final piece of advice I would give to other superintendents looking to undertake a similar project, is purchasing a drone. Our drone was used to document the various stages of works and it also helped us to identify irrigation and drainage lines prior to construction starting.

The drone was used daily for before and after shots which formed part of our monthly reports to the insurer. Although the construction works were GPS'd to form an 'as built,' we took additional drone shots for quick references. The drone is still being used today to identify irrigation issues, checking dam levels, inspecting brush fire hazards, promotional photos and roof inspections.

The purchase of a drone proved invaluable to Molloy who was able to utilise it to take aerial photos before, during and after construction. Pictured is the 8th

A geotextile liner from Polyfabrics Australia was used to line all bunkers

Although a preventive maintenance programme will not make an irrigation system last forever, it will reduce the labour and materials costs associated with keeping the system operational

WORDS: BRIAN VINCHESI

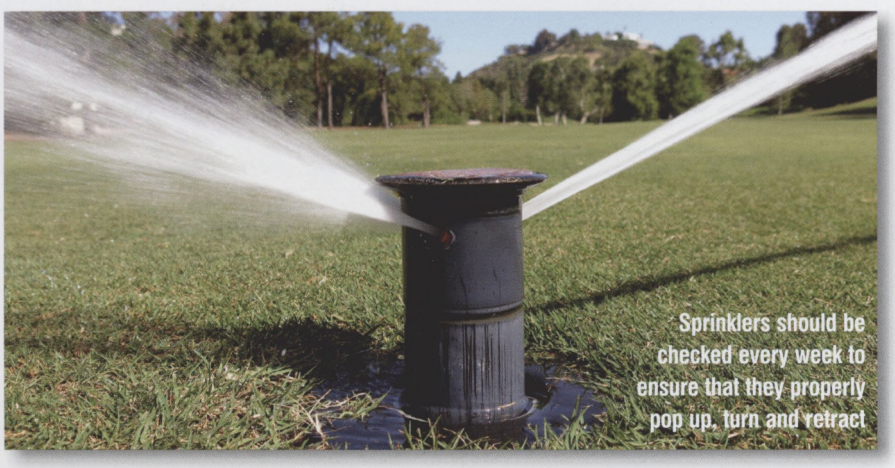
Prevention
better than cure

Irrigation system preventive maintenance can reduce labour and materials costs and may also help save water and energy while improving playing conditions.

Irrigation systems are an integral part of golf course maintenance, just like maintenance staff, mowing equipment and maintenance facilities. Without a functional irrigation system it is virtually impossible to maintain golf course turf in a playable condition.

However, while mowers and other equipment are regularly seen working on a golf course, irrigation systems are a mystery to many golfers because they are buried underground and most frequently operate at night. Therefore, it can be difficult for golfers to understand that irrigation systems wear out and are very expensive to replace.

A new irrigation system can cost into the millions depending on location and complexity. Not surprisingly, most golf courses try to avoid this expense for as long as possible, especially since the true value of an irrigation system often is not fully understood.



Sprinklers should be checked every week to ensure that they properly pop up, turn and retract

Golf course irrigation systems can quickly deteriorate from lack of maintenance. Irrigation system maintenance is primarily reactive at most golf courses (i.e.: when a component of the irrigation system breaks or is not properly working, an irrigation technician or other senior crew member is dispatched to make repairs). Preventive maintenance can reduce the amount of reactive maintenance and improve playing conditions.

Developing a preventive maintenance programme is the best way to extend the life of an irrigation system, maintain performance and minimise the severity and frequency of problems. Preventative maintenance programmes must be customised to meet the unique needs of an irrigation system and based on a thorough check of the system and its components.

As with any preventive maintenance regime, some tasks will need to be accomplished on a daily, weekly or monthly basis, while others may require attention quarterly, semi-annually or annually. Of course, while preventative maintenance reduces irrigation system problems, it does not eliminate some tasks that must be completed on an as-needed basis.

So, what does a preventive maintenance programme look like for the irrigation system at your golf course? It depends on the type of irrigation equipment and its age, but a typical programme includes the observation, adjustment and maintenance at regular intervals of sprinklers, valves, controllers, pump systems and other

components. The following sections of this article can be used to create a customised preventive maintenance checklist for any irrigation system.

DAILY MAINTENANCE

On a daily basis, the maintenance staff should perform the tasks that are a normal part of routine irrigation system operation and management. Examples include the following tasks:

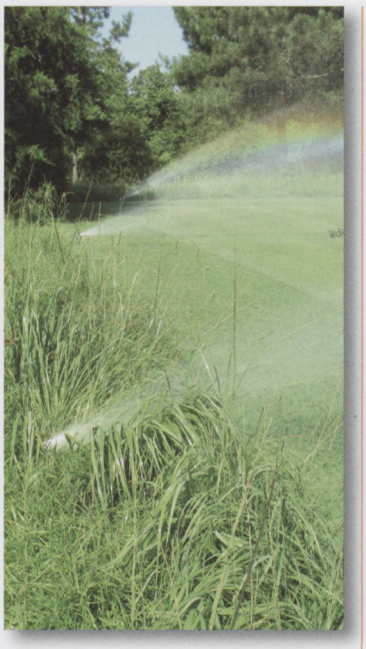
- Observe golf course turf conditions for wet and dry spots.
- Review the irrigation programme from the previous night to confirm that the irrigation system operated on the programmed schedule.
- Check the pump system monitor for any inconsistencies or abnormalities. This may be done remotely depending on your pump system equipment.
- Review and record water use from the previous night's irrigation cycle.
- Document evapotranspiration with a weather station or online source.
- Measure any precipitation using a simple rain gauge.
- Log any pipe breaks and component failures.
- For two-wire systems, check the operating log in the central control software diagnostics to verify normal communication between the central control software and each sprinkler or valve. Investigate stations that report possible issues.

Sprinkler nozzles should be frequently checked for clogs and wear. Also, ensure that the proper nozzles are installed in each sprinkler

- Prepare and prioritise irrigation repair orders and discuss them with the appropriate personnel. Assign additional staff to assist with repairs if necessary.
- Determine the water requirements for the next irrigation cycle and adjust the programme accordingly.

WEEKLY MAINTENANCE

Daily observation and maintenance should occur as part of normal irrigation system operation. On a weekly basis, time should be allocated to inspect the irrigation equipment itself and to make sure it is functioning correctly. Because the irrigation



Turf can grow over sprinklers and disrupt irrigation coverage, especially in rough and naturalised areas. Check and trim turf around sprinklers every month

system most frequently operates at night, issues are not always obvious without inspection. Therefore, preventative maintenance on a weekly basis should include:

- Check sprinkler operation and answer the following questions:
  - Do any sprinklers appear to be turning faster or slower than usual? If so, time them to be sure.
  - Does each sprinkler pop up, turn and retract?
  - Are part-circle sprinklers turning in the correct arc?
  - Is there any leakage?
  - Are any nozzles clogged?
- Update the central controller database with any changes.
- Check the condition of valve boxes and covers.
- Review the status of irrigation repair orders. Order necessary parts to complete repairs if they are not in stock.
- For two-wire systems, use software diagnostics to check the performance of each wire path for abnormalities such as excessive or unusual current draw and low-voltage reports.
- Visually inspect the condition of the pump station.

MONTHLY MAINTENANCE

Approximately once a month, course staff should:

- Check that sprinklers are not blocked by surrounding turf and trim around sprinklers as necessary.
- Inspect valve assemblies for leaks or damage.
- Examine and clean filtration devices. Check for wear on filter screens.
- Review, and consider adjusting, temporary changes made to irrigation station run times during the previous month.
- For two-wire systems, use software diagnostics to run a voltage check of every sprinkler or valve in the field. Compare voltage readings to results from the previous month to verify that there is no unexpected drop in voltage.
- Inventory and restock irrigation repair parts.

QUARTERLY MAINTENANCE

Dust, dirt and debris can damage irrigation controllers and pump systems. Quarterly cleaning can significantly extend the life of system components, especially electrical items such as central computer controls and field satellites. Quarterly maintenance should include:

- Clean satellite controllers and replace insect repellent.
- Clean the pump system, pump house and irrigation parts room.
- Remove dust from the central computer using a compressed-air duster.
- Check if software updates are available for the central control system and install them as necessary.
- Clean out rain gauges.
- Listen to the pump system as it starts up and shuts down during an irrigation cycle to ensure that it is operating correctly. Check to ensure that pumps turn on and off smoothly, watch for excessive cycling and listen to how the drive ramps up and down.

Checking the satellite controllers and central computer for backup programmes and accurate run times should be done at least once every month

SEMI-ANNUAL MAINTENANCE

- Exercise all quick couplers on the course, especially those that are rarely used.
- At minimum, record pressure readings at high and low points of the irrigation system using quick couplers and a pressure gauge. Compare readings to previous results and note any changes in pressure to identify potential problems.
- Pump system service should occur semi-annually at minimum in climates with a 12-month irrigation season.

ANNUAL MAINTENANCE

- Exercise all isolation valves and drain valves to prevent them from sticking open or closed.
- Pump system service should occur annually in climates with a six to eight month irrigation season.
- Pressure-wash pump system filter or "Y" strainer screens. Check intake screens for clogging and debris.
- Test and certify the function of any backflow prevention devices. Hire a certified technician that works in accordance with state and local testing requirements.
- Test and service pressure-regulating devices.
- Test, clean and service air-release valves by flushing "Y" strainers and exercising ball valves.
- Level and set sprinklers and valve boxes to grade.
- Check antennas and their connections.
- Back up map and programme databases on the central control system to an external device.
- Renew central computer service plan and update the computer according to service schedules.
- Check field controllers to ensure that backup programmes are still installed and relevant.
- Calibrate flow meters on the pump system and water sources.

CONTINUED ON PAGE 36

DISEASE SUCCESS

Anthracnose (*Colletotrichum graminicola*),

Brown Patch (*Rhizoctonia solani*),

Dollar Spot (*Sclerotinia homoeocarpe*),

Helminthosporium Disease (*Bipolaris spp, Drechslera* spp, *Exserohilum spp*),

Pythium Leaf Blight, Pythium Root Rot, Seedling Damping Off (*Pythium spp*),

Fusarium (*Fusarium nivale, Microdochium nivale*),

Take-All Patch (*Gaeumannomyces graminis* var. *avenae*),

Ectotrophic Root Infecting Fungi (ERI) [Autumn strategy]

Spring Dead Spot (*Ophiosphaerella narmari*),

Take-all Patch (*Gaeumannomyces graminis var. avenae*)

Ectotrophic Root Infecting Fungi (ERI) [Spring and Summer strategy]

Couchgrass Decline (*Gaeumannomyces graminis var. graminis*),

Take-all Patch (*Gaeumannomyces graminis var. avenae*)

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Clean field satellite controllers quarterly by dusting, removing cobwebs and replacing insect repellant. This can greatly extend the life span of electrical components

CONTINUED FROM PAGE 34

- Run a test of the battery backup that protects the central computer and replace it if necessary.
- Verify that a sample of grounding readings continues to meet manufacturer specifications. Compare readings across years to identify changes that could indicate reduced lightning protection.
- Check the calibration of weather station sensors and check all connections.
- Inspect quick-coupler hoses and hose-end fittings.

AS NEEDED

- If necessary, hire a contractor to inspect the pump intake and clear any accumulated debris.
- Repair or replace pump intake screens.
- Rewind pump motors and rebuild turbine pumps; replacing seals, bowls and bearings.
- Perform an irrigation field audit every three to five years to monitor water distribution uniformity and sprinkler performance.

DIAGNOSTICS AND REPAIRS

With new technology, some of these tasks can be automated or are incorporated into the features of irrigation equipment. Today's central control systems have the ability to diagnose or troubleshoot many aspects of a golf course irrigation system. They are often able to pinpoint where problems are occurring and can provide diagnostic data such as voltages and amp draws at every sprinkler. These troubleshooting features, currently available with newer irrigation systems, will only expand and improve in the future.

In order to efficiently service an irrigation system, it is important to maintain a small, on-site inventory of irrigation parts. It is difficult to perform maintenance when parts must be ordered every time something goes wrong. Parts inventories should be diverse. However, every golf course should have at minimum a selection of fittings, a small amount of pipe, and repair couplings for every size of pipe used in the irrigation system.

Additionally, sprinkler bodies and internals, sprinkler control wire, wire connectors, gate valves and a variety of nozzles should be readily available. Other items that are good to have on hand include a spare faceplate and several spare circuit boards for field controllers; an electrical multimeter for testing voltage, amperage and resistance; a metal detector; and a wire locator. Two-wire systems will require more specialised diagnostic equipment such as a clamp meter and wire radar device.

Depending on the age and amount of time required to maintain an existing irrigation system, employing an irrigation technician may be advantageous. Irrigation technicians focus on performing both reactive and preventive maintenance, checking pump system operation and keeping the irrigation computer database accurate. A properly trained irrigation technician will keep an irrigation system functioning as intended while reducing additional costs.

A side benefit of proper irrigation system maintenance is the potential for reduced water use. When an irrigation system is in good condition, it is more efficient and saves both water and energy.

Pumps are the heart of an irrigation system. Semi-annual maintenance of electrical and mechanical components by a trained technician ensures efficient operation

CONCLUSION

Although a preventive maintenance programme will not make an irrigation system last forever, it will reduce the labour and materials costs associated with keeping the system operational. It may also help save water and energy while improving playing conditions. A well-maintained irrigation system can even help reduce the stress level of maintenance staff by providing a dependable system they can rely on during hot, dry days when it is most needed.

ACKNOWLEDGEMENTS

ATM wishes to thank the USGA for giving permission to reprint this article. The original article, titled 'Developing a preventative maintenance checklist for golf course irrigation systems', appeared in the 6 October 2017 edition of the USGA's Green Section Record – Vol 55 (19). Brian Vinchesi is president of Irrigation Consulting, Inc., a golf course irrigation and consulting firm in Massachusetts, US.

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A Successful Result for Glenelg?

Back ATM Volume 9.5, Daryl Sellar wrote about Glenelg Golf Club's ground-breaking aquifer storage and recovery project that it was hoping would future-proof the club's irrigation needs. Ten years on, he looks back at how the scheme has evolved, some of the lessons learned and asks whether it has all been worth it.

Above: Glenelg was one of three Adelaide golf clubs to invest in an aquifer storage and recovery scheme in the 2000s. The scheme has settled in well, with performance becoming more reliable and predictable

It's hard to believe 10 years have passed since the last time I wrote about the aquifer storage and recovery (ASR) Scheme at Glenelg Golf Club **(ATM Volume 9.5 – Sept-Oct 2007, 'ASR scheme gives Glenelg the green light', p12-16)**. Pardon the pun, but a lot of water has literally gone under the bridge since then, so the chance to put together some thoughts on the scheme's operation is very timely.

The primary objective of the scheme for Glenelg Golf Club (GGC) was to secure a high quality water source for the course for the foreseeable future. There was also genuine interest in the environmental benefits of such a scheme (i.e.: reducing stormwater outfall to the ocean and replenishing the depleting Adelaide Plains aquifer), with the club being mindful of positioning itself as a responsible corporate citizen in an increasing environment of public scrutiny over water use for turf irrigation.

Adelaide has a proud history of ASR scheme operation, with the work of the City of Salisbury deservedly attracting considerable kudos during the 1990s. The GGC scheme was one of three golf course inspired projects that actually came about through a need to improve flood management (the irony!) during the early 2000s, with state and federal government funding being made available for schemes designed to reduce pressure on the inadequate stormwater infrastructure of the western suburbs.

Glenelg, Royal Adelaide and The Grange golf clubs successfully applied for funds to construct similar ASR schemes, with Glenelg's being the third of the trifecta to be constructed. Funding was split three ways with the state and federal governments, with the club's investment being close to $1 million in the end.

The concept of ASR involves;

- The harvesting/collection of stormwater;
- Treating it to a quality that meets Environmental Protection Agency (EPA) requirements for injection into the underlying aquifer; and
- Storing it in the aquifer until it is required for re-use (i.e.: irrigation)

In the case of Glenelg's scheme, this involves;

- Pumping water 350 metres from adjacent Brownhill Creek to the north eastern corner of the golf course. Brownhill Creek flows nearly continuously during winter, allowing the use of smaller pumps (compared to schemes that capture high flows immediately following storm events) yielding up to 60L/sec that can run continuously with adequate depth in the creek. The catchment area is approximately 120km^2 and extends out to the Adelaide Hills;
- Water is released into the first of three 'cells' of a 1.4 hectare constructed wetland, where it takes three days to flow through various bands of vegetation and open water to the end of Cell 3 (see photo page 40 for a system overview).
- Water quality is monitored continuously at this point, and if it meets the necessary criteria, it is then pumped at up to 45L/sec over a distance of up to 850m to three injection bores, which double as extraction bores as well. Typically, the above takes place during winter, so the water is then stored in the aquifer until irrigation season commences.

Planning for the GGC scheme started in 2003, with construction carried out over the summer of 2008/09 and injection commencing 2011. The two years from completion of construction to commencing injection was necessary to allow the wetland plants to mature sufficiently to perform the required filtering of the stormwater.

AQUIFERS AIN'T AQUIFERS

The Adelaide Plains aquifer is particularly conducive to ASR, as it is quite stable and slow moving (apparently 5m/year), therefore as fresh water is injected it displaces the more saline groundwater water away from the bore, creating a 'bubble' of fresh water. This bubble then reduces in size as water is extracted during irrigation season, but over time, if more water is injected than extracted, the likelihood of extracting saline water decreases. Many aquifers are not suitable for ASR, with fractured rock systems often flowing rapidly, resulting in injected water moving off site and unable to be extracted.

The initial modelling of the GGC system suggested up to 300 megalitres per year could be injected, which 20 years ago was around the annual water consumption for the course. However, the course redevelopment, conversion of turf species, refinements to management practices etc... have seen this figure reduced to around 200ML/year. As a result, there should be no problems injecting more water than is extracted, creating a surplus and larger bubble of fresh water to draw upon... theoretically! However, the reality to date has been slightly different.

Since injection commenced, annual results have been;

- **2010/11:** 94ML
- **2011/12**: 85ML
- **2012/13:** 69ML
- **2013/14:** 80ML
- **2014/15:** 100ML
- **2015/16:** 125ML
- **2016/17:** 164ML
- **Note:** May-October 2016 saw 223.8ML injected

There have been a number of factors that have limited the yields against expectations;

- Initial (Year 1 and 2) algae blooms resulted in plant debris blocking wetland pumps.
- The injection of fresh water into the limestone aquifer has dissolved the underlying limestone, creating instability of the bore hole, restricting injectable and extractable flows and creating sediment that has blocked irrigation components and storage tanks.
- Initial levels set within wetland controls were inoperable with harvesting not being permitted as quickly as it should and being shut off earlier than required.
- Initial water quality threshold levels were inoperable, restricting the injected amount.

Algal blooms, which blocked screens and restricted flow to the wetland pumps, were among a number of teething problems which had to be overcome early on in the system's operation

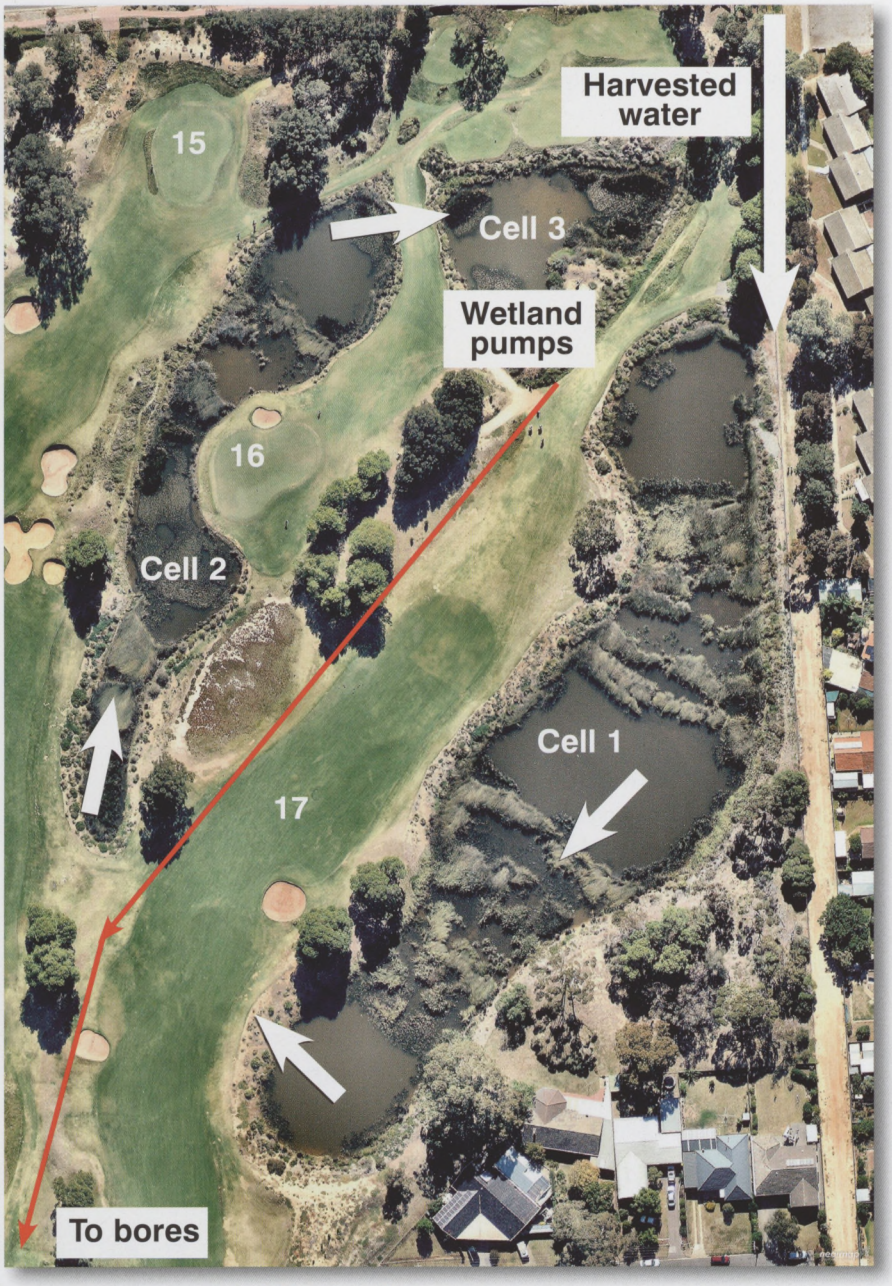


PHOTO: NEARMAP

An overview of the GGC ASR scheme. Harvested water from a 120km² catchment is treated through a series of wetland cells totalling 1.4 hectares before being pumped to three aquifer injection/extraction bores

- Location of water quality monitoring equipment was not allowing representative sampling of lake water, promoting algae growth that was providing false readings.
- Isolated component failures.
- Flow and pressure settings within the system restricting rate of injection.
- Rainfall patterns have at times resulted in initial 'flushing' of Brownhill Creek taking longer than expected for water quality to be deemed acceptable.
- No rain!

Many of these issues were teething problems that, whilst frustrating, were to be expected in a system as complex as this. A number of them have resulted in modifications to fittings, control locations, filtering components and even reviews of water quality targets. While it is true these have been frustrating at times, a longer term view of the value of the system helps to keep these in perspective as they have largely been 'one-off' fixes. In more recent times, it has been the lack or inconsistency of rain that has limited injection volumes.

Despite the hurdles, the scheme has been successful on a number of fronts;

- The quality of water has assisted turf management with salinity levels typically around 500mg/L compared to natural ground water being between 1200 and 1900mg/L.
- The wetlands themselves have enhanced the north eastern corner of the course, with holes 15, 16 and 17 benefiting directly. Bird life has increased and become more diverse with the introduction of the wetlands.
- The interest in environmental management has resulted in numerous tours by local schools to educate them on what the club is doing.
- Secured a relatively economical high quality water supply, with whole of production cost approximately $800/ML (compared to recycled water that is very variable but in excess of $1000/ML and potable water at $3500/ML).
- 2016 demonstrated the capacity of the system to deliver in excess of the course's annual water requirements, with 223ML able to be injected (even with some persistent limitations on injectable rates) due to some good rainfall in the catchment area.
- Club pride in the scheme and visible education for the club on the value of water.

The maintenance of the system has been greatly assisted by the design of the control system and its physical form which integrates with the course very well, especially now the plants have matured.

- Weed control on banks is ongoing, but generally not too time-consuming (20-25 hours/year)
- Monitoring of the system (water levels, valve status, pressure, water quality etc...) is automated with displays and readings fed back to the main office.

- Monthly compliance reporting on water levels and draw down readings.
- Annual reporting on system changes, non-conformances and usage requirements.
- Annual pre-injection water quality testing (between $500 and $1500).
- Annual removal of carp (currently approx. $5000) and regular removal of *Typha* spp from wetland beds.

MORE IS BETTER?

While the winter of 2016 was a great one for harvesting stormwater, it revealed another challenge for the club. With two other operating schemes within four kilometres of the course, and a third commencing across the road, the pressure created within the aquifer from constant injection saw bores of varying ages within neighbouring suburbs becoming artesian (flowing).

The issue of responsibility was a contentious one, but the three existing operators and the regulators undertook a very productive, practical approach as everyone was learning from the experience. It has led to the development of some monitoring obligations for scheme operators to avoid the creation of artesian conditions into the future.

The cost of power will also determine how much water is harvested into the future, with a surplus of injected water possibly being a luxury that cannot be afforded, even if the water is available. The current budgeted figure is $40,000 per annum for harvesting and injection power, plus an additional $80,000 for extraction and irrigation pump power.

WHAT HAVE WE LEARNT?

The ASR scheme at GGC has undoubtedly been a success, but it is clear that some lessons have been learned along the way.

Typha removal from the wetland beds is important to ensure the scheme's designed flows are not compromised

- **Be involved in the planning process:** Having a seat at the planning table from the outset enabled the club to articulate aspects that were critical for the long-term acceptance and management of the scheme. This could include the location of necessary hardware through to the shaping of wetlands (although it needs to be understood they are engineered to be functional, not beautiful).
- **Utilise local contractors wherever possible:** Due to the nature of funding for the project, national tenders were called but fortunately our local electrical contractor was part of the successful submission. They knew our needs and the course very well, and hence were able to alert us to things that needed to be considered from a system control and power demand perspective. It also ensured great back-up once the system was operational.
- **Ensure the club has a say in final acceptance of completed works:** Provides greater assurance that components specified are actually utilised.

The ASR scheme has significantly improved the quality of Glenelg's irrigation water with salinity levels typically around 500mg/L compared to the natural ground water which can be up to 1900mg/L

Glenelg's ASR scheme has attracted plenty of interest from local schools and environmental management groups

- **Ensure you have remote control and visibility of the system:** Monitoring of an ASR scheme is constant and a lot of time can be wasted travelling around the site checking performance, water levels etc… and then recording them. An appropriate control system will automate this process saving hundreds of hours each year.
- **Investigate all the water source options, their costs and their likely social acceptance:** ASR is a great option, but it isn't the only one. In building a case for ASR, it is important to be mindful of the other options, their capital and maintenance costs and the likelihood that they will be available into the future.
- **Understand your aquifer:** Not all aquifers are suitable for ASR and some will behave differently once water is injected into them. Hydrogeologists can be very helpful in gaining an understanding of how your aquifer is going to respond to the injection of water and what the practical implications will be for the operator.
- **Ask questions and demand training:** While we understand irrigation practices and principles, ASR is a different game and we shouldn't be afraid to ask lots of questions to gain an understanding of how the system operates. Once constructed, it is likely you will be on your own to make it work, so you will want to have several staff members across the operational requirements of the system.
- **Think outside your boundaries:** Although injection of water into a bore on your property seems quite localised, it needs to be understood that you could be impacting neighbouring properties.
- **Understand your licence agreement:** Not that there is anything to be afraid of, but it pays to consider 'what that phrase means', even if it seems unlikely to occur.
- **Be patient:** There *will* be glitches, headaches and problems. But they should be one-off issues that diminish over time, so keep the focus on the long-term benefits of the scheme.

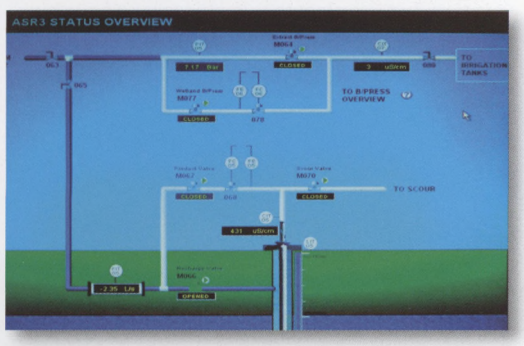
HAS IT ALL BEEN WORTH IT?

The ASR scheme at Glenelg has settled in well, with performance becoming more reliable and predictable. It is now at an age where some refurbishment of vegetation and early infrastructure is now required. Planning has started for the replacement of things like cabinets and fittings that are weathering and pumps being assessed as to their likely lifespan to ensure future reliability.

As well as the ASR scheme is performing, water supply is always going to be a competitive and at times volatile market in a climate such as Adelaide's, so the option of accessing recycled water again as a back-up source is being considered.

So has it all been worth it? Absolutely! The management and members responsible for undertaking the circa $1 million investment some 15 years ago should be justifiably proud of their decision, as the current members are of the end result. The course team have done an amazing job maintaining the system and also take pride in what the system represents.

Long-term decisions can be the hardest to adopt, but everyone is confident the benefits will be with the club for a long time to come.



Right: Monitoring of the system (water levels, valve status, pressure, water quality etc…) is fully automated

Bottom: Wetland cell one (adjacent to Glenelg's 17th fairway) during initial construction and planting (below) and as it looks today (right)

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ATM's expert columnist John Neylan continues the discussion on perched water table greens construction and also ruminates about the role that cultural practices could play in assisting with *Poa* control in warm-season grasses.

What's the right recipe?

In a recent article by AGCSATech senior agronomist Bruce Macphee ***(ATM Volume 19.4 – 'Understanding PWTs', p38-41)*** the perched water table concept and moisture release curves were discussed. As on most occasions when this topic is discussed, it stimulates a wave of heated debate about the best sands and the best way to build a golf green. Is the science correct, is it actually relevant and is the laboratory theory replicated in the field? In short, the soil physics are sound but what happens in the field is still in doubt and there are still questions as to whether there is any relevance.

The first perched water table greens came about through the work undertaken by the USGA Greens Section in the late 1950s and early 1960s and was in response to an increase in golf activity and the associated traffic and the failure of soil-based greens to tolerate the wear. This story is very similar to the progression of Australian golf courses to move from loamy sand type golf greens to a more specific sand-based construction.

The 'Specifications for a Method of Putting Green Construction' were first published in 1960 (USGA Greens Section Staff) and have formed the basis of the guidelines that have been refined over the past 57 years. The question in my mind has always been whether those that developed the USGA Greens Section Guidelines for greens construction actually had the perched water table as a key aspect in mind?

In the 1960 guidelines the emphasis was on high permeability soils over an intermediate sand layer which was placed over a gravel layer and subsoil drains. The guidelines at that time emphasised the advantages of rapid drainage, good aeration, deep rooting, protection against diseases, protection against over-watering, protection against salt problems, a putting surface which holds a shot without being overly wet and one which resists pitting by golf balls.

The guidelines emphasised the physical characteristics of the soil that are important for good turf growth and are still true today. That is, on a compacted sample the total porosity is a minimum of 33 per cent v/v, aeration porosity 12-18 per cent v/v and capillary porosity 15-21 per cent v/v and a

Above: Organic matter accumulation dramatically alters the moisture release characteristics of a greens construction sand

saturated conductivity of 150-460mm/hr. In the 1960 guidelines there was no mention of the perching affect at the gravel sand interface.

Marvin Ferguson (former National Director, USGA Green Section) was one of the drivers of the guidelines for greens construction and in an article in 1983 he discussed the challenges of managing sand profiles. He notes that the doughtiness of sands could be mostly overcome by the use of a gravel blanket at a depth of 300mm where the gravel provides rapid drainage and forms the perched water table which provides a reservoir of available water.

This concept seems to have come about through research by Miller and Bunger (1963), Dougrameji (1965) and Unger (1971) where it was identified that having a coarse-textured strata within the soil profile will result in a "perched water table" and increase the water retention of the entire profile. The 1989 specifications stated that the coarse sand layer was an integral part of the perched water table concept and seems to have more formally integrated this phenomenon into the specifications.

In Hummel's (1993) detailed review of the greens specification, the need for the intermediate sand layer was questioned from a perched water table perspective. Hummel (1993) cited research where providing that the correct gravel size was used it would both prevent the migration of fine soil particles as well as form a perched water table.

While the perched water table and its importance is recognised within the USGA guidelines, the development of the moisture release curve (MRC) is not documented and is not related to the depth of the rootzone layer. All measurements are undertaken at a standard tension of 300mm and presumes a rootzone depth of 300mm.

McIntyre and Jakobsen (1998) and McIntyre et.al. (2007) have used the MRC as a method of determining the optimum depth of the sand rootzone so that the root system of the turf has optimum access to the water stored in the capillary fringe or perched water table. Consequently, the optimum depth of the rootzone sand becomes specific to that particular sand and as a generalisation is less than the standard depth of 300mm used by the USGA Green Section guidelines.

The only question around the McIntyre et.al. (2007) method is the reliance on laboratory tests to provide such a specific rootzone depth. In particular, the rationale of adding 100mm to the top of the perched water table to give roots access to sufficient water to reach the top of the perched water table is somewhat questionable.

The theory around the perching or accumulation of water at the interface between contrasting layers (e.g. sand over gravel) is well proven. The question then becomes whether the concept holds true and predictable under field conditions. The research that I undertook into the characteristics of various sands for greens construction ***(ATM Volume 16.5 – 'Hard and fast', p40-44 – and Volume 16.6 – 'Navigating the curves', p42-46)*** looked at how sands and soils perform in the field but also how we measure these characteristics in the laboratory.

The results of laboratory analysis, in particular the MRC, has always been a constant source of

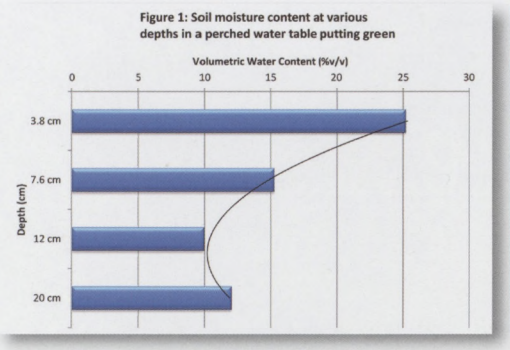

Figure 1. Soil moisture content at various depths in a perched water table putting green

Figure 2: Comparison of the soil moisture content of the surface layer and the underlying sand in 21 perched water table golf greens

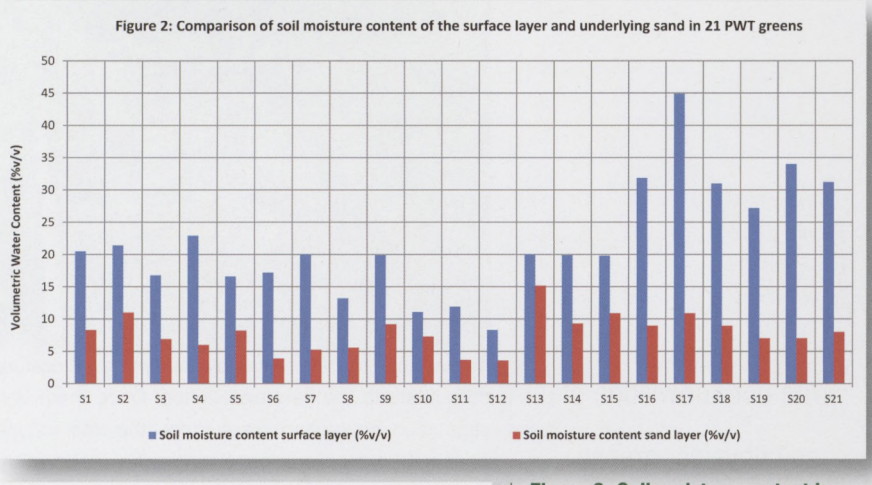

Figure 3: Soil moisture content in sand profiles

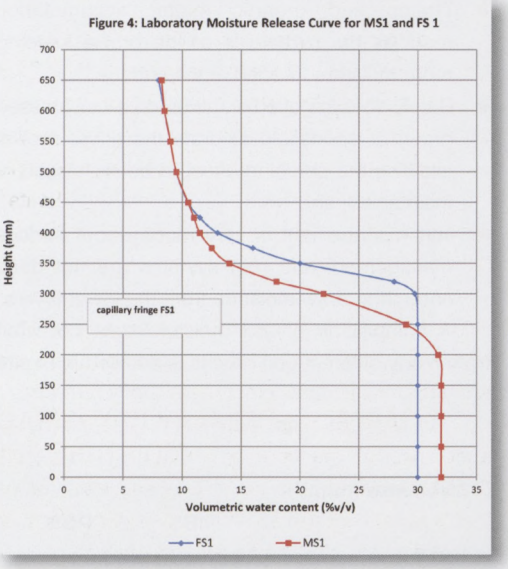

Figure 4: Laboratory moisture release curve for MS1 and FS1 sands

How long did it take for this mature *Poa* plant to get to this size?

> "With our knowledge of soil physics, greens construction can be more innovative and site specific. The key is testing materials and understanding their characteristics, having a strict testing regime during construction, good construction methodology and an appropriate maintenance regime."

debate and in particular how does the laboratory data relate to the field experience. Once there is a vegetation cover and plant roots, the interactions become more complex and the laboratory determined characteristics can alter markedly.

With the sand research project and my field observations of golf greens, there is often a disparity between the laboratory results and the field observations. In my field observations of having taken many core samples from sand profiles, very few of them have the moisture profile as determined in the laboratory.

An example of this is provided in Figure 1 and should be compared with the laboratory-generated curve (Figure 4). There are several reasons for this;

- Thatch and organic matter accumulation modifies the hydraulics of the profile keeping more moisture trapped at the surface;
- Rarely does irrigation or rainfall on a well grassed green or sportsfield saturate the entire profile, allowing the perching effect to be recharged or maintained; and
- Turf management is very much about surface management and root systems are not deep enough to draw moisture from the lower layers.

A compilation of soil moisture data collected from many different golf greens is detailed in Figure 2. The measurements were taken in the top 7.6cm of the profile (includes turf and organic matter layer) and then the underlying sand layer using a FieldScout™ TDR moisture probe. As can be seen, the difference is considerable with the surface layer having 24-79 per cent more moisture than the underlying sand. This immediately demonstrates that the dynamics of the MRC for a sand at field capacity is altered dramatically by the turf layer. This occurrence then often dictates how the greens are managed in terms of irrigation and rarely is the entire profile re-wetted and the perched water table restored.

With the sand research project, I sampled each of the different sand profiles to determine what the moisture profile would be following saturation and drainage. My principle interest was to see how closely the moisture profile mimicked the laboratory results. The profiles were saturated by capillary rise and then irrigated until water was running from the drainage outlet. Once the profiles had drained, samples were taken at 5cm increments and the gravimetric water content determined.

The results for several sands (Table 1) are detailed in Figure 3 and are compared to a MRC generated in the laboratory for FS1 and MS1 (Figure 4). In the laboratory-generated MRC, note

TABLE 1: SUMMARY OF CHARACTERISTICS FOR SANDS USED IN THE MOISTURE PROFILE EXPERIMENT

Sieve size (mm)	% Particles retained*					
	MBS	PGS	FS1	MS1	FS2	MS2
<0.053	0.8	0.5	2.8	0.7	2.2	0.5
Fineness modulus	0.94	0.91	0.94	0.96	0.87	0.97
Cu = D60/D10	1.53	1.88	2.35	2.06	1.62	2.2
Description**	U/F	MU/F	WG/F	WG/F	MU/F	WG/F
Infiltration rate (mm/hr)	450 (68 – 825)	223 (150 – 330)	256 (217 – 266)	869 (750 – 1061)	296 (206 – 397)	1041 (963 – 1147)

*Sand gradings done by wet sieve analysis **U = uniform, MU = moderately uniform, F = fine

the difference in the height of the capillary fringe for the two sands. That is, the capillary fringe is considerably higher for the finer FS1 sand compared to the coarser MS1 sand.

The final question around the perched water table golf green is what happens when it is not flat. Once a green has undulations in the surface, the forces of gravity start to direct water to the low point at the detriment of the perching effect in the more elevated sections of the green. Prettyman and McCoy (1999) demonstrated that when the green has undulating areas, moisture extremes in the rootzone often lead to turfgrass decline.

In my field observations, it is not uncommon to find saturated conditions and black layer in the low points of these undulations. It has also been observed on a sand-based racetrack with a substantial slope on the turns that the inside portion (low point) of the track becomes saturated and the outer section dry.

Frank et. Al. (2005) went to the extreme of building a profile with a variable rootzone depth on a sloping profile. The depth of the rootzone varied from 200mm at the high points and 400mm in the low points. In general, their research found that in areas of undulation the uniform rootzone depth can result in moisture extremes at the different elevations and that modifying the depth of the sand rootzone improved the uniformity of volumetric water content across the surface of an undulating putting green.

In recent times there has been a question around the applicability of the USGA/perched water table method of greens construction and its relationship to firm and fast greens. Interestingly, the playing characteristics of the putting surface don't appear to have been studied in any great detail as it relates to the firmness of the putting surface.

Ferguson (1983) did make mention of this aspect in his article in that there is one major objective – the green must provide a satisfactory surface for playing the game. "It must hold a well-played approach shot without being severely marked and it must allow a putt to roll true". In addition to these needs of the plant, a soil for putting greens must also be stable and firm. While Ferguson (1983) made these comments there was no further discussion regarding the physical attributes that provide stability and firmness.

So where are we at? The perched water table profile, the USGA profile, the California method of greens construction and, on the right site, the 'push up' green, all have validity. There is no 'absolute way' to build a sand-based profile.

In an article written by world-renowned golf course architect Mike Hurdzan (2000), he makes the comment that he believes that there isn't any one best way to build a green. He makes the observation that the preferred method is the one best suited to any given combination of microclimate, irrigation water source, turfgrass, construction budget,

From left, *Poa annua* seedlings at 24, 37 and 55 days after germination

maintenance goal and golfer expectations, and it is not always the USGA method. However, what he emphasises, as do many other researchers on this topic, is that testing and selecting the most appropriate sands and gravels is paramount.

In conclusion, the perched water table greens profile is well proven providing that the correct sands and gravels are selected and there has been good construction methodology employed. There is no doubt that it is a good recipe with a predictable performance. However, with our knowledge of soil physics, greens construction can be more innovative and site specific, particularly when using native sands or searching for other characteristics such as surface firmness. The key is testing materials and understanding their characteristics, having a strict testing regime during construction, good construction methodology and, of course, an appropriate maintenance regime.

POA ANNUA SEEDLINGS – ARE WE KEEPING THEM ALIVE?

In keeping with my interest (and some may say obsession) with *Poa annua*, I continue to make observations regarding its characteristics and some of the factors that may be making it difficult to control.

Over the past 12 months, since the herbicide resistance testing was commenced, I have taken core samples from numerous locations where there has been recorded herbicide resistance. This has been primarily to determine the size of the seed bank but also to observe the growth characteristics of the plants and their mature plant form and whether this relates in any way to controlling it.

The size of the *Poa* seed bank is considerable with 1500 to 20,000 seedlings per square metre recorded (average about 7500) with about 90 per cent of the population occurring in the thatch layer. Clearly there is a large potential reserve of new plants with the possibility that a high proportion of the population will have herbicide resistance.

The second aspect is that it takes about two weeks for germination to occur, irrespective of where the samples come from (including different golf courses and different states) and then over the next 4-6 weeks the seedlings do not progress particularly quickly from the single leaf stage. From six weeks onwards, providing that the conditions are favourable, there is an increase in tiller numbers at which time the plant is relatively large and would be noticeable within a turf sward.

So what is the relevance? It has become apparent that many golf courses are at a very high level of conditioning and in particular the presentation of the fairways. The fairways are being watered and fertilised more regularly which is going to favour the survival of *Poa annua*, even during periods of high stress.

In the early days of using couch in the southern states, water was either at a premium or the irrigation systems were incapable of irrigating frequently and therefore there was a natural decline of the *Poa annua* population as the fairways dried out over summer. Given the mild spring/summer experienced in SE Australia in 2016/17 and the high aesthetic presentation of fairways, there is a good chance that these inconspicuous plants survived through the summer and then matured in the autumn/winter period.

So the question is what are the ramifications? If these plants are present they will be well protected by the couch from herbicides and possibly heat and moisture stress. If they survive the summer, they are likely to be unaffected by the late summer/early autumn application of pre-emergent herbicides.

So what to do? The obvious tactic is to review the irrigation and fertilising practices on fairways. While the visual aesthetics have some importance, the traditional summer couch fairways have been one where the turf has good density, provides a great golfing surface but is an off-green colour.

Watering deeply once every two weeks or so will be sufficient for keeping couch strong and healthy while placing the *Poa annua* under greater stress. The heat and drought resistance of couch was why it was planted in the first place and these attributes need to be exploited as a means of controlling *Poa annua* seedlings.

With all the discussions, forums and workshops held over the past 12 months, it is obvious that *Poa annua* control is more than what herbicide we can throw at it. It requires a multi-faceted approach including cultural practices, as well as the strategic use of herbicides. So now the question is, if good control is to be achieved are we prepared to revert to some older practices now that an expectation has been created?

"The heat and drought resistance of couch was why it was planted in the first place and these attributes need to be exploited as a means of controlling *Poa annua* seedlings."

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Changing properties

At the recent International Turfgrass Research Conference in New Jersey, Penn State University Professor Mike Fidanza presented a paper documenting the changes in USGA rootzone properties in ultradwarf bermudagrass greens over a period of eight years.

The new ultradwarf couchgrass hybrids, such as Tifeagle (pictured here at RACV Royal Pines on the Gold Coast), can provide superior playing surfaces, but they require close monitoring and management of thatch, organic matter levels and saturated hydraulic conductivity

The USGA Green Section has developed standardised methods or specifications of putting green construction to provide uniform playability and performance. The principle factors in the specifications address rootzone parameters of particle size distribution, profile depth, and to a less detailed extent, organic matter (OM) content (Beard, 1973), with the system widely adapted around the world (Aldous, 2011).

However, it is well recognised that the chemical and physical rootzone properties of greens change from the day the green is established (Lewis et al., 2010; Oatis, 2010; Schmid et al., 2014). Chemical properties can be managed and adjusted (McCarty, 2004), but physical properties such as particle size, pore space distribution, thatch accumulation and soil OM content are more difficult to modify (Lowe, 2014; Waddington et al., 1992).

Typically, cultivation methods such as verticutting and hollowcore aerification are employed to address those physical problems, but these methods can be damaging to the turfgrass surface and temporarily affect play (Moeller, 2010). Consequently, golf course superintendents must justify the need for such measures (Gross, 2013) and having quantitative information on green rootzone properties can help with this justification.

Thatch is defined as a tightly intermingled layer of living and dead stems, leaves and roots that accumulate between the turfgrass and the soil below (Turgeon, 2011). Thatch is a normal component of an actively growing turf and as long as it is not too thick it can increase the resilience of the turf to heavy traffic (Moeller and Bigelow, 2007). For example, thatch develops more readily on high-maintenance lawns than on low-maintenance lawns and is typical in turfgrass swards containing species that spread by stolons or rhizomes (Turgeon, 2011).

Thatch and OM can accumulate rapidly, especially when ultradwarf bermudagrass hybrids are used (McCarty, 2004). Additionally, permeability or the ability of water to move through the soil can decrease in response to OM accumulation (Lewis et al., 2010; Lowe, 2014; Waddington et al., 1992).

For example, new Tifeagle ultradwarf bermudagrass USGA-specification greens were established on a golf course in southern Florida in the summer of 2003. In autumn 2004, OM in the 2.5cm to 7.5cm rootzone layer averaged 3 per cent (by weight) over the two greens measured, and saturated hydraulic conductivity (Ksat) averaged 50cm/hr. One year later in autumn 2005, OM averaged 5.5 per cent, or an 83 per cent increase, and Ksat averaged 7.5cm/hr, or an 85 per cent decrease. This initial observation led us to conduct this case study.

MATERIALS AND METHODS

Soil samples were collected to quantify thatch, OM accumulation, and Ksat of two ultradwarf bermudagrass USGA-specification greens on each of four southern Florida golf courses (eight greens in total) over a period of eight years from 2006 to 2013. Rootzone samples were generally extracted in the spring, just prior to the start of the early-summer cultivation programme and again in autumn after the completion of late-summer cultivation.

The cultivation programme generally consisted of three to four hollow-tine aerifications spaced 5.1cm apart to a depth of 7.6cm and scheduled monthly from mid-June through mid-September. These cultivation procedures included core removal and sand topdressing to fill the holes (Foy, 2014; Guertal and White, 1998).

The greens received multiple verticuttings during the summer months (Lowe, 2013). Less aggressive verticutting was used in the winter months, along with periodic solid tine and/or hydroject aerification, as well as light sand topdressings (Lowe, 2012). Overall, the greens were subjected to normal or routine maintenance for ultradwarf bermudagrass (McCarty, 2004).

For thatch and Ksat assessment, four relatively undisturbed rootzone cores measuring 5cm diameter by 7.5cm deep were collected in PVC pipe cylinders from two greens each and on each of four golf courses in southern Florida in the spring and autumn from October 2006 to October 2013 for thatch and from April 2009 to October 2013 for Ksat.

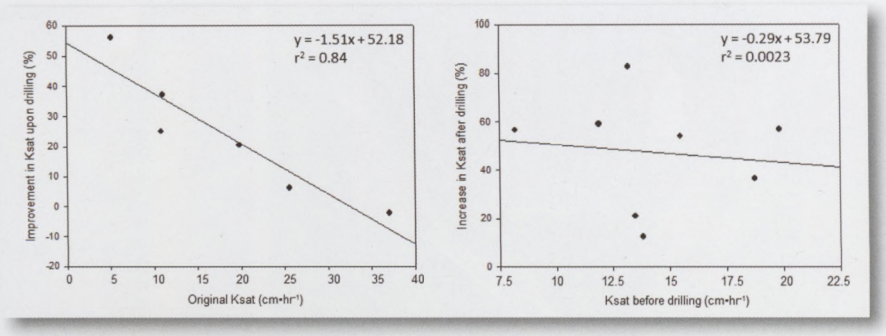
For determination of OM content in thatch and stained rootzone layers, eight cores, 1.9cm in diameter by ~20cm deep, were collected using a standard soil probe from two greens each and on each of those four southern Florida golf courses during each spring and autumn sampling time from April 2008 to October 2013. Rootzone samples were generally extracted in the spring, just prior to the start of the early-summer cultivation programme, and again in the autumn after the completion of late-summer cultivation.

THATCH

The 1.9cm diameter rootzone cores were divided into thatch, stained and original sections (see photo above). The verdure and thatch layer, which hereafter will be termed 'thatch' (even though the term 'mat' may be more appropriate), was separated from the lower OM stained layer subjectively by cutting with a knife at the depth where resistance to cutting decreased substantially.

Within the context of this case study, the stained layer is defined as a zone of OM deposition that, over time, differs from the original rootzone mix and can be delineated visually by colour, as well as physical resistance. The thatch depth or thickness was measured on each sample from spring 2006 to autumn 2013 and the thatch was retained. The depth or thickness of the OM-stained layer below the thatch was also measured from spring 2006 to

Two examples within the soil samplers – thatch layer (top), organic matter-stained layer (centre) and original rootzone layer (bottom) in a rootzone core taken from a Tifeagle green in southern Florida



Top: Figure 1. If an increase in Ksat was observed due to holes through the thatch, relative to the initial Ksat determination, and the effect was most pronounced in samples having an initial low Ksat (graph to the left), it is assumed that thatch has a strong influence on Ksat. If there is little relationship between changes in Ksat due to holes and the initial Ksat (graph on the right), it is assumed that the thatch is not greatly controlling Ksat and suggests that the rootzone below the thatch may be more influential

Above: An undisturbed core taken from a golf green with seven 0.80-cm-diameter holes drilled through the thatch layer to gauge the effect of thatch on saturated hydraulic conductivity

autumn 2013 and the stained layer was retained. Periodically, material from below the stained layer was collected to represent the original rootzone material used to construct the greens.

ORGANIC MATTER

The OM content was determined on the thatch, OM-stained layer and underlying rootzone material as percentage by weight loss after ignition. After ashing, particle sizes were determined on the remaining material by screening through a nest of sieves.

SATURATED HYDRAULIC CONDUCTIVITY

The Ksat was measured on the 5cm-diameter cores, which contained both turfgrass and thatch, and followed the procedures described by the USGA. However, it should be noted that the USGA procedures were designed to predict the suitability of rootzone mixtures for green construction, and not for analysing undisturbed cores from existing greens. For example, the procedure calls for compacting the mixture prior to analysis. For the undisturbed cores in this investigation, laboratory compaction did not seem appropriate and was not conducted.

The USGA Ksat procedure does not assume that turf is present, as it was in the 5cm-diameter cores. In some cases, after conducting the Ksat analyses, eight 0.78cm-diameter holes at 2.5cm deep were made in each core with a cork borer and Ksat was measured again to gauge the effect of the thatch layer on Ksat (Figure 1). The initial Ksat reflects the conductivity of an undisturbed core; however, the thatch coring procedure was employed to provide further insight into Ksat of suspected restrictive layers (Figure 1).

For example, after thatch coring, if Ksat was increased, then the restrictive layer was thatch, and therefore a recommendation would be to encourage cultivation (i.e., shallow coring, verticutting, etc.) to relieve thatch layer conductivity restrictions. After thatch coring, if there was slight or no Ksat improvement, then cultivation would be recommended to improve conductivity below the thatch layer and deeper in the soil rootzone.

RESULTS
THATCH

Over the eight year assessment, the measured depth of thatch stabilised at 2.5cm or less, whereas the OM-stained layer increased in thickness to nearly 10cm (Figure 2). Initially, the rootzone below the thatch probably becomes stained with OM as roots extend into it, senesce and decompose to form humus.

Over time, however, the stained layer likely increases in thickness, not because of deeper rooting, but rather because of increasing rootzone thickness due to repeated sand topdressings. The green's turfgrass surface grows upward and the lower regions of thatch decompose to contribute humus to the underlying stained layer (see photo opposite page). Thus, the stained layer increased in thickness over time in the rootzones of these greens (Figure 2).

ORGANIC MATTER

The OM content in the thatch and stained layers generally fluctuated over the year (Figure 3, p54) in response to the cultivation programme (i.e., verticutting and hollow-core aerification). In both layers, the OM content was greater in the spring than in the autumn. This occurred despite the fact that the warm-season turfgrass growth is much greater in the summer than in the winter, because superintendents in Florida typically conduct active cultivation programmes in the summer with the goal of removing excess OM or preventing excess OM accumulation. The increase in OM over winter, even with reduced turfgrass growth, indicates that OM 'buildup' would occur over time if an aggressive OM removal programme was not conducted.

As was shown in Figure 2, the OM-stained layer increased in thickness over time. However, if the OM content is stable and relatively low, as was the case with all greens measured on all four golf courses (Figure 3), then the increased thickness should not cause a significant reduction in soil porosity. Of note, OM content of the stained layer exhibited a slight decrease over time (Figure 3), but the minimum OM content of thatch showed a slight increase

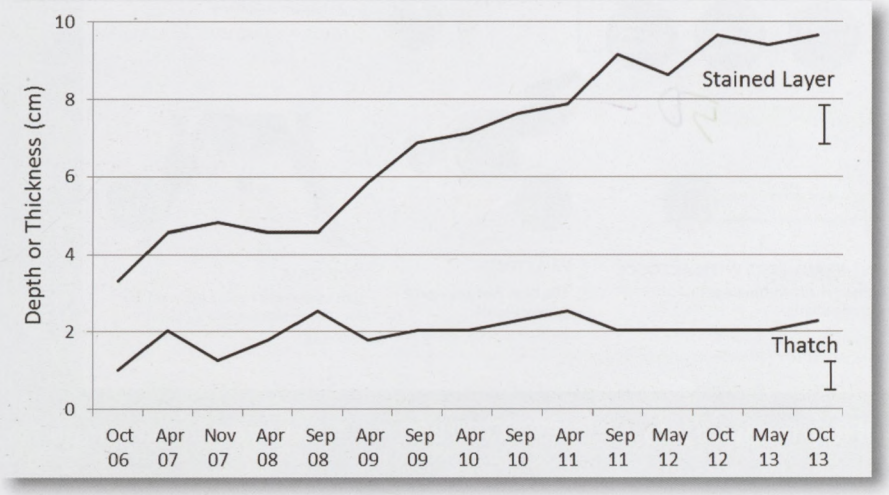


Figure 2. Depth of thatch and thickness of the organic matter-stained layer measured from October 2006 to October 2013, representing a spring and autumn assessment each year

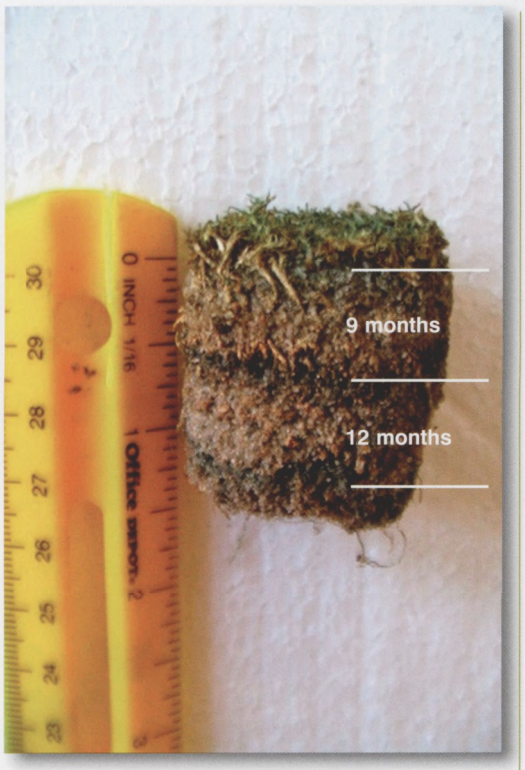
over time (Figure 3). Thus, cultivation programmes were successful in managing OM content in the stained layer, but more cultivation may be needed to decrease OM content in the thatch layer.

These observations reveal that the depth (or thickness) of the stained layer increases over time, and OM content is diluted as topdressing sand is included in the original rootzone mix. Notably, with cultivation, some OM is removed with the expelled cores and the empty coring holes are filled by lower-OM-content topdressing sand, which most likely results in the stain layer having a stable OM content. Also of note, OM content in thatch at about the 1cm depth increased over time, suggesting that more topdressing sand and/or cultivation is needed to reduce thatch OM content.

SATURATED HYDRAULIC CONDUCTIVITY

Ksat also fluctuated over the seasons. The Ksat was typically lower in the spring and higher in the autumn, which could be attributed to summer cultivation practices that removed OM both in the thatch and in the underlying stained layer. Increased Ksat is indicative of increased rootzone porosity, which favours movement of not only water but also oxygen into the rootzone and carbon dioxide out of the rootzone (Waddington et al., 1992).

The Ksat data was subjected to CV analysis which is a statistical measurement of the variability among observations and is expressed as a percentage. A CV for Ksat indicates the uniformity of the porosity in a green's rootzone and therefore uniformity for an entire green would be considered a favourable trait (Lowe, 2012). As illustrated over time, the CV was generally greater in the spring than



Example of upward rootzone growth of a sand-based ultradwarf bermudagrass golf green due to repeated sand topdressings. At this particular course, the superintendent used black sand topdressing during the winter, making it possible to observe the effect of repeated topdressings at 9 and 12 months later

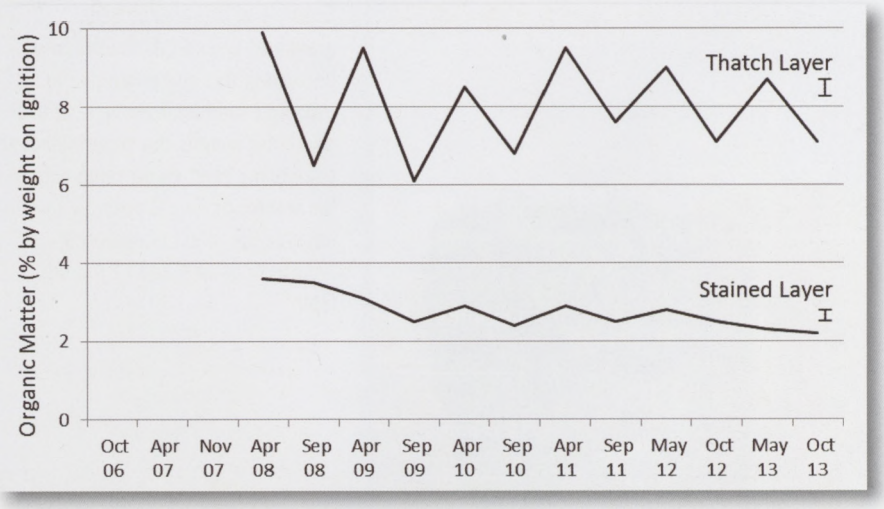


Figure 3. Organic matter measured in the thatch layer and rootzone stained layer measured from April 2008 to October 2013 to represent a spring and autumn assessment each year

in the autumn in four of five years. Thus, summer cultivations appear to improve green uniformity, as indicated by the CV.

DISCUSSION

To promote permeability in a USGA-specification ultradwarf bermudagrass golf course green, either rootzone particle size distribution should be uniform throughout the profile or the surface soil layers should be coarser than the underlying soil layers. A decline in percolation results from the loss of macropore space when the finer sand particles in the topdressing accumulate toward the surface (Moeller and Bigelow, 2007). This 'finer' layer restricts drainage and air movement (Hillel, 1980), resulting in a softer, wetter surface more prone to scalping (Hartwiger and Nicoludis, 2017; Moeller and Lowe, 2016).

Particularly when ultradwarf bermudagrasses are used, superintendents may frequently use finer sands for topdressing to facilitate movement of the grains into the tight turf canopy that is associated with these grasses. The original rootzone may meet USGA specifications at the time of green construction and installation, but over time, coarse sand of the rootzone decreases toward the surface, whereas the fine and very fine sands increase or accumulate (Table 1). Therefore, the surface or upper rootzone layer becomes out of compliance with USGA specifications. Of note, particle size distribution of sand topdressing at all four golf courses was within USGA-specifications guidelines (Table 1).

The rootzones measured in this study revealed that the surface contained <60 per cent coarse and medium sand and exceeded USGA specifications for fine and very fine sand (Table 1). This condition restricts permeability because of the increase in finer sand particles, which leads to reduced macropore space through which air and water movement is best facilitated (Beard, 1973). To help overcome this condition, a superintendent can employ strategies to penetrate coarse sand into and through the turf canopy to reach the thatch or rootzone (McCarty. 2004). Some examples are the use of USGA specification sand, or a coarser-sized sand, after deep verticutting and also for filling core holes, and the use of dry sand applied to dry turf for routine topdressings to use the coarsest sand possible without excessive mower pick up (McCarty, 2004).

In conclusion, superintendents who routinely monitor OM and Ksat on their ultradwarf bermudagrass USGA-specification sand-based greens can use data on thatch and OM-stained layer thickness, OM content and Ksat in the spring to show their stakeholders why summer cultivations will be necessary, and in the autumn to illustrate what has been achieved by the summer cultivation programme. Such data should help overcome resistance among those stakeholders and decision makers to conducting verticutting and aerification practices on greens. The data can also provide information to determine how aggressive the cultivation programmes need to be.

ACKNOWLEDGEMENTS

ATM is grateful to Prof. Mike Fidanza and co-authors George H. Snyder and John Cisar for allowing publication of this research. The paper, presented at ITRC 2017, was titled 'Documenting Changes in USGA Specification Rootzone Properties in Ultradwarf Bermudagrass Greens'. Full references for the paper can be obtained from the AGCSA.

Brisbane Golf Club became the first in Australia to use Champion ultradwarf hybrid couchgrass on its greens

TABLE 1. PARTICLE SIZES IN THATCH, STAIN AND ORIGINAL LAYERS[1]

	Particle size diameter[2]						
	FG	VCS	CS	MS	FS	VFS	S+C
	% by weight						
Thatch Layer	0.0	0.9	15.5	37.3	26.8	18.9	0.6
Stain Layer	0.0	1.6	27.2	42.3	23.1	5.3	0.4
Original Layer	0.2	3.9	35.6	39.7	17.0	3.5	0.1
USGA Specs	< 10%		≥ 60%		≤ 20%	≤ 10%	

[1]Particle sizes expressed as percentage by weight in the thatch, stained layer and underlying original rootzone layer measured in October 2013 and compared with USGA specifications for new greens construction. [2]Particle size diameter: FG (fine gravel, 2mm-3.4 mm), VCS (very coarse sand, 1mm- 2mm), CS (coarse sand, 0.5mm-1mm), MS (medium sand, 0.25mm-0.5mm), FS (fine sand, 0.15mm-0.25mm), VFS (very fine sand, 0.05mm-0.15mm) and S+C (silt + clay, < 0.05 mm).

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Managing performance

In her latest column focussing on HR management issues, Vicki Crowe looks at the changing nature of performance management.

Above: The way companies deal with managing the performance of their team is changing and it is important to be across these in order to get the best out of your employees

Often at this time of year, managers are starting to plan for their employees' performance reviews.

A recent Australian workplace survey on performance reviews shows that most managers dread them, seeing them as time-consuming and overall not very useful. Employees, on the other hand, find them frustrating, a waste of time and can become quite anxious at the thought of receiving negative feedback. The survey also found that more than half of a performance rating has to do with the personality traits of the person conducting the review, not of the person being rated, resulting in a very subjective, biased and unfair rating of an employee.

Another survey, conducted by PricewaterhouseCoopers, shows that 96 per cent of ASX companies have either recently changed or are planning significant changes to their performance management system in the next 12-18 months.

Traditionally, annual reviews have focused on past performance, however, this thinking has now changed with a shift of focus to the future. Here are a few examples of how some global companies have changed their review system, with one linked to salary increases and one based on performance. As an aside, many companies do not link salary increases to performance reviews.

Accenture, the strategy, technology and digital consulting firm known for its traditional corporate culture, has completely discarded its annual reviews, replacing the process with a system where managers give feedback on a more regular basis. Accenture has implemented a more informal 'check-in' process that takes place throughout the year, with employees receiving regular feedback on what they're currently working on.

Accounting firm Deloitte has replaced its laborious annual review process with four questions done after every project or major task. On a 1-5 scale, managers write down how strongly they agree with two assertions:

- "Given what I know of this person's performance, and if it were my money, I would award this person the highest possible compensation increase and bonus."
- "Given what I know of this person's performance, I would always want him or her on my team."

They also answer 'yes' or 'no' to:

- "This person is at risk for low performance."
- "This person is ready for promotion."

The answers are used not only to make decisions about who should be promoted in the future or how much they should be paid, but to influence how the company helps rising stars advance and help the troubled ones get back on track. According to managers at Deloitte, "In effect, we are asking our team leaders what they would do with each team member rather than what they think of that individual."

Microsoft has also discarded its performance review system. The company's new approach to performance and development is designed to promote new levels of teamwork and agility that have an impact on the goals of the business. The key elements of Microsoft's approach include:

- More emphasis on teamwork and collaboration;
- More emphasis on employee growth and development; and
- No more scoring or rating scales.

REVIEWING PERFORMANCE

You don't have to be an Accenture with 330,000 employees or a multinational technology giant like Microsoft to look at changing your review process. At the end of the day you are dealing with people.

The PGA of Australia has followed these global trends and in 2015 changed its performance review process. To begin, we eliminated the six monthly reviews and redesigned our annual reviews. Our focus is now firmly on the future rather than on the past 12 months. Here is an overview of our new process…

The manager emails an employee self-assessment template to their team members a couple of weeks prior to the meeting. The employee self-assessment template has two parts:

- The first part is divided into three columns – responsibilities, KPI's achieved/not achieved and employee comments. Firstly, team members need to review and update their position description and then use their PD's to fill in the first two columns.
- The second part is the 'future state'. In this section, team members briefly bullet point projects/tasks they would like achieve or work on the following year, list development or training they would like to undertake and add any other points they would like to discuss with their manager.

The self-assessment is then emailed back to the manager prior the meeting. The manager's template also has two parts.

- The first part is divided into three sections – tasks and responsibilities (the tasks and areas of responsibility critical for the success of the position), outcomes (describes what doing the job well looks like) and individual and team objectives (clearly identifies whether the tasks are to be done individually or with the team, and the timeframes, if applicable).
- The second part is the 'development plan' which is divided into two sections - 'areas of development' (what they're doing well or where they need to improve with tasks, skills or behaviours) and 'actions' (activities that will assist in development – this could be class training, on-the-job training or coaching).

The templates are designed to facilitate a two-way flow of conversation. The individual and team objective column is the 'what' and the development plan is the 'how'. Managers are encouraged to discuss with their team members how their individual goals or objectives contribute overall to the company. It is motivational to let employees know how their individual effort and performance contributes to the broader organisational goals and vision.

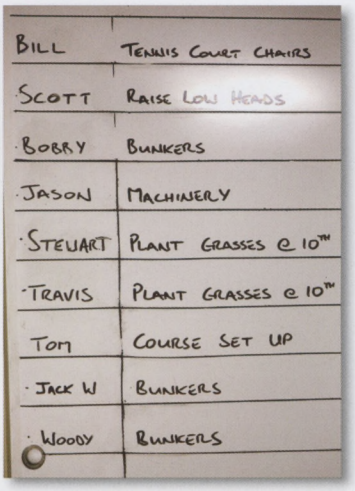
If you are a manager, the three key areas to focus on are:

- Linking goals/objectives to company priorities;
- Helping team members apply new and critical skills in their roles; and
- Shifting the focus to performance, not ratings.

As a guide, a performance review meeting should go for no more than an hour. Spend the first 15 minutes on past performance and the rest on the future. Ensure absolute clarity on future performance expectations. Shift from a focus on employee management to a focus on fuelling employee performance.

It is also important to always manage at the time and don't leave it for the performance review meeting. Effective managers provide specific feedback on a daily or weekly basis. The more you can get the team member to evaluate their performance the better. Some questions you can use are;

- How do you think you went?
- What do you think you did well?
- What would you do differently next time?



It is motivational to let employees know how their effort and performance contributes to organisational goals and vision

Performance reviews are now more on what the employee can focus on in the coming 12 months

St Michael's new Pure Distinction 1st green growing in

Green light for St Michael's

After converting its fairways over an eight year period, St Michael's Golf Club in Sydney is now focusing on rebuilding and converting its greens writes course superintendent Russell Fletcher.

St Michael's Golf Club in Sydney's eastern suburbs has recently embarked on what is hoped will be an ongoing project to rebuild its greens and convert from *Poa annua* to bentgrass. To date the 16th, 1st and 4th greens complexes have been transformed and going by the positive reaction from the membership it is hoped that we will be able to continue this work and provide better playing surfaces in the future.

Turning back the clock a little, in 2005 St Michael's embarked on a programme to convert fairways from kikuyu to Windsorgreen couchgrass. Although taking eight years to complete, it ensured the club could survive Sydney's harsh summers and reduce its water consumption. In addition to this, it visually lifted and enhanced the course, giving it the links look that it should have given its location right on the coastline.

Reconstruction of the St Michael's chipping green in late 2016

The fairway conversion was a major undertaking for a small club like St Michael's. The disruption to golfers as well as income from the corporate side, did impact on club revenue for a number of years. However, over time the club has managed to return to a healthy state financially and started to make further investments on the course. This included the construction of a new maintenance facility in 2011 and the replacement of nearly all course machinery over the last five years.

It would be four years after the last fairway was converted before the club started to entertain the prospect of rebuilding greens. The first step was to find a golf course architect and shaper, with the club appointing Golf Shapes which had been engaged for previous bunker and wasteland construction projects. Golf Shapes' simplistic greens design and hands-on work skills, coupled with a vision to construct the ideas, persuaded the club to choose them.

HAPPY MEDIUM

Before any greens reconstruction started, the club needed to source a suitable and reliable greens profile material for construction. Peter McMaugh (Turfgrass Scientific Services) was engaged by the club and went through a rigorous process of sampling soils from various quarries and even looked at the possibility of mining sand from an area on the course. This option was ultimately rejected due to inconsistencies over the area and the timing to replace all the greens on the course – one or two greens a year spaced over the next 10 years would not suit mining an area on the course.

After thorough testing, Peter found a sand which met his criteria for a good greens construction

medium. The main point was that a gravel base was needed to get the infiltration rate that would meet Peter's methodology. While it delayed the time it took to get the first green underway, it was critical that we got this step correct. Now the club has a green base that they can be confident with and the platform has been set for future construction with a quality assurance format in place for both sand and gravel.

As part of this process, I visited the quarry to look at the source and the locality, but more importantly to ascertain how many years we could source the required supply and whether they could deliver the sand specification in say 10 years from now. It is all very well for quarries to say they have 'x' amount of sand and can supply it for so many years, but can they really? We know in Sydney it has happened on numerous occasions and things can, and do, change.

The other big decision the club had to make was what turf species to use on the new greens (the existing greens were *Poa annua*). This led me to visit Steve Marsden at Royal Sydney Golf Club to look at some test plots they had installed for their impending redevelopment. It was very noticeable that one of the standout varieties, especially as far as leaf texture was concerned, was Pure Distinction.

Thinking it was the way to go but knowing it hadn't been used in a major way in Sydney, I wanted to find out more so took a trip to Royal Canberra which used Pure Distinction on all its greens as part of the recent rebuild. Although superintendent Ben Grylewicz had only been in the role for a few months when I visited, from speaking with him and hearing his thoughts on it, combined with some of the knowledge he had gleaned from superintendents in the US, it led me to recommend it for St Michael's.

UNDER WAY

With the greens profile and turf variety decided upon, the first project was to reconstruct the old chipping green which for years had done little to entice golfers to practice. Along with the chipping green, a formal wedding area was also constructed to bring in additional income for the club. Both the chipping green and wedding area were constructed in late 2016 and from this momentum to rebuild the greens on course grew.

The 16th green (along with the 17th tee surrounds) was reconstructed just prior to Christmas and eventually opened in May. The feedback from members was overwhelmingly positive and prompted the club to embark on the next stage which would target the 1st and 4th greens starting in August.

The 1st green was arguably the worst on the course. Being 40 years old with no drainage and growing *Poa* in a hydroponic fashion, it was often hit hard by disease, especially in summer. The 4th green, which was chosen due to its proximity to the 1st (they are 100m apart), was unusable in the front

The 16th was the first green on course to be reconstructed

and the shape of the surrounds was very ordinary to say the least. The surrounds were also one of the worst drained areas on the course with water seeping constantly through the subsurface.

A network of drainage pipes and pits were installed to try and overcome these wet areas. A source of sand was found at the end of the 4th fairway and was used to shape and lift up the surrounds. Soil was brought from another area to back-fill the hole used as the sand excavation site. All up about 350 tonnes of sand was excavated from the 4th.

So, 12 months and four green complexes later, the members and committee are very pleased with the results to date. With the club only able to undertake a maximum of two greens at once due to financial constraints, it now has a few decisions to make as to how the project progresses. In taking out two holes at a time there is scope to build a temporary green on a par five and convert this to two holes. The new chipping green can also be used as a par three.

Regardless of which way the club proceeds, it has made a very promising start and the members are very keen for the rebuild to continue.

The new 4th green which was reconstructed this past spring. Substantial work was also undertaken to lift and shape the surrounds

Numurkah Golf & Bowls Club has taken a number of steps recently to improve its on and off course operations which will go a long way to ensuring its future viability

Numurkah G&BC, VIC

After starting his turf management career at Numurkah Golf & Bowls Club, Mat Campbell now finds himself in charge of maintaining this popular regional sporting hub.

Superintendent: Mathew Campbell (28).
Nickname: Soup.
Family: Wife Kelly and dog Lilly.
Years as a superintendent: 4.5 years.
Association involvement: AGCSA and VGCSA member (4.5 years).
Career: Numurkah Golf & Bowls Club (apprentice, four years; 2IC, one year). Moved north to Hyatt Coolum for the last Australian PGA Championship in 2012 for three months. Moved back home to superintendent's job at Numurkah GBC where I have been for the past 4.5 years.
Qualifications: Cert III Turf Management, Cert IV Horticulture.

The NGBC crew from left superintendent Mat Campbell, apprentice Zane Newbound and groundsman Ray Hocking

Where in Australia is Numurkah Golf and Bowls Club (NGBC) and what is the club/township known for? NGBC is located around a 300 kilometre drive north from Melbourne, around 30km north of Shepparton on the way to Tocumwal. Every time I get asked that question people say 'I know where Shepparton and Tocumwal are, but not Numurkah – is there a golf course in Numurkah?' The township has a population of around 4800 people and the area is known for its dairy and crop industry and a large canola oil seed factory.

Tell us a bit about your background and how you got into turf. I grew up on a dairy farm and was around machinery from an early age but disliked milking cows. Being a keen golfer from a young age, the thought of working on a golf course really appealed to me. When I finished school I still wasn't sure what I wanted to do, but an apprenticeship came up at my home golf club – Numurkah – and thought I would give it a crack. Once getting into my first couple of years I knew I had found a passion and a job I loved.

Who were some of your early mentors? My mentors in life are definitely my parents. Although not in the turf industry, their work ethic and the business they run together is a real credit to themselves. I still seek their advice on certain things relating to my job even today. Previous bosses I have worked for also helped me learn my craft and a couple of people in the industry that I know and trust I ask for advice when required. I'm definitely a massive believer in you learn something new every day.

How did the job at NGBC come about and what do you like most about being the superintendent there? After being in Coolum for the last PGA and witnessing the politics that were going on behind the scenes, I could see that my position there was pretty tenuous. Fortunately, the superintendent position come up back home and as I believed I was ready for the challenge, I applied and duly

landed the position. It was hard saying goodbye to the Sunshine Coast I must say – a fantastic part of Australia.

The best part of being a superintendent is being able to put your beliefs and visions to work and hopefully seeing the results. There is nothing more satisfying than shutting the gate on a Friday after you've presented the course well for the weekend golfers to enjoy. It has also been great to watch the entire club grow and evolve over the years.

Give us an overview of NGBC and some of its unique characteristics. The most unique factor about NGBC is there are no bunkers ***(must be a superintendent's heaven – Ed)***. We have smaller raised greens which can sometime prove hard to hit. The NGBC fairways are quite tight with large gums lining the fairways. Left handed golfers with a slice aren't a fan of NGBC due to its many doglegs going to the right. It isn't overly long but definitely a golf course where you need to be accurate.

What are some of the unique features about NGBC from a turf management perspective? Soil types would be the biggest challenge and unique feature. Having to deal with heavy clay in some areas to sandy loams in others, it can go from being rock hard in summer to a complete bog with average rainfall in winter. It really is weather-dependent. For example, last year though the wet months of June to September we had nine holes shut for six weeks due to it being so wet we couldn't leave the shed. Obviously this impacts the club financially.

Is it an easy/hard facility to manage? There are times when it becomes a real challenge and test due to only having two other staff. In saying that, we do have some volunteers that help with small jobs around the course and some mowing and rolling on the bowling greens. Irrigation is the aspect that's really challenging due to the system being manual – it basically takes one bloke full-time all week chasing water and can lead to some long hours in summer. The bowling greens are also challenging. It's a fine line between good and bad when it comes to preparing bowling greens. Overall, as a small crew we just try to present the course the best we can through the busy periods and leave smaller capital works jobs to late autumn or winter.

What changes have you implemented during your tenure as superintendent? From the first day I arrived I really wanted to get both the golf and bowling greens in good health and play consistent all year round. That started below the surface, working on soil structure and nutrient balance. Introducing a soil nutrient programme has made the greens much easier to look after through high stress periods. We still have some work to go, but it's something that will be continually monitored. Other small improvements consist of rebuilding tees and last autumn re-laying one of our worst green surrounds. Capital works can be frustrating at times due to us wanting to complete more, but we struggle to do so with a small crew.

What other maintenance changes are you hoping to introduce? For now we are focused on finishing rebuilding tees and then continuing with re-laying more surrounds as the first one done was well received by members. The biggest one of all would be upgrading the irrigation system.

Any special environmental considerations that you have to incorporate into the management of the course? There is a large area of native grassland that separates both nines. We are always conscious and careful when spraying herbicides.

What are some of the major challenges facing NGBC both from a turf and club management perspective? One of the major challenges NGBC faces from a turf perspective is securing more water for the future. At the moment the golf course could potentially struggle if a severe drought was to hit and water became scarce. Our dams on course hold around four megalitres. We get an allocation of 75ML high reliability from the Murray system which is pumped across, filling our dam when

CONTINUED ON PAGE 63

NGBC's major event is the two-day Pro-Am (held in December) which it holds in conjunction with nearby Mooroopna GC

The NGBC greens are your typical mix of Penncross and *Poa annua* with Campbell focussing on improving turf health and consistency since starting his tenure as superintendent

AT A GLANCE – NUMURKAH GOLF & BOWLS CLUB, VIC

Course specs: 5936 metres (par 72 men, par 73 ladies). Course comprises around 16 hectares (fairways, greens, tees, primary rough) with the site approx. 24ha. Thirteen fairways have Wintergreen couch and the remaining five are South African. Tees are a mixture of Santa Ana and Wintergreen. Greens are a mixture of Penncross/*Poa annua*, except the 5th which was rebuilt after floods in 2012 with Authority bentgrass. Two Tifdwarf bowling greens.

Members/rounds: 290 golfing members, 65 bowls members. 12,000 rounds p/a.

Major events: Annual tournament over four days, two-day Ladbrokes Pro-Am held in conjunction with Mooroopna Golf Club (14-15 December 2017) and Holden Scramble.

Course budget: $130,000 p/a excl. wages.

Staff structure: Mat Campbell (superintendent), Ray Hocking (groundsman) and Zane Newbound (1st year apprentice).

Climate/rainfall: Hot/dry through the summer months with temperatures getting as hot as 44 degrees. Cold, sometimes wet through winter with temps averaging around 14 and frosty mornings as cold a -5. As an example of how up and down it can be, one summer we suffered through eight consecutive days of temperatures between 40 and 44 degrees, whereas in another summer we only had one or two 40-degree days. In winter last year we had over 100mm from June – September and only one or two frosts, compared to this year of minimal rainfall but upwards of 35 frosts!

Soil types: The soil types vary. The majority of fairways are clay but some years ago sand was dumped in areas that were low and continually got wet. Unfortunately, over the years these sanded areas have built up their own organic profile and now hold moisture through the wetter months and more nutrient through summer, making it hard to get a consistent look through some fairways. All golf greens are old push ups with sandy loam.

Irrigation system: What can I say… it's still manual and surely must be one of the last of its kind remaining in the country! To do a water run consists of going out and turning on a fairway or 10 to 12 sprinklers (we have Rain Bird Eagle 900 sprinklers up the middle of the fairways) manually from the switch on the top then turning the pump on. Once finished we turn them all off and start again – I'm sure you're getting the gist! The greens have two valves for every green. All fairways are watered during the day (trying to avoid golfers as best as possible) as well as surrounds with hoses and sprinkler stands. Greens are set for certain nights through the week with hand watering if required. Hopefully this will be a thing of the past with the club soon to embark on an upgrade.

Cutting heights/regimes: Greens are mowed at 3mm all year round, six times per week through the growing months. Fairways and tees cut at 12mm once a week (Primo becomes your best friend) with surrounds around 15mm. All rough is cut around 50mm. The bowling green is mowed twice a week at 'ten cents' (1.75mm-2mm range).

Renovations: Our major renovation occurs the first Sunday/Monday of September with a minor one in late March. With the major one, I have been scarifying every year and coring every third year with verti-draining in between and heavy topdressing. I find verti-draining really helps with water movement and penetration going into the summer months. The coring every third year helps to improve thatch levels. Doing the scarifying helps remove thatch in the years we verti-drain.

Renovation is becoming harder to achieve, not so much due to pressure from the members but because the September/October period is very busy for our 'stay and play' packages which is an extremely important part of the business. I think it is something as superintendents we should revisit regularly and weigh up possible alternatives without sacrificing our turf – perhaps a possible topic at future AGCSA conferences!

Major disease pressures and how you combat them: I wouldn't say disease pressure is high in this area. Improving soil condition through soil testing and renovations has been the best way to combat disease. I do spray preventative fungicides from October to March mainly for pythium control which was the problem years ago. Since starting this programme, it has never been a problem and gives me peace of mind to be able to apply more water though periods of high heat.

Nutrition management: We conduct soil tests annually and apply any bulk recommendation through renovations. My nutrient plan is again based around soil tests with liquid foliar fertilisers applied in small amounts every four weeks and liquid soil applications done in between, mainly from October to April when soil temps are warm. Come winter we only foliar fertilise when required. The same is done to both bowling greens only through the growing months.

Campbell and his team also maintain two Tifdwarf bowling greens

CONTINUED FROM PAGE 61

required (usually over a weekend). We also have 50ML of town run-off we can acquire if it's available (rainfall dependent). I'm continually monitoring our water position and purchase more temporary water if required. In a hot year with minimal rainfall we use around 135ML and in a good year around 90-100ML. We are in discussions on how to improve our water position in the years to come.

From a club perspective, it's definitely about growing the business through our stay and play packages and also trying to improve club membership and participation in both golf and bowls. Golf these days seems to be a sport that consumes too much time for the younger generation, so it's about trying initiatives that are fun but take up less time. We are currently looking at programmes like foot golf and shorter nine-hole comps, as well as junior programmes.

Outline any major course improvement works recently completed and/or highlight any upcoming works. Last year the management team decided to come together and become a core management group, deciding the future of the club and re-writing the business plan for the next five years. Being a part of all financial decisions really gives you an insight into the business as a whole, not just what's best for the golf course. The club is finally in a position to fund a sizeable loan over a small number of years without putting the club under any financial stress.

We decided half the amount would be put towards something that will give us a return on investment (which was increasing our accommodation beds) and the other half as a members' dividend which would be put towards a new automated irrigation system. At this stage all the irrigation plans have been drawn up and we will hopefully go to tender next year. This will be massive for the course and will make my summer much more enjoyable, improve turf surfaces and make daily maintenance tasks much easier.

Among some of the ongoing course works include rebuilding tees

One of the unique features about NGBC is that the course has no bunkers

The weather and climate is always a great leveller for a superintendent. How has Mother Nature treated you in recent times? Since I started my turf career most years have been different climatically. In 2012 we went through a one-in-twenty-year flood which inundated the course for two weeks. Working through that was an interesting experience. Then there are the hot and dry summers with weeks of 40 degree temperatures and having to start watering at 2am working split shifts! Some winters it can get that wet you can't leave the shed! Mother Nature definitely keeps you on your toes.

Are expectations of course presentation and conditioning any less than that placed on your metropolitan counterparts? I think all courses have their own expectations. No doubt metropolitan courses are heightened, but expectation plays its part in driving us to deliver the best course possible week in, week out. Your expectations must, however, align with the budget and man hours you have at your disposal.

Do you have to be more resourceful as a regional-based superintendent? I don't think you have to be more resourceful at a regional club, but definitely in a small one you do. Not having a course mechanic means over the years learning how to fix issues and problem solve as well. Sure, at times some problems are too big, but most issues can be fixed in-house. That also goes for large irrigation issues and leaks.

NGBC is about to invest in a new irrigation system which will replace the existing labour-intensive manual system. Pictured is the 17th

If you could change one thing about your job as a regional superintendent what would it be and why? Not much. We have a great little club that members enjoy, the majority of whom have been here 20 to 30 years and can see and understand how far this place has come.

What have you got in your shed? Toro 5610, Toro 6500, 2 x Greensmaster 3250s, Kubota F2400 front deck, Smooth Roller, Flex 21 walk-behind, John Deere Aercore 800, Massey Ferguson Tractor, 400L Hardi spray tank, John Deere tractor, Kubota front end loader, Trimax finishing mower, Queen bowling green mower, 2 x old Queen mowers with fatboy reel and groomer reel.

Any interesting/old pieces of machinery you keep alive through necessity? We only just recently gave away our old buck rake as a garden ornament (it had seen better days). It hasn't been used much in my time, but I have seen it in action a few times and it does a good job raking under the big gums. The old guys at the club swear by it!

Do you think regional/country superintendents have a better work-life balance than their metro counterparts? I can't speak on behalf of metro supers because I haven't been one, but I think I have a pretty good work-life balance. Living only minutes from work makes the trip on weekends to check everything out quick and easy. In saying that, I do spend long hours at work through summer due to our irrigation system, but hopefully that problem will be fixed soon enough.

What is the most challenging aspect of a superintendent's role today? Not being in a management position before this, it's something I'm learning along the way, especially things like club politics and different personalities. Being able to keep up with all the recordkeeping, paperwork and WHS demands, as well as delivering the course week to week, can be a real juggling act. I also recently hired my first apprentice and now being a teacher is a new challenge but one I'm enjoying.

What gives you the most job satisfaction? Seeing members and visitors enjoying the golf course and playing on the bowling greens. Seeing my staff grow into their job and become passionate about what they do and watching the club grow.

Most pleasing/rewarding moment during your time as NGBC superintendent? I would say Pro-Am day. Spending weeks of hard work leading up to the event and hopefully delivering a course for professionals and members to enjoy on one of the most important days for the club.



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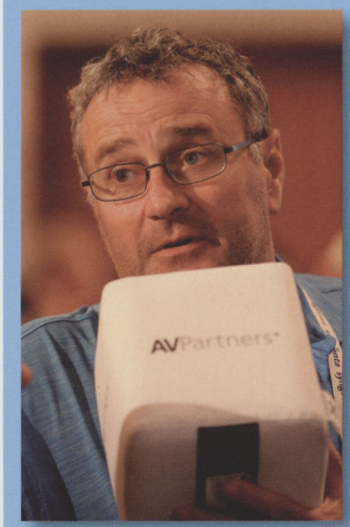
The new Nano Bubble Technologies unit installed at Avondale Golf Club

AVONDALE GOLF CLUB TRIALS WORLD-FIRST NANO BUBBLE INJECTION SYSTEM

Avondale Golf Club in Sydney's northern suburbs has become the first golf club in the world to install a Nano Bubble Technologies injection unit.

As showcased at the recent Australian Turfgrass Conference on the Sunshine Coast, Melbourne-based Nano Bubble Technologies has developed a patent-pending nano-bubble generator that permits the infusion of various gases (such as oxygen, ozone, air etc...) as nano bubbles into liquid at extremely high concentrations. Nano bubbles are essentially nano-scopic gas-filled cavities in aqueous solution, providing super-saturated oxygenated water which has a range of applications across various industries.

Over the past nine months, Avondale Golf Club has been undertaking small scale trials using nano bubble water in a turf situation and the results have been extremely promising according to course superintendent David Warwick. As a result, the club granted approval for a trial injection unit to be installed on course.



Avondale Superintendent David Warwick

Trials to date at Avondale have looked at using nano bubble water to determine its impact on bentgrass root growth and also on reducing nematode counts. These are ongoing and Warwick is hoping to expand the scope to include trials on the effects it has on reducing black layer and combatting BF1 fairway patch disease. In addition, Warwick has also observed that the nano bubble water appears to boost the properties of soil wetting agents and has assisted with the efficacy of commercial products to treat stem weevil.

The Nano Bubble Technologies system works by compressing air, extracting out all the pollutants and removing the nitrogen component which leaves 96.3 per cent pure oxygen. This is then injected into the irrigation water through patented technology which creates the nano bubbles. Around 250 million nano bubbles can be injected into every millilitre of liquid per single pass through the company's injection system. Nano bubbles have no buoyancy, so they do not float and rise, releasing the gas into the environment. This makes the added oxygen very stable in solution for extended periods of time.

Avondale's injection unit, which was commissioned on 29 September, is located adjacent to a 500,000L water storage tank. A small pump removes the water from the tank, passes it through the injection unit on its way back to the storage tank. According to Warwick, the dissolved oxygen levels in the tank went from 2.9ppm on the day of commissioning the unit to 28.4ppm after 12 hours of treatment.

"From all the research I've done, I can't believe that the subject of dissolved oxygen (DO) is not known about in turf to any great degree," says Warwick. "I've worked closely with the staff from Nano Bubble Technologies for the past nine months and each time we converse I learn something new. I'm still staggered that the problem of poor DO concentration is only just coming to our attention as an industry worldwide.

"While the trials we are conducting are still in their early days and more time is needed to see clearer trends, the early results look extremely promising. Data to date indicate a huge improvement in root mass and reduction in spiral nematode numbers, and based on other observations we are hoping to expand our trials."

Right: After 12 hours of treatment with the nano bubble injection unit dissolved oxygen levels had increased form 2.9ppm to nearly 29ppm

TRU-TURF ROLLS WITH NEW R50-11

Tru-Turf has added another variant to its line of industry-leading greens rollers with the launch of the R50-11. The R50-11 offers a number of enhanced features focused on productivity, reliability and reduced maintenance.

According to Tru-Turf managing director Ray Dufty, the R50-11 greens roller is the perfect tool for prestige golf greens that require a true, smooth and grass clipping free surface. Driven by a flexible, full width contour-following drive roller and equipped with Tru-Turf's patented triple offset smoothing rollers, following contours is made simple with the R50-11. Combine this with overlapping roller heads and new self-cleaning smoothing roller system, superintendents will achieve a true, smooth 50-inch (1.27m) wide roll on the most contoured greens without leaving gaps, clippings or line crease marks.

"Because we are always evolving and listening to our market, we have incorporated a new quick release design that allows for a fast, safe and tool-free transition between brushing, spiking or slicing attachments," says Dufty. "This allows course staff to spend less time in the workshop and more time on the greens."

While other greens rolling machines rely on weight to heavily compress the playing surface, Dufty says Tru-Turf's lightweight rollers "create fast, true surfaces, without compacting the soil beneath, resulting in healthier greens".

Tru-Turf's R50-11 greens roller offers a number of enhanced features focused on productivity, reliability and reduced maintenance

The R50-11 is powered by a 6.5hp Honda petrol engine with an operating speed up to 15kph. To watch the R50-11 greens roller video, visit the Tru-Turf YouTube channel or visit www.truturf.com.

COMPASS SETS NEW DIRECTION IN FUNGICIDE MARKET

AGCSA Gold Partner Nuturf Australia has launched Compass fungicide into the Australian turf management market. Compass is a new multi-site contact fungicide containing 500g/L of the active ingredient fluazinam and is registered to provide powerful contact activity on a range of turf diseases including dollar spot, helminthosporium, anthracnose and grey leaf spot.

Compass fungicide is out now

Fluazinam is the only registered fungicide for turf in Group 29. According to Nuturf, it has no known resistance and due to its multi-site mode of action has a very low risk of developing resistance. According to Nuturf business manager Peter Schumacher, Compass will add value to fungicide programmes in a number of areas including;

- Dollar spot control. Research in Australia and in the university system in the US, shows that fluazinam is one of the leading dollar spot fungicides in the market, controlling strains that iprodione and DMI fungicides have reduced activity on.
- It is an excellent rotational tool in anthracnose disease management. Compass offers a new mode of action in the combat against anthracnose either alone or in combination with other fungicides.
- With the active ingredient discovered at least 30 years later, Compass provides improved residual protection and activity over the other key turf contact fungicides in chlorothalonil and mancozeb. This makes Compass an ideal mixture candidate with systemic fungicides for extended, broad spectrum inside-out protection.

For more information about Compass fungicide, contact your Nuturf territory manager or visit www.nuturf.com.au.

EARN YOUR WAY TO NZ 2018 WITH SYNGENTA'S TURF REWARDS

AGCSA Gold Partner Syngenta, in conjunction with the AGCSA, in October launched an exciting new initiative that is giving course superintendents and turf managers an opportunity to earn their way to the inaugural Australasian Turfgrass Conference in Wellington, New Zealand (24-29 June, 2018).

The Syngenta Turf Rewards programme gives turf managers the opportunity to accrue points when they buy certain Syngenta products. These points can then be used towards a range of industry discounts, including reduced delegate registration rates for the Australasian Turfgrass Conference, tickets to the conference President's Dinner, AGCSA bookshop vouchers, annual AGCSA memberships and agronomic services such as water, soil and disease identification tests. The more points turf managers accrue, the bigger the rewards.

"The AGCSA is delighted to team with long-term industry supporter Syngenta to offer this joint initiative," says AGCSA events and education manager Simone Staples. "This collaboration reinvests funds back into the industry and is designed to assist turf managers in a variety of different ways. Together, the AGCSA and Syngenta are, as always, committed to providing support services and professional development to all areas of the sport turf maintenance industry."

Adds Paul Jackson, Syngenta business manager turf and landscape, ANZ Lawn & Garden: "Our partnership with the AGCSA will assist turf managers in gaining relevant industry education and increase the use of scientific diagnostics within the professional turf management industry."

The Syngenta Turf Rewards programme runs until 31 March, 2018. Products can be purchased

Xpert autonomous mowing kits are available in Australia for a range of Toro mowers

XPERT TECHNOLOGY CUTS A NEW COURSE

Victoria-based technology company Precision Control Australia has announced it is now the exclusive distributor for Precision Makers' Xpert autonomous mowing system. The Dutch-built system is revolutionising the turf maintenance industry with a driverless kit now available for golf course mowers. Xpert technology enables mowing to be performed fully autonomously, freeing up staff to undertake other maintenance tasks.

Xpert uses one of two patented modes – either 'Teach & Playback' or 'Dynamow'. To record a mowing route with 'Teach & Playback', operators simply step on the mower, press the 'record' button and mow as per normal. The system records every action – driving, steering, throttle operation and lowering and raising of the cutting units. Afterwards, the operator places the mower at the start of the route, presses 'Play' and the system will repeat this route, precisely and unattended.

The 'Dynamow' function requires the course to be mapped once, marking boundaries, headlands and any obstacles present. The system then calculates the most efficient path based on the desired direction of cut. Transport routes between fairways or greens are also recorded so the mower can move from one area to the next to mow automatically.

A touch-screen terminal operates the whole system. This terminal displays information in 3D and is able to record hundreds of mowing routes and patterns. The system is easy to use and can be up and running within five minutes. The mower is also equipped with numerous safety features. The system checks itself and stops when an obstacle is detected in front or behind the mower. When the system stops, it informs the user via SMS.

Xpert uses high precision GPS with centimetre accuracy to control the mower, allowing it to precisely repeat what was taught. Moreover, the GPS system can be used to create perfectly straight passes when recording a route. The machine will repeat these straight patterns time after time, ensuring a consistent and high quality of cut.

Kits are currently available for Toro 3250 and 3400 greens mowers, as well as 5510, 5610 and 5010H fairway mowers. For more information on the Xpert driverless mowing technology system, visit www.precisioncontrol.net.au.

from a Syngenta agent or dealer. For more information about the programme and how it works, including details on how to register, visit www.greencast.com.au/turf-rewards.

MATCHPLAY RANGE EXPANDED

The liquid nutritional range from AGCSA trade partner Living Turf has recently been strengthened by three new additions under the MATCHplay brand.

MP Reinforce has been re-formulated to now contain monosilicic acid or MSA – the most plant-available form of Silica (Si) – to aid with cell wall strength, wear tolerance and improve essential nutrient uptake. MP Reinforce is also complemented by two new products – MP Enrich and MP Safe N.

MP Enrich contains highly available dexlated chelates of iron and zinc that results in great colour and low burn potential. Dexlated chelates are known to be 100 per cent more efficient than inorganic iron salts to deliver long lasting colour. MP Safe N is a protein-based nitrogen source that is extremely safe to turf. It delivers efficient plant-recognisable nitrogen directly into the leaf tissue for optimised response. Both MP Enrich and MP Safe N contain VM3 technology that significantly enhances nutrient availability and contains beneficial bacteria, plant stimulants and trace minerals.

For more information on the MATCHplay Superior Liquids range, contact your Living Turf specialist or visit www.livingturf.com.au.

GET REELTUFF WITH SPRAYING

Australian hose and reel manufacturer ReelTech has introduced a new range of ReelTuff remote controlled hose reels. Ideal for use in both low and high pressure spraying duties on golf courses, sportsfield, council parks and urban landscapes, the ReelTuff range is built with reliability in mind.

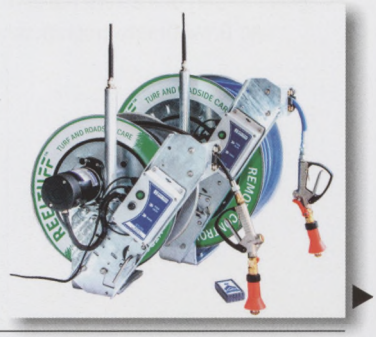
The ReelTuff reel is a world-patented, all Australian designed and manufactured direct drive hose reel. It features flexibility in size and capacity, adaptable Reel-In-Control remote and a unique Safe-R-Reel non-belt gearbox that ensures a controlled speed during rewind.

The Reel-In-Control automatic hose rewind operates with the simple push of a button, with the motor drive capable of safely retrieving the hose even at full extension. ReelTuff offers superior craftsmanship and quality hot dip galvanised construction, which has been proven to withstand Australia's harsh environment.

ReelTuff hose reels can be easily installed to many vehicles with 12V power supply including utes, ATV's and golf buggies. Available in 50m and 100m models you can also customise hose reels to suit your specific needs. ReelTuff reels can be as a single unit or in a mirrored configuration for dual independent hose reel setup, allowing multiple operators to cover large areas in half the time.

For more information of the ReelTuff range, visit www.reeltec.com.au/reeltuff.

The ReelTuff reel is a world-patented, all Australian designed and manufactured direct drive hose reel



Toro's Robert Rein (left) and Gloucester Country Club superintendent Anthony Ross with the Triflex 3400 which the club was gifted as part of the Toro Support and Grow Grants programme

CLUBS BENEFIT FROM TORO'S SUPPORT AND GROW SCHEME

AGCSA Platinum Partner Toro Australia has teamed up with Golf Management Australia to bring a pre-owned Toro Triflex 3400 mower to two not-for-profit golf clubs through the Toro Support and Grow Grants programme. Gisborne Golf Club (Victoria) and Gloucester Country Club (NSW) have each received the mowers, estimated at $18,000 each, which will give them a much-needed boost to maintaining their courses.

For Gloucester Country Club, which has been in operation since the 1920s, the mower is a very timely addition. Superintendent Anthony Ross says the club's goal is to promote golf in the area, however, the current equipment was in need of replacement and they had no means of funding it.

"Our old mower had well over 4500 hours on it and was ready to breakdown any day," says Ross. "We're a club run by volunteers, I'm the only full time employee and we were in no position to buy new equipment. Winning this mower means we can present a great golf course for our members and the golfing community. It's great to come in and know that the mower we now have is going to do an A1 job compared to our old mower."

Toro's senior marketing manager for equipment, Elise Willemsen, says the company was overwhelmed by the positive response the Support and Grow Grants programme received and thanked all clubs that applied.

"We are proud to assist through this programme and have no doubt this grant will benefit these two well-deserving clubs for many years to come," says Willemsen. "The sheer number of applications received shows just how important programmes like this are to clubs all over Australia. We look forward to doing it all again next year!"

JT TURF TAKES ON LASTEC, TRU-TURF DISTRIBUTIONS

After a long association with Lastec and Tru-Turf, AGCSA Silver Partner Equipment Solutions announced in October that agreement had been reached with NSW-based JT Turf to transition the distribution of these products in Australia.

"With a recent decision to align the Equipment Solutions business toward renovation equipment, we were looking for a professional business to take on the Lastec (national) and Tru-Turf (NSW) distributions," says Peter Frewin, business manager for Globe Australia. "After some discussion, it was obvious that JT Turf was the perfect choice.

"Equipment Solutions has had a long association with Lastec and Tru-Turf and as such we are delighted to have been able to facilitate a smooth transition of the respective distributions. Equipment Solutions' recent acquisition of the Graden Industries distribution nationally reinforces our commitment to the renovation machinery market."

JT Turf's general manager for sales Justin Bradbury adds: "As part of our continued efforts to evolve into a sustainable partner for the turf industry, the additions of these great products and also the growing relationship with Globe Australia, are a fantastic way for JT Turf to ensure that we take all practicable steps towards that goal."

For more on the Lastec and Tru-Turf ranges available through JT Turf, contact Justin Bradbury on 0432 390 171 or visit www.jtturf.com.au

TURF CULTURE RELEASES WALDO

Turf Culture's Waldo miticide (a.i.: 500g/L diafenthiuron) is now available to Australian turf managers for the control of couchgrass mite in turf.

Available in 1L and 5L pack sizes, Waldo miticide is a Group 12A mode of action insecticide, with contact, translaminar and fumigant (vapour) activity resulting in immediate paralysis after contact or ingestion. It is effective against all mite leaf feeding stages and is an ideal rotation partner with Turf Culture's other mite control product Thumper insecticide. For more details on Waldo miticide, visit www.turfculture.com.au.

INDUSTRY APPOINTMENTS

DOODSON HEADING BACK DOWN UNDER

AGCSA Gold Partner Nuturf Australia announced in late September that it has secured the services of **Robin Doodson** as a Queensland territory manager. Doodson, currently course superintendent at Doha Golf Club in Qatar, will start his new role in early January 2018.

Doodson is set to arrive at Nuturf with 16 years' experience as a golf course superintendent, having managed both warm- and cool-season grasses. During his career to date Doodson has worked at Doha Golf Club and prior to that six years at Sanctuary Cove Golf and Country Club on the Gold Coast where he successfully guided the club through a $12 million redevelopment of the Palms Course.

Says Nuturf business manager **Peter Schumacher** on the appointment: "I am excited about Robin's decision to join the Nuturf business and know that he will strengthen our technical and service offering to the Queensland market. Robin's experience in southeast Queensland golf is at the highest level possible and he will be a great addition to the Nuturf team and a great resource for our customers and all turf practitioners in Queensland. Robin has prepared golf courses for 22 PGA Tour events, is an AGCSA accredited superintendent, is a certified superintendent under the ISO 14001 International Standard for Environmental Management and is a past board member of the AGCSA and GCSAQ."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SAGCSA

A group of SAGCSA members attended the GCSAWA Margaret River Conference in August and also took the chance to visit a number of Perth courses including Wembley Golf Complex (above) and Cottesloe (top right)

Summer is almost upon us and I really don't know where this year has gone! Since our last article in the May-June 2017 edition, the SAGCSA has been reasonably quiet, although in August about 13 members attended the GCSAWA Margaret River Conference. The WA association puts on a great few days (except for the weather) and a big thanks goes to the GCSAWA organising committee for all their support in helping us get there and looking after us.

Special mention also to the superintendents in and around Perth that welcomed us onto their courses for an inspection and a chat – **Nick Price** (The Cut), **Adam Strachan** (Secret Harbour), **Simon Bourne** (Cottesloe GC), **Idris Evans** (The Western Australian GC), **Fraser Brown** (Lake Karrinyup CC) and especially **Darren Wilson** (Wembley Park GC) for all his support. The SA crew all had a great time – the conference was first class with quality guest speakers and the following few days were equally fantastic visiting some of Perth's finest courses.

In September, the SAGCSA held a superintendents' forum at our local Jacobsen dealer's facility, Turf Equipment SA (**Jordan Ormsby**). After the forum some supers and managers gathered for some hospitality in the workshop. A huge thank you to Jordan, Zac, Mike and the Turf Equipment SA team.

The Golf SA Awards night was held at the Playford Hotel in late October. The night was a great opportunity to recognise our high achievers. The SAGCSA handed out the Graduate of the Year Award to **Matthew King** (Flagstaff Hill GC) and Excellence in Turf Management Award to **Nathan Bennett** (Royal Adelaide GC). On behalf of the committee, congratulations to both Matthew and Nathan. The next SAGCSA event will be the rescheduled AGM, which was postponed back in July. This will be held at Royal Adelaide GC in early December.

We have had some movement in the industry recently – **Steve Newell** heading home to Victoria GC from Kooyonga GC, with **Richard James** making the shift from The Grange GC to Kooyonga (he now gets to prepare Kooyonga for the 2018 Women's Australian Open after having prepared The Grange for the same event in 2016!). After a short stint at Murray Downs in what was his first superintendent posting, **Rowan Daymond** returned to take the vacant seat at The Grange. Congratulations to all those guys.

Finally, it was a few months back, but congratulations also to the AGCSA for putting on another great conference on the Sunshine Coast. The Future Turf Managers' Initiative was given high praise by my assistant **Simon Work** who was fortunate enough to be selected for the programme.

Wishing everyone the best with summer and Christmas coming up.

BAZZ BRYANT
PRESIDENT, SAGCSA

STA VIC

Planning is well underway for 2018 STA Victoria events and we encourage you to contact us if you would like to see a particular subject addressed. We are planning a minimum of four events throughout 2018 with the main one being the annual Sports Turf Seminar, to be held on Wednesday 18 July. Stay tuned for more details.

Following on the success of the Pitch Preparation Day at Flack Park in September, we are planning a similar event in September 2018 and will incorporate your feedback to make it an even better day. This is a 'not-to-be-missed' event open to not only beginners and volunteers but also experienced personnel engaged in the important seasonal task of building, preparing and maintaining a quality cricket pitch.

We are excited to announce that we will soon be releasing a YouTube video produced from footage taken on the Pitch Preparation Day. The video will be a great training tool for school communities, country cricket clubs and councils.

A reminder to all STA Victoria members, please communicate any workplace personnel changes, emails, addresses etc. We have had a number of magazine returns and appreciate advice of changes to enable all parties to update databases. Email changes to Jan Fenton vic@sportsturf.asn.au.

We are looking to grow the STA Victoria Facebook page and encourage all members to participate by providing us with information and editorial. It is a great tool for sharing information. We also encourage the use of Twitter and LinkedIn.

As this edition of ATM was going to print we were looking forward to our final event of 2018 – the Toro Regional Sports Field & Ground Forum at Packer Park Pavilion, Carnegie.

The STA Victoria committee thank you for your support and wish you a safe and happy holiday season. We look forward to providing information and support to the turf industry again in 2018.

STA VIC COMMITTEE

Around much of New Zealand we are experiencing a pretty typical spring. The old adage of 'four seasons in one day' is never more true in terms of describing the weather this time of year. Up until early November, many of our premier sports fields resembled a paddock as opposed to a manicured sports surface. Now that the weather is starting to settle down and soil temperatures are creeping up, we are dealing with the usual flush of broadleaf weeds and awakening kikuyu.

Winter rainfall has broken records along with the mean temperatures in many parts of New Zealand. This was the coldest winter since 2009 and in Christchurch rainfall to date has been 134 per cent above usual rainfall amounts (551mm compared to 411mm). Auckland experienced up to 902mm of rain (up to September) which sits significantly above the 'normal' rainfall for the same period – 753mm.

Aside from weather issues, the New Zealand sports turf industry is gearing up for another big year of sport. At the moment we are enjoying co-hosting the **2017 Rugby League World Cup (RLWC)** with games scheduled in many of our main centres. The recent Tonga v Samoa fixture at Hamilton's FMG Stadium proved to be an amazing event that superseded the action on the field with the action and vibrancy in the stands! The RLWC has in many ways crept up on the New Zealand public and media, with relatively limited publicity or promotion prior to the games being hosted in this country.

Later this summer, Hamilton will also host games in all three of the upcoming summer cricket series, with the West Indies, Pakistan and England all playing at the recently resurfaced Seddon Park Oval in the months between December and February. In addition, the Rugby 7s will also be staged at the FMG Stadium later in the season – Hamilton is the sporting destination of choice for 2017/18!

As I write this update, the eyes of two nations were centred upon the turf at Westpac (Wellington) Stadium. The All Whites took on Peru in their 2018 FIFA World Cup qualifier showdown with the home side fighting out a 0-0 draw (they would go on to lose the return leg in Peru). The new surface at the stadium continues to perform well and receive positive feedback. How long will it be until we see a number of other stadiums in New Zealand going the way of hybrid or stabilised technology? We have been watching with interest regarding the many stadium venues now going this way in Australia.

In terms of Kiwis on the international stage, it's been very interesting to follow the progress of former Eden Park turf manager **Mark Perham**. Mark has been enlisted to act as a consultant for the ICC and oversee the installation of the portable cricket pitch and temporary outfield being installed at the London Olympic Stadium for the 2019 World Cup. The stadium could also be used in England's revamped city-based Twenty20 competition, due to start in 2020. It's great that our turfies are gaining international acknowledgement.

FMG Stadium in Hamilton was one of a number of NZ venues that hosted games during the recent 2017 Rugby League World Cup

It's a busy summer ahead for our major and regional venues and turfies throughout New Zealand will be enjoying this all too brief period of growth and vigour prior to the onslaught of summer drought, heat and humidity that will doubtless ensue.

WILL BOWDEN
STANZ EXECUTIVE

ON THE MOVE

BROCK AGNEW: From assistant superintendent Sanctuary Cove Golf & Country Club, Qld to Landscape Solutions.

TREVOR FULLER: Departed as assistant superintendent RACV Cape Schanck resort, Vic.

BRENDAN GRAHAM: From course superintendent Cairns Golf Club, Qld to superintendent at Nambucca Heads Island Golf Club, NSW.

STUART GRAHAM: Departed as superintendent Settlers Run Golf & Country Club, Vic.

JUSTIN GROVES: From grounds manager/turf consultant South Australia Cricket Association, SA to grounds manager Sydney Cricket and Sports Ground Trust, NSW.

DEAN HARDMAN: From 3IC/spray technician The Australian Golf Club, NSW to assistant superintendent Killara Golf Club, NSW.

RYAN IRWIN: From superintendent Waterford Valley Golf Club, Vic to operations manager at Askernish property and facility management, Vic.

TIM HOSKINSON: From assistant superintendent Paradise Palms Country Club, Qld to superintendent Cairns Golf Club, Qld.

NICK JEFFREY: From horticulture and operations manager Metricon Stadium, Qld to racing surface manager Racing Queensland, Qld.

CHRIS MITCHELL: Elevated to assistant superintendent Palms Course, Sanctuary Cove Golf & Country Club, Qld.

ADAM REILLEY: From The Gabba to superintendent Geelong Golf Club, Vic.

TREVOR RIDGE: From senior greenkeeper to assistant superintendent Pines Course, Sanctuary Cove Golf & Country Club, Qld

DAVID SANDURSKI: From curator Melbourne Cricket Ground, Vic to head curator The Gabba, Qld.

WAYNE TICKLE: Resigned as superintendent Ballina Golf and Sports Club, NSW.

NATHAN TURNER: From superintendent Geelong Golf Club, Vic to Global Turf, Vic

TIM WARREN: From superintendent Links Lady Bay, SA to assistant superintendent The Grange Golf Club, SA.

STA WA

Above and below: Nearly 80 delegates, some travelling from up to eight hours away to attend, turned out for the WA instalment of Toro's regional sportsfield forum in early November

STA Western Australia held two events in recent months. The first was the annual STA WA Golf Challenge which was held on 11 October once again about the beautiful environs of the award-winning Hartfield Country Club (host superintendent **Nick Kinley**). The event this year was staged as an afternoon event, beginning with a light BBQ lunch thanks to sponsors State Wide Turf Services and Turfcare Australia, after which the players all enjoyed a relaxing and not-too-competitive nine holes of golf.

Major sponsor for the day was Jacobsen/McIntosh & Sons who very generously provided prizes for a number of novelty challenges for the players during the afternoon. Well-deserved thanks go to **Mike Healy** and **Mike Foskett** for their help making a very enjoyable afternoon; the STA WA looks forward to future events with Jacobsen.

The next event was the much-anticipated Regional Sportsfield and Grounds Forum sponsored by Toro Australia. This event was designed and staged by Toro Australia and shares a very similar format with their much larger annually held national forum. For the past five years or more Toro has recognised the fantastic potential such events mean for not only their business but also the whole industry's development, by reaching out in a cooperative and collaborative educational conversation with as many of their turf clients as possible.

The regional forum is hosted in partnership with the various state STAs and when held in Perth on 8 November at the Larkhill Sports Complex in Port Kennedy, it was a brilliant success. We were very proud when the final registration tally for the day numbered 77 delegates, many of whom had travelled from far afield to participate.

We had attendees come from Esperance (eight hours away), Albany (five), Busselton (four), Kulin (3.5) and Kojonup (three), as well as many other districts that were well over an hour's drive away. Their effort was certainly well appreciated by our interstate guests and gave a clear indication of the value many regional grounds care teams place on training such as this.

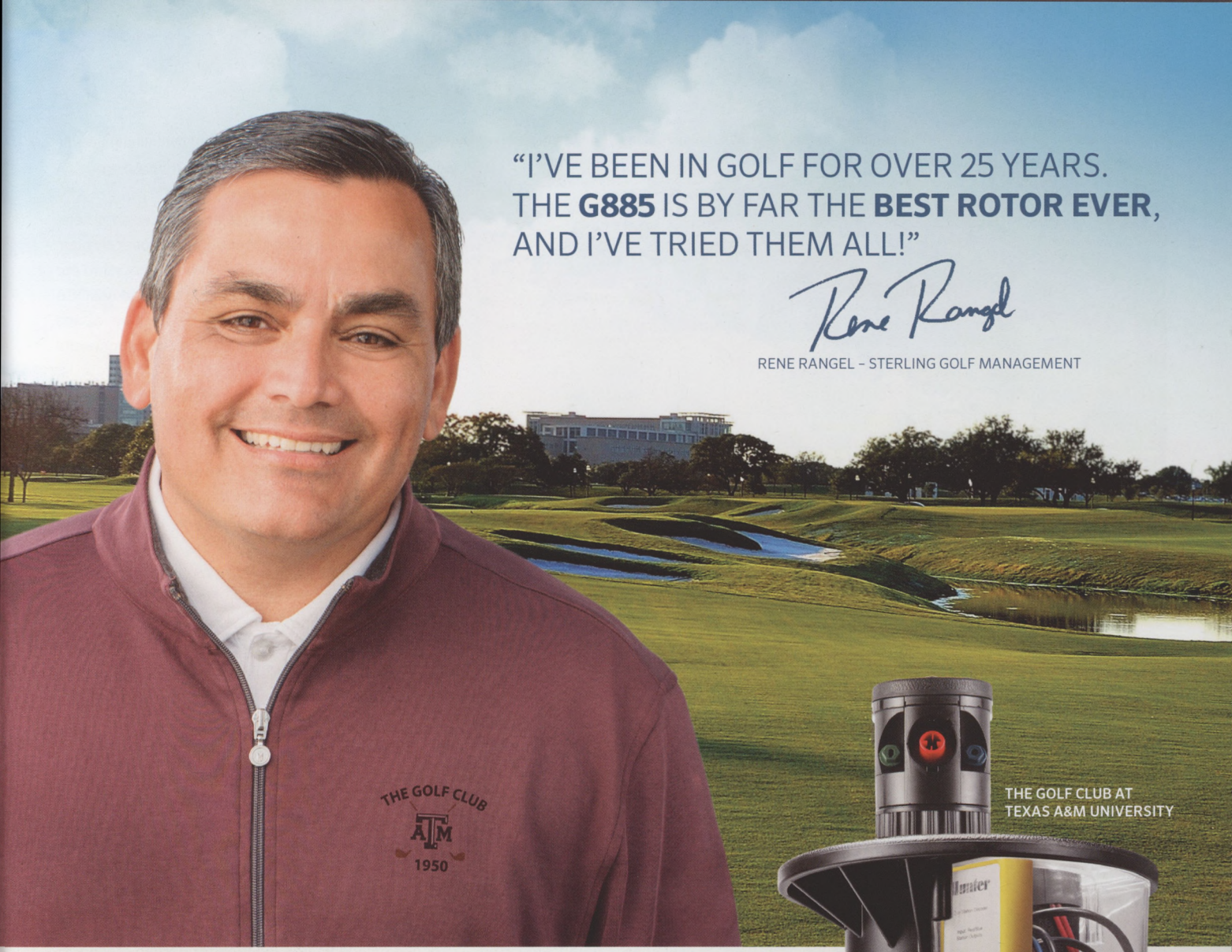
With such a good turnout we divvied up the crowd into three groups that rotated between a Toro machinery presentation with **Scott Wallis**, a Toro Irrigation presentation with **Chris Williams** and a Syngenta presentation with **Paul Jackson**. All the presenters did a truly brilliant job and I must say that I was greatly impressed with Scott Wallis, who did an outstanding job presenting a select range of Toro sports ground equipment. Throughout the presentations the hosts engaged common ground conversation with the delegates to relate on all aspects of their daily challenges managing their turf surfaces.

Thumbs up also to the Toro Irrigation team on the day. Chris, Clint and Gareth spoiled us with an amazing demonstration of an absolute monster sprinkler that blasted a beautiful stream of water almost 50 meters across the synthetic courts! Paul Jackson and **Matthew Holmes** from Syngenta also put on a very informative presentation and delved into those questions that some seem always reticent to ask, such as practical tips and suggestions on making the most out of the growth regulator 'Primo'.

It was a beautiful spring day, although it continued to get quite warm, nudging 35 degrees as the afternoon wore on. When lunch finally came around (45 minutes late) and our BBQ specialist delivered up his man-sized portions of beef ribs and sausages, concerns about the weather were irrelevant. So good was the BBQ that when reading through the feedback forms later that evening, one happy delegate actually granted us an extra point with a score of a 6 out of 5 for the catering!

Days like this cannot be put together without a fabulous support crew, such as from the City of Rockingham, **Nathan Hayes** and **Paul Smith** with their help with the venue and, last but not least, a big shout of thanks to my fellow STA WA committee colleagues **Hugh Gardner, Greg Jackson** and **Shannon White**, plus the inimitable **Eva Ricci**.

TONY GUY
PRESIDENT, STA WA



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Rene Rangel

RENE RANGEL – STERLING GOLF MANAGEMENT

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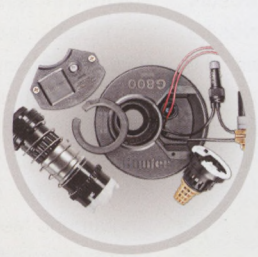

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VGCSA

Sam Langford and Mark Nicholson (Woodlands GC) teamed up with Shaun Page (Southern GC) and Chris Angwin (Burnley GC) to take the honours at the VGCSA Open Golf Day

Cheltenham's James Stewart (left) collected a longest drive prize

The association's year finished on a high note with a great turnout of 113 members for the VGCSA Open Golf Day held at Riversdale Golf Club. Course superintendent **Travis Scott** and his staff had the course in immaculate condition for the 4-ball Ambrose event. A magnificent dinner followed in the clubhouse accompanied by presentations of golf prizes and opportunities for members to interact.

The winning team for the day comprised **Sam Langford** and **Mark Nicholson** from Woodlands Golf Club who teamed up with **Shaun Page** (Southern GC) and **Chris Angwin** (Burnley GC). They each received a Crown voucher worth $250. Runners up were the team from Freeway Golf comprising **Ben Hartley, Paul Locke, Shannon Bennett** and **Geoff Tandy**. Third place went to **Paul Woloszyn** from Rain Bird Australia and his team of **Nick Launer, Andrew Anderson** and **David Johnston** from The Metropolitan Golf Club.

The two nearest the pins were won by **Andrew Maggs** (Maryborough GC) and **Paul Bardsley** (Australian Seed & Turf). Both the longest drives for the day were certainly a long way up there, with the winners being **James Stewart** (Cheltenham GC) and Mark Nicholson (Woodlands GC).

With the 2017 events calendar now complete, the committee has been working hard over the last few months securing venues and sponsorship for 2018. I'd like to thank the committee and VGCSA administration officer **Mary Napier** for their efforts and commitment in making 2017 a very successful year for the VGCSA.

The schedule has been locked in for our 2018 meetings and we are pleased to announce the following dates and venues:

- **Education meeting (Monday 5 March):** Frankston Golf Club and The National Golf Club – Long Island (superintendents Dean Hadfield and Simon Page).
- **Annual General Meeting (Wednesday 9 May):** Victoria Golf Club (Steven Newell).
- **2IC/3IC/Groundstaff meeting (Tuesday 5 June):** Box Hill Golf Club (Josh Leyland).
- **Superintendent/2IC country meeting (Monday 30 July - Wednesday 1 August):** Cobram Barooga GC (Matt McLeod).
- **Education meeting (Tuesday 11 September):** Kew Golf Club (Cameron Hall).
- **VGCSA Open Golf Day (Monday 19 November):** Spring Valley Golf Club (David Phillips).

The support to the association from golf clubs in Victoria is second to none and we are very appreciative of this and thank all superintendents and their clubs for hosting these important meetings.

Sponsorship and support from trade partners is again strong heading into 2018 and we thank the trade for their assistance towards the association's productive operations. All 'A Class' members would have received their trade directory via email and we hope members continue to support our trade partners in 2018.

In other news, trial work conducted over the winter period involving the control of *Poa annua* in couchgrass has been completed and results will be distributed to members in the New Year. A second trial concerning *Poa annua* control has already begun for the summer period across four sites in and around Melbourne. Hopefully we will see some promising results that members can utilise.

Good luck to all those hosting tournaments across the country whether they are major or minor. Hope the summer provides some good growing weather and consistent rainfall. Merry Christmas and a safe New Year.

MATHEW POULTNEY
PRESIDENT, VGCSA

The Freeway Golf Club team of Ben Hartley, Paul Locke, Shannon Bennett and Geoff Tandy finished runners up at Riversdale Golf Club

STA QLD

STA Queensland was proud to host its first ever national event, the Sportsfield & Grounds Forum, in partnership with Toro Australia, Syngenta and STA Australia at Golf Central in October. With participants from sports fields and grounds, schools, racecourses, maintenance companies, contractors and government departments, Toro delivered training, education and product trial sessions including:

- Spray technology;
- Advancing turf maintenance practices;
- Improving durability of sports fields;
- Productivity in turf maintenance;
- Innovation and technology; and
- Latest in Irrigation technology.

We also held our annual renovation and construction field day in September hosted by Redlands Cricket. Redlands Cricket curator **John McFarlane** has been a regular recipient of the STA Queensland annual award for Curator of the Year and attendees were given guidance on the maintenance and different renovation practices to repair wickets after a game, oval renovation options and live machinery and product demonstrations. **Dr Don Loch** from the University of Queensland addressed the audience with updates on his research into couch mite while conducting a walk and talk of an area within the facility that has been affected.

As part of the day, we were fortunate that Green Options were in the process of rebuilding an oval on Redlands College, which is next to Redlands Cricket. Here, the team gave an overview of the brief of the project as well as the construction practices they are incorporating into the rebuild.

We are looking forward to finalising the categories and inviting members to nominate for the first annual STA Queensland Awards to be held on 4 May 2018. Members, nominees and associates will be celebrated at the Queensland Cricketers Club at The Gabba. Other meeting dates for the first half of 2018 include an education day on 13 March and STA Queensland AGM on 17 April.

Redlands Cricket hosted STA Queensland's annual renovation and construction field day in September

FIRE ANT TREATMENT

The Lockyer Valley, Ipswich and Scenic Rim regions are currently the target of a broadcast bait treatment programme for fire ants. The National Red Imported Fire Ant Eradication Programme has been approved to deliver a 10-year plan to eradicate fire ants from Australia.

The area of treatment is significantly expanded and between September 2017 and June 2018 there will be three rounds of treatment across the above-mentioned regions. Fire ant bait treatment involves the distribution of granulated bait over lawns, garden beds, paddocks and other open areas either by foot personnel, all-terrain vehicle or by helicopter.

STA Queensland members who operate in these areas are encouraged to familiarise themselves with the programme as it is critical that parks, sports fields and other outdoor areas that receive fire ant bait treatment are not disturbed for 48 hours. This includes no irrigating, topdressing, applying insecticides or disturbing the ground where bait is laid. This allows worker ants to forage for bait and circulate it through the colony to the queen ant.

Preventing the bait from taking effect may exacerbate a fire ant infestation, making it an offence under the Biosecurity Act 2014. For more information about fire ant bait treatment and to view the areas targeted for treatment, visit www.daf.qld.gov.au/fireants or call Biosecurity Queensland on 13 25 23.

KRISTY-ANN PRATSCH
SECRETARY, STA QLD

Adam Marchant will take over as Royal Sydney Golf Club superintendent on 23 January 2018

CHANGING OF THE GUARD AS MARCHANT SET TO MAKE MARK AT ROYAL SYDNEY GOLF CLUB

There have been plenty of superintendent, assistant superintendent and sportsturf manager movements this spring, but none bigger than the two announcements made by Royal Sydney Golf Club in October.

Late on Friday 6 October, it announced that **Steve Marsden** was finishing up as course superintendent and then just three weeks later it wasted little time to reveal the elevation of long-serving and highly-regarded assistant **Adam Marchant** to the superintendent role effective from late January 2018.

Marsden's announcement certainly took the industry by surprise, especially in light of the fact that Royal Sydney is about to embark on a major course redevelopment under the auspices of renowned golf course architect **Gil Hanse**. However, as he mentioned in the AGCSA's enewsletter The Cut, Marsden commented the decision to leave the club and head back to his native New Zealand was more for family reasons than anything else.

"It has been a very hard decision to come to, but it is one that we have based on lifestyle and trying to achieve a better work-life balance," says Marsden. "I have had five great years at Royal Sydney and it has been a privilege to work alongside the excellent Turf Care crew and clubhouse staff who make this place so unique."

The news of Marchant's posting was certainly a popular one and within a day of the AGCSA breaking the news to industry on its Facebook page, the post had more than 250 likes and over 100 comments! Marchant's appointment came literally two months after he returned from a three month, club-approved stint working at Merion Golf Club in the US.

Speaking in The Cut in late October, Marchant was excited about his new role: "I am very honoured to be given this opportunity. Royal Sydney has been a major part of my turf management career for more than 15 years and to follow in the footsteps of past superintendents and mentors **John Odell** and Steve Marsden is a huge privilege.

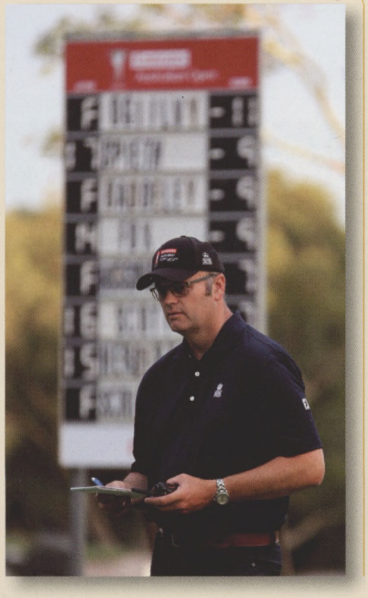
"It is set to be a very exciting phase for the club in the coming years with Gil Hanse currently working on a masterplan which will be voted on by the members next year. I am very much looking forward to being involved in this and leading our talented and dedicated Turf Care team through what will hopefully be one of the most significant projects in the club's history."

The refinements of Royal Sydney are far removed from where Marchant started his turf management career as a 17-year-old apprentice at Mudgee Soldiers Club, NSW in 1999. By sheer coincidence, that apprenticeship had become available because the previous apprentice had taken a role at Royal Sydney under then superintendent John Odell. Making contact with Odell, Marchant transferred his apprenticeship to Royal Sydney in his second year, starting in early 2001 just as the club was embarking on a major greens reconstruction project.

After five years with the club, Marchant departed and spent a few years working for an irrigation company before returning to the club in 2008 as a senior greenkeeper. At the start of 2010 he was appointed Links foreman and following the departure of Odell and arrival of Marsden in late 2012, Marchant was appointed foreman of the club's Northern Area (tennis, bowls and croquet) following the 2013 Emirates Australian Open.

A restructure of the club's senior staff in 2015 then saw Marchant appointed as one of two assistant course superintendents and he went on to play a major role in overseeing preparations for last year's successful Emirates Australian Open. Marchant officially takes the superintendent reins on 23 January 2018.

Steve Marsden announced his resignation as Royal Sydney superintendent in early October. He will be returning to his native New Zealand in January



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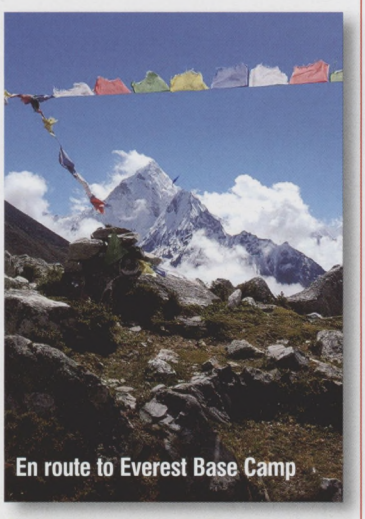
Mission accomplished for Stephen Mallyon (right) and brother-in-law Mark Thomas

Reaching new heights

Bexley Golf Club superintendent Stephen Mallyon has a real taste for adventure outside of turf.


En route to Everest Base Camp


Another item off the bucket list

Beyond the daily task of maintaining a golf course, staff and member expectations, there lies a deep passion for adventure and travel. This passion has led to many overseas expeditions to fuel and excite my inner adventurer. A couple of the most noticeable and exhilarating trips in recent times have included trekking to the southern base camp of Mt Everest and cycling up Mt Haleakala on the Hawaiian island of Maui.

The expedition to Everest Base Camp, which sits at 17,598 feet (or 5364 metres), occurred last October and I completed it alongside my good mate of 25 years Gavin French. The return trip, once you are in Kathmandu, is only 15 days. While that might not sound like much, you are hiking between 7-9 hours per day on some extremely rough terrain and dealing with the effects of high altitude.

Flying into Lukla airport (9334ft or 2845m), which is carved out of the side of a mountain deep in the Himalayas, definitely gets the adrenalin flowing straight away. A regular contender as the world's most dangerous airport, as you fly in you can see the wreckages of numerous planes that didn't quite make it strewn across the landscape.

Once you step off the plane you meet your Sherpa and the trek begins immediately. The Sherpas make it look easy and it is amazing to see the weight they can carry (sometimes up to 100 kilograms) with a single hessian strap around their forehead.

Throughout the trek you encounter some of the most photogenic sights on the planet. We also heard and witnessed about 10 avalanches, but thankfully none of them were close enough to worry our group. The sound they make is incredible as the echo rumbles around the mountainous landscape.

Some of the wire cable bridges that you have to cross are like something out of an Indiana Jones movie! Some are over 400 feet high, spanning 150m in length across enormous gorges and just 1m wide. And just to add to the experience, every now and then you'd come across a farmer walking his yaks!

Needless to say, it was an amazing feeling to reach Everest Base Camp. I know it is only the starting point for the more serious mountaineers who go for the summit (maybe one day), but I cannot recommend it enough to people. It is very achievable and a big tick on the bucket list.

ON YER BIKE!

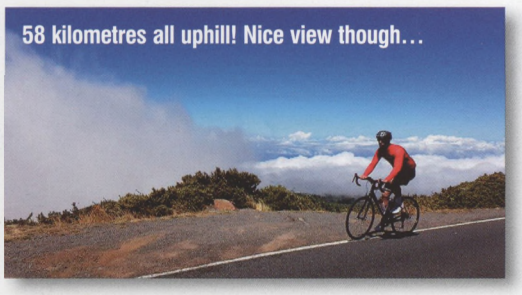
Cycling has been a growing passion of mine for the past 3-4 years and I need no excuse to head out for a ride when time allows. This past October I travelled to the island of Maui in Hawaii to celebrate my father-in-law's 70th birthday and while there was able to indulge in another small adventure.

Mt Haleakala, a massive shield volcano, sits on the east coast of Maui and is world famous for its 'Cycle to the Sun' event, one of the most difficult bike climbs in the world. The average gradient for the climb is 7-8 per cent with sections reaching 16 per cent. The total distance is only 58km to the summit (which sits at 10,023ft) but it is uphill all the way and not easy.

I did the ride with my brother-in-law who is a much stronger rider than me. The day we chose to do the ride the weather was perfect with not a cloud in the sky. By the time the clouds did close in, we were already above them! There are tour operators that drive their customers to the top and they cycle down. We saw a lot of these groups who all yelled out as they sped past – 'You're crazy!'

Throughout the ride I casually consumed eight energy gels, four protein energy bars and around 10 litres of water. There was an immense feeling of pride reaching the summit and it was definitely a case of mind over matter to will my body to keep turning the pedals over to get to the top. It took us just over six hours to reach the summit and just over an hour to make the descent back to the car. The descent was certainly the fun part with perfectly cambered corners meaning you could get up some serious downhill speed.

So where to next? Well, there's still plenty of the world to see and together with my mate Gavin we are planning our next challenge which will be a hike to the summit of Mt Kilimanjaro in Tanzania some time in 2018. Let the adventures continue…


58 kilometres all uphill! Nice view though…

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