
Swimming Australia

# Testing the waters for the Commonwealth Games

The competition pool, as the swimming is about to commence

In August, hundreds of swimmers from around the Pacific basin came to the newly rebuilt Gold Coast Aquatic Centre at Southport to contest the 2014 Pan Pacific Championships.

This major swimming event was seen as a dress rehearsal for the 2018 Commonwealth Games, to test how the facility would operate under the serious pressure of a major international meet.

The pressure on the venue was exacerbated by a very un-Queensland cold front complete with storms sweeping across the Gold Coast right at the time of the competition.

Michael Brock, aquatic centres coordinator for the City of Gold Coast, admits that the spectators did find it a bit tough in the conditions.

"It was considered a test event for the Commonwealth Games and we got the worst weather you could imagine. So they'll have to decide how far they will go to cover that possibility happening again.

"From our point of view, the spectator comfort was an issue. My own personal view is that we won't put a roof over the whole facility, but it will be up to the Commonwealth Games Olympic Committee to decide whether to put one up over the seating."

Overall he thinks the event went well and the feedback he got was that the venue performed well.

"Generally the feedback was, the facility was great, shame about the weather. It will give the committee a lot of food for thought about how they tackle that."

He stresses that the facility's ongoing requirements will be quite different from the requirements for the Commonwealth Games. This is because the pool is primarily a community pool, with the refurbishment funded 50 per cent by the Gold Coast City Council which views it as very important that there is a strong ongoing legacy component.

Also, after the Commonwealth Games, the aquatic centre will have hosted two of the biggest possible international meets they are likely to host for the foreseeable future, and events of similar size will be hard to find.

For that reason, the seating for the Commonwealth Games will boost capacity up to 10,000, but 90 per cent of it will be temporary. The legacy component will revert back to about 1000. The Pan Pacs seated 3800.

"If you were going to build a roof over the seating for the Commonwealth Games, it would have to be of such a height – about 20m high – that when the temporary seating is taken away the roof would look quite odd," says Brock.

"So I think you wouldn't look at a permanent roofing solution until after the Games, because how many games like this would you get? We'll have already had the Pan Pacs and the Commonwealth Games and they're the big ones. I think you need to split it into: what do the Games need; and what does the venue need to be sustainable as a high performance facility community facility?

"The right solution for the event might not be the right solution long term."

Two other questions were what was the water like, and how did the transport work.

"From our point of view, the water quality was good," says Brock. "We were in six weeks prior and the only issue was getting enough bather load in the water to do the testing. The media said the clarity was very good and they could get good shots in the water.

"And while I don't think there were any major transport issues, I think they can review all of those aspects. Ease of access, drop off zones. It generally worked well. The light rail was in operation and that was a big bonus – it was pretty heavily used."

## The upgrade

The $42 million dollar upgrade to the Gold Coast Aquatic Centre was funded 50-50 by the Gold Coast Council and the Queensland Government.

It encompasses a new 10-lane 50 metre competition pool, a new learn-to-swim pool, an elevated spectator concourse/viewing terrace, new change room, gym and toilet facilities, community meeting rooms, event facilities, permanent seating for approximately 1000 people, and refurbishment of the existing eight-lane 50 metre pool and dive pool.


The diving tower and pool

Paul Stevenson, one of Australia's most highly regarded consultants, was the aquatic engineer for the project. With more than 1000 pools under his belt, including the Olympic pools for the Sydney and Beijing games, he is well qualified for the task.


Paul Stevenson of Stevenson + Associates

Two separate plant rooms were built, one for competition pools and one for the leisure pools, and the six pools include a mix of disinfection systems.

"We considered all options including liquid chlorine, calcium hypochlorite, electrolytic generation of chlorine using salt, and electrolytic generation of chlorine using fresh water," says Stevenson.

For the outdoor 25m pool and the splashpad, they decided to go with straight electrolytic saline running at 3500ppm from AIS.

"The reason we did this is we didn't want to end up with a big liquid chlorine store somewhere and of course the cost effectiveness of on-site chlorine generation," he says.

"For the indoor learn-to-swim pool we used the Ecoline from AIS. That's a freshwater chlorinator using a much lower TDS of around about 1200ppm. The reason we chose that is we didn't want a high concentration of salt in an indoor pool. It's not a good idea because of corrosion potential. Again, the cost effectiveness of on-site chlorine generation was taken into account.

"For the competition pools we were so close to choosing the Ecoline freshwater system," he says. "In the end they went for cal hype feeders, due to cost considerations and also the desire to choose a technology proven over time for such an important competition pool."

In addition, they put medium pressure Siemens UV on the indoor swimming pool to strip the chloramines.

"The pH is controlled primarily by CO2, but on the competition pools we also provide a supplementary acid system. They're such big pools so we have the acid for use in conjunction with the CO2 so you can have a bit of flexibility in dosing methods."

For the filtration, they ended up designing two ultrafine systems, one using a Defender system and one using an Atlas NPC system. Both systems are capable of filtering down to 1-2 microns using perlite – which the council wanted to use instead of DE due to OH&S considerations.

Both systems were documented, designed and tendered. The Atlas NPC won out on cost.

The aquatic centre also boasts a gigantic installation of Rheem's Accent heat pumps.

"It's more than two megawatts of heating," says Stevenson. "It's a very big heat pump installation and studies found that this was viable over a gas system and had a very good payback of less than three years."

He says that in summer they'll get a COP (co-efficient of performance) of at least 4.5 and in winter 3.5, providing an average COP of around 4. As mentioned below, the heat pumps are also equipped with a unique tariff control system which automatically adjusts water temperatures to maximise low energy tariffs.

## The super-efficient hot and cold tubs

One of the most ingenious elements of the project is the hot and cold tubs used for swimmers' recovery after competition.

The system is believed to be a first in Australia and possibly the world. Using an Accent Air water-to-water heat pump from Rheem Pool Heating, it simultaneously heats the hot tub from the energy recovered from chilling the cold tub. Stevenson designed the super-efficient system.

"Very little energy is wasted, as the Accent heat pump transfers heat from the cold tub to heat the hot tub," he says.

It has been created so the tubs (both 2.2m in diameter and 900mm deep) don't need their own water treatment plant, but rather utilise the huge capacity of the adjacent diving pool water to keep them crystal clean with fresh water on a daily basis.

When the tubs are in use, generally for a couple of hours each day, the water is kept clean by flushing with diving pool water very frequently.

"You've got a very short turnover," says Brock. "You've got to swap that water within fifteen minutes."

The heat exchanger ensures that the energy contained in the water from the hot or cold tub returning to the diving pool is then transferred back into the water coming from the diving pool and then entering the tubs.

It is this inter-relationship between the hot and cold tubs and the diving pool that is so unique.

"The benefits of this system are manifold," says Stevenson. "Not only does it have low energy use, but the water is of very high quality.

"Unlike other systems, the tub water doesn't have to be emptied, because it's being constantly refreshed. Plus capital costs to install the system were lower as there's two less water treatment plants to install, operate and maintain."

The Accent unit was custom-designed by Rheem's specialist heat pump engineers and contains twin compressors in a two-stage design to maximise energy efficiency and provide the flexibility of temperature control needed to complement the revolutionary concept.

The heat pump for the athlete recovery tubs was one of eight Accent Air heat pumps provided by Rheem for the aquatic centre, which required systems to heat almost nine million litres of water. Heating was also needed for the existing 50m, 25m and diving pools, in addition to the new 50m competition pool, indoor learn-to-swim pool and splash pool.

Following an open tender, Rheem was contracted by Trisley Hydraulic Services to provide the heat pumps, which were built to specifications provided by Stevenson + Associates.

The heat pumps also include Building Maintenance Control (BMS) capabilities. This enables the operators to control and interrogate the units in relation to a broad range of operating parameters, including checking operation, data logging of heat pump performance and monitoring temperatures.

The smart controller also enables the temperature of the water to be automatically adjusted during tariff changes.


The centre features more than two megawatts of heat pump heating supplied by Rheem

"The controller is a really big plus," says Stevenson. "It means that as soon as the tariff hits high, the temperature of the water is automatically lowered by a quarter to half a degree and the heat pump turns off. And as soon as the tariff hits low, then the temperature of the water is bumped up and the heat pump begins operating again. It's ideal for offsetting costs."

## For the community and the elite

Michael Brock says that the aim with the refurbishment was to end up with a top class competition facility on the Gold Coast, first rate training facilities across a wide variety of aquatic sports, and a community facility that will last into the future.

"It's about not just swimming but a whole range of aquatic sports, be it swimming, diving, water polo, triathalon. We work in fairly close conjunction with the AIS diving facility at Chandler, where Diving Australia is based. We also have a fairly strong synchronised swimming program here as well. It's basically the national team based here.

"We want to develop this as a training centre for a whole range of sports. We are one of Swimming Australia's podium centres, of which there's 11 or 12 in the country. We'd like to develop that relationship with the other sports as well."

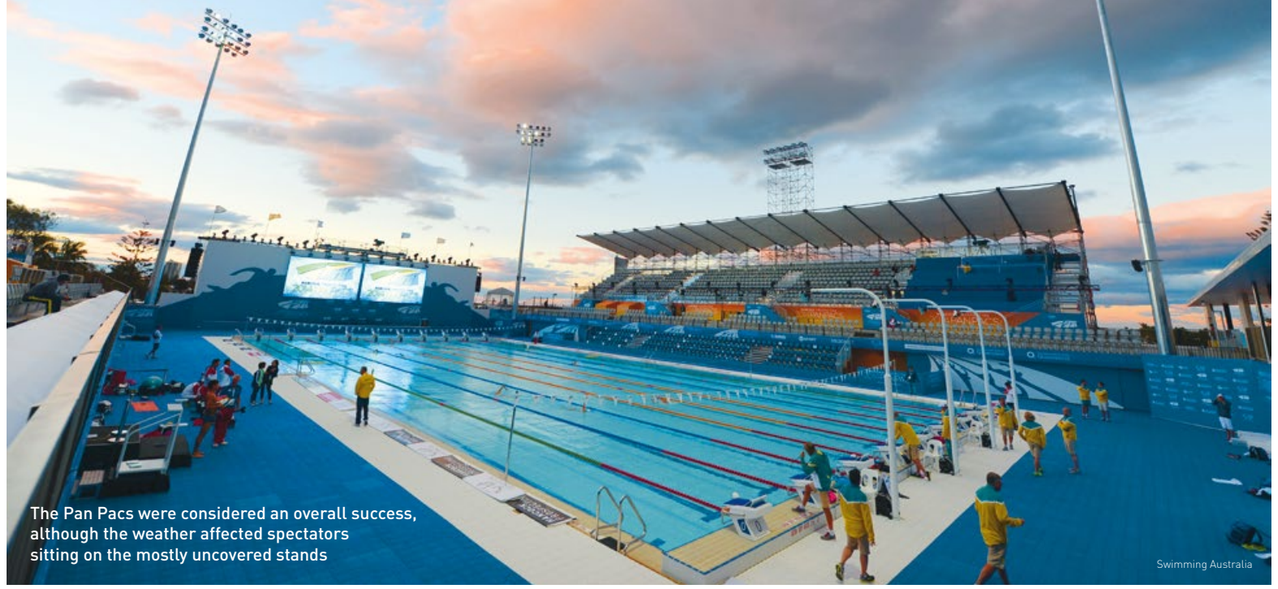
He says that it is a community facility first and foremost, with the result being a community facility that will accommodate an elite component.

"The trick for us is to get the balance right in blending the two. Because, to be honest, the community use will be our bread and butter, and it's about giving the community value," he says. "A lot of rate payer dollars have gone into this, so it's about providing the best possible community facility as well."

The facility is very much as series of rectangular pools, with only one modest splash area.

"We haven't gone too much into the recreational space," says Brock. "One reason is that the Broadwater Parklands – which is the precinct around the pool – contains a fairly large, cost-free, free-form play space called the rock pools. So we don't really need to replicate that."

Community use will include lap swimming, training, aquatic fitness and school competitions, and during the summer holidays they will provide less structured recreational activities, such as putting inflatables in the pools and opening up the dive boards under supervision.



The Pan Pacs were considered an overall success, although the weather affected spectators sitting on the mostly uncovered stands

Swimming Australia

Council has made a decision to manage the centre in-house up to and including the Commonwealth Games and then they'll reassess it.

"There's a few reasons for this," says Brock. "One is that there'll be quite a lot of disruption during the Commonwealth Games and the Pan Pacs, and potentially for other events as well. So council said lets run it, see exactly what it's worth so if we do put it out to tender we'll have a very clear handle on the return we might expect to the community for doing that."

That also gives them the opportunity to pursue events like the Pan Pacific Masters.

"It's a high participation, not necessarily high spectator, event," he says. "But from an economic benefit point of view, it really is good for the Gold Coast – it brings a lot of people in. We're close to accommodation and we'll have all the infrastructure for those sorts of events, so we won't need to bring any overlay in."

The redevelopment was delivered on time, starting on site in March 2013 with handover around middle of June 2014.

The 21st Commonwealth Games will run from April 4 to 15, 2018, and will include 6500 athletes and team officials from more than 70 nations. The para-sports program including the swimming component will be integrated into the event. ■

The hot and cold tubs, which utilise an ingenious heat transfer system

### 2014 Pan Pacific Championship

| Rank | Nation | Gold | Silver | Bronze | Total |
|---|---|---|---|---|---|
| 1 | United States | 16 | 13 | 14 | 43 |
| 2 | Australia | 10 | 9 | 9 | 28 |
| 3 | Japan | 7 | 8 | 4 | 19 |
| 4 | Brazil | 1 | 2 | 1 | 4 |
| 5 | Canada | 1 | 1 | 5 | 7 |
| 6 | South Korea | 1 | 0 | 0 | 1 |
| 7 | New Zealand | 0 | 2 | 3 | 5 |
| 8 | China | 0 | 1 | 0 | 1 |

## Project credits

**Client**: Gold Coast City Council

**Lead contractor**: Watpac

**Construction**: Crystal Pools

**Aquatic engineer**: Stevenson + Associates

**Services and civil engineer**: Arup

**Structural engineer**: Geoff Ninnes Fong

**Architect**: Cox Architecture

**Project manager**: Project Services

**Filtration**: Atlas filters with Aquaperl perlite media

**Hydraulics**: Trisley Hydraulic Services

**Heating**: Rheem Pool Heating's Accent heat pumps

**UV disinfection**: Siemens (Wallace and Teirnan)

**Electrolytic disinfection**: AIS

**Disinfection control**: BECSys5 Pool pH & Chlorine Controllers

**Pumping**: Southern Cross

**Cleaning**: Maytronics cleaners

**Timing**: Swiss Timing