

WATER CORPORATION: SSDP EXPANSION

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PLANNING AHEAD

Western Australia's Water Corporation has commenced the expansion of its second major water desalination plant to end dependency on climate sensitive rainfall. Project director Nick Churchill updates Gay Sutton about project managing for a speedy and cost-effective outcome



An aerial shot of the plant in July 2011

Western Australia is one of the world's driest places and it's indisputably getting drier. During the 1970s the state's water supply was fed mainly from rain runoff collected and stored in a network of dams in addition to a small amount from underground aquifers. At that time, the average annual rain runoff into the dams amounted to around 320 gegalitres (GL) and was more than sufficient for the state's needs. But by 2001, runoff had decreased to just 70 GL a year—in other words, the water resource had shrunk to just 20 per cent of its 1970s level.

To provide security of water supply to this vast and arid region, the state's water provider, the Water Corporation, has been restructuring its operations and installing a range of new and often ground breaking technologies, particularly for the south-western region around Perth where the recent decline in rainfall has been the most dramatic. Today, only one third of water needs is supplied from the dams: the remainder is supplied by underground aquifers and two seawater desalination plants.

The Water Corporation's Perth Seawater Desalination Plant was the first large-scale project of this nature in Australia, and has been producing 50 GL of water a year continuously since coming online in 2007. A second similar project quickly followed and the Southern Seawater Desalination Plant (SSDP) came into operation in September 2011. Work is now underway to expand the plant, doubling its output.



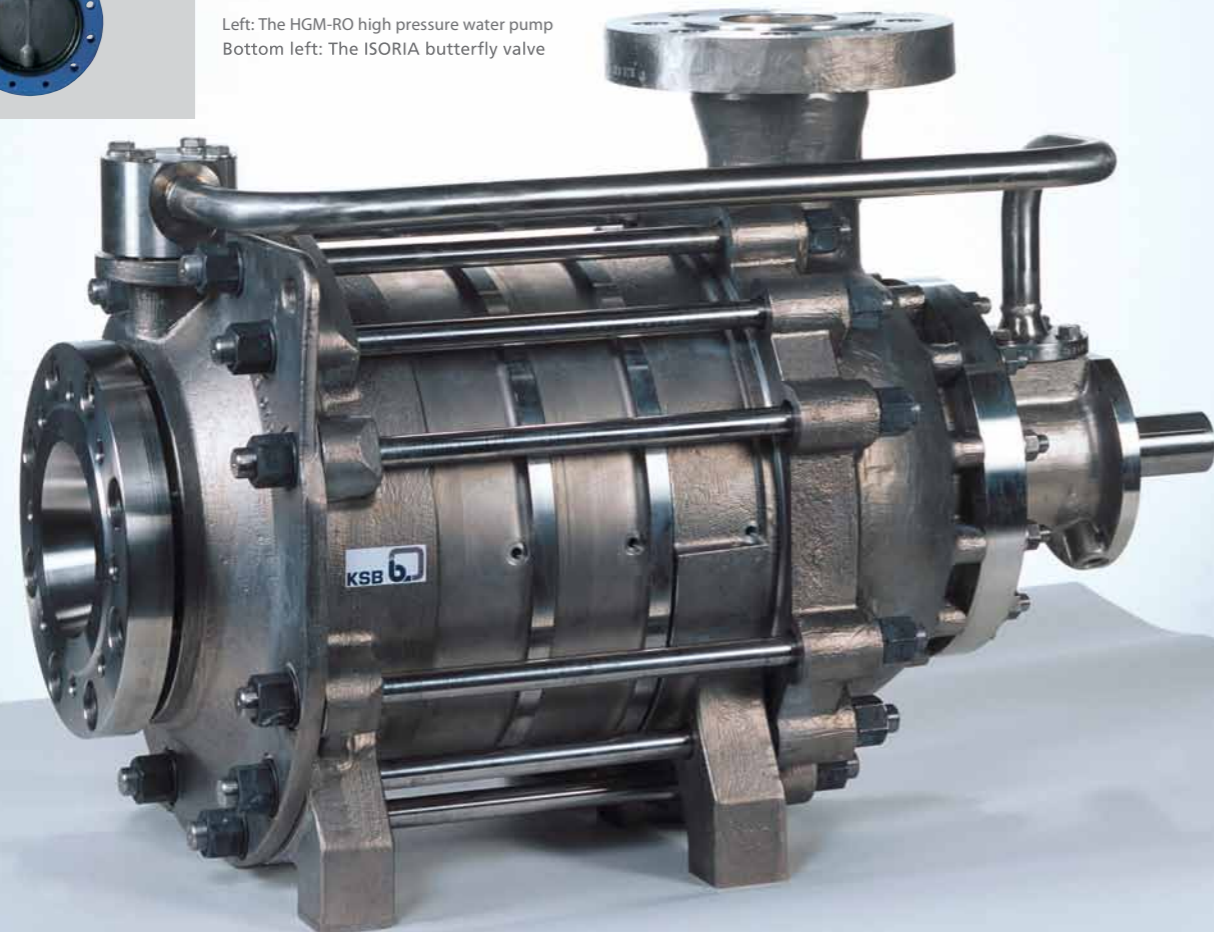
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Left: The HGM-RO high pressure water pump
Bottom left: The ISORIA butterfly valve



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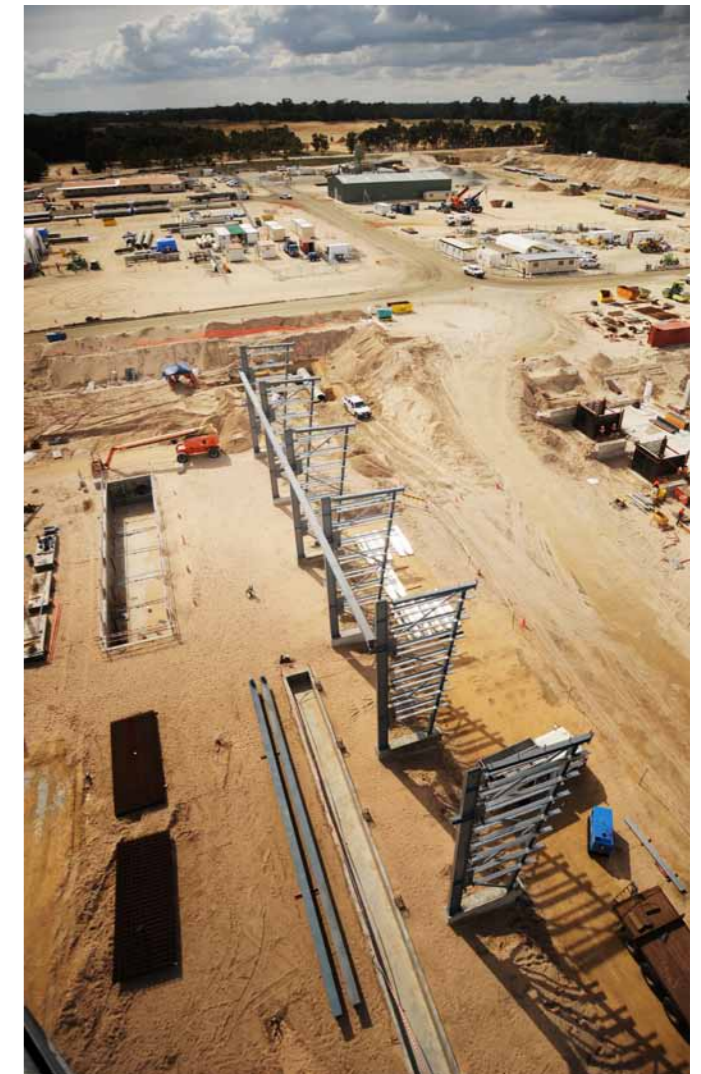
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“Expansion was already foreseen when we began planning the first phase of SSDP,” explains project director Nick Churchill. “So we completed all relevant assessments and approvals for a second plant at the time we did the first, a process that has now saved us two years.”

Two master plans were also created at the early planning stage of phase I. The first covered the development in hand, and a second was a plan for a possible second phase. “When we undertook the risk assessment, we also looked carefully at the plan for the expanded site. Where there was a risk that work for phase II could involve shutting down the existing plant or that it would be cheaper to install phase II infrastructure during phase I, then we did the work right away.”

The major water intake pipes connecting the plant to the pumping station and the highly sensitive and complex marine work into the ocean are an example of this. All the tunnelling and engineering for both

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Construction underway at the SSDP

phases were completed during phase I, leaving just the installation of additional pumping equipment and the infrastructure for connecting the pipe work to the new plant to be completed in phase II.

The construction and engineering work that has just been initiated will have a lot to live up to. Phase I earned the team a number of prestigious industry awards including two Australian Institute of Project Management Awards, Project of the Year at the International Tunnelling Awards and the Western

An innovative berm, used to conceal the plant and reduce noise and lighting nuisance

“THE CONSTRUCTION AND ENGINEERING WORK THAT HAS JUST BEEN INITIATED WILL HAVE A LOT TO LIVE UP TO”

Australia Engineering Excellence Awards 2011—no mean feat as industry and business in Western Australia is heavily engineering-oriented.

Moreover, phase I was delivered three months ahead of schedule and slightly under budget, an achievement that Churchill attributes to the knowledge and experience gained on the construction of the Perth plant. “One of the most effective things we did at that time was to bring together everyone from the first desalination project and engage in a huge brain dump session looking at all the risks, what worked well



and what did not. Then we were able to tackle all these issues early for SSDP.” This focus on continuous improvement has resulted in a considerable bank of expertise among the Water Corporation team, knowledge that they are happy to share with others in the industry.

Many of the lessons learned during phase I are now being applied and developed in the second phase. The contracting strategy, for example, is being honed to improve efficiency and effectiveness. “With multiple contractors on Phase I it took a lot of time to manage the different interfaces between contractors, so we’re combining

70 GL

WA’s average annual rain runoff into dams in 2001

the mechanical and electrical installations as their work is so closely interdependent. On phase II we’ll be going for two major contractors—AJ Lucas for the civils package and the mechanical & electrical contractor is yet to be announced.”

Desalination technology has also moved forward significantly, and one of the major innovations being incorporated into phase II is a microfiltration seawater pre-treatment process which will pre-treat the water for both plants. Another innovation, which at this stage is exclusively for the new plant, is the use of a hybrid reverse



Safety was a number one priority for all employees on site

“WE HAD TO SHUT THE WORK DOWN FOR TWO-AND-A-HALF MONTHS WHILE WE WORKED WITH THE ARMY AND CONTRACTOR TO CLEAR THE ENTIRE SITE AND MAKE IT SAFE”



Machinery on site at the SSDP site in Binningup

osmosis membrane which operates at a lower pressure and is therefore more energy efficient.

The Southern Seawater Desalination projects, of course, have not been without their challenges. Perhaps the most curious occurred when construction began on the water storage tank overlooking the site. “It turned out that this was the location for a World War II bombing range, and we found a number of unexploded ordnance in the ground,” he says. “We had to shut the work down for two-and-a-half months while we worked with the army and contractor to clear the entire site and make it safe.”

A more difficult challenge came when the decision to go ahead with the project was announced by the Premier, and the local communities had not been prepared for it. “At the time we were progressing a major ground water source,” Churchill recalls. “The new desalination plant was the alternative water source strategy, which made the announcement a shock for the local community.”

The reaction among local communities was angry and vocal, and action groups were formed against the project. “The critical part for us was that the approval process incorporated public comment. So we had to engage with these communities and spent a lot of effort making the process as transparent as possible, providing information and enabling the community to comment on it.”

Long-term noise and the visual appearance of the site were two of the major

concerns, and from an early stage the plans were adapted to incorporate a berm—an eight-metre high embankment to reduce noise and visibility—around the plant. Another concern, particularly as this was a fishing and holiday area, was that the beach might be closed for a three-year period while the marine works were undertaken linking the plant with the sea.

“That certainly raised a lot of angst,” Churchill says. “But by choosing tunnelling methods we only closed the beach for a week, as a safety precaution, each time we tunnelled beneath. In the end, by meeting our commitments and following through on what we said we’d do, we’ve turned the situation around in a spectacular way. The community is now completely supportive of the project.”

Construction of phase II began in September 2011 immediately after the announcement had been made. And if all goes according to plan, the new plant will be commissioned and put into operation at the end of 2012. “Phase II will be variable flow,” Churchill says. “The output will depend on the volume of rainfall and surface water available. So when the dams are full the plant will only run to top up capacity. This will make us independent of rainfall.” Such security of supply will certainly be appreciated in the dry and arid region. **BE**

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A welder working inside
a pipe on the SSDP project

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