



# CONNECTING THE SYSTEMS

The North South Interconnection System Project (NSISP) consists of a range of works which 'connect up' the northern and southern water supply networks.

NORTH SOUTH INTERCONNECTION SYSTEMS PROJECT / SA WATER



**Left** The new Gilberton pump station which is one of three pump stations as part of the North South Interconnection Systems Project (NSISP).

For over 150 years SA Water has remained focused on providing essential services that support growth and economic development throughout the state of South Australia. Owned by the Government of South Australia, SA Water manages more than \$13 billion worth of assets.

“Every hour of every day, SA Water embraces the challenge of delivering safe, sustainable and affordable water services to more than 1.5 million South Australians,” explained Network Water Security Program Project Director, Mark Dedman.

“Many states experience droughts, yet South Australia remains one of the driest states in the world. Coupled with its location at the end of the river system, South Australia was highly dependent on flows of water from the River Murray to sustain the State’s economy.”

The Government and SA Water recently implemented two strategic projects to introduce an additional source of water and deliver greater flexibility and security to the Adelaide distribution network.

The construction of the Adelaide desalination plant has delivered a non climate dependent source of water that can supply up to half of Adelaide’s drinking water in any given year. This substantially reduces reliance on the River Murray and will future proof Adelaide against severe drought.

The second project, interconnection of the Adelaide water supply system has resolved the inability to move water throughout the network in accordance with demand thereby maximising the use of all water sources. Prior to the North South Interconnection System project (NSISP), Adelaide’s water supply system was roughly split at the River Torrens into a northern system (supplied through the Hope Valley and Anstey Hill Water Treatment Plants) and a southern system (supplied through the Happy Valley Water Treatment Plant).

Mark said that the completion of the \$400 million NSISP on time and budget enables the transfer of large volumes of water between two very distinct water supply networks – including water from the desalination plant. Extensive feasibility design and assessment processes identified three major construction components: 3 new pump stations (Clapham, Wattle Park, Gilberton all located in inner city residential

suburbs); approximately 32 kilometres of new pipe and 5 valve stations.

“Hydraulic modelling and technical testing confirmed that connecting the northern and southern water supply networks could be better completed through the construction of smaller pipelines and additional booster pumping stations - integrated into existing assets”. The network improvement has also allowed for upgrading of underground services - including new and replacement valves,” said Mark.

As with all major works, some level of disruption is unavoidable. SA Water believes it is important to work closely with the community to ensure high levels of understanding on each phase including how residents and business owners need to prepare and how other possible impacts such as dust can be minimised.

“Community engagement was taken to a new level with this project with local residents and Councils collaborating with SA Water to directly influence the overall project design and construction.”

“The community challenged the NSISP team to minimise building sizes to reduce the impact on the urban landscape. For example the Clapham Pump Station, is the largest pump station in urban Adelaide, yet it is small for the role it performs. It houses 5 one mega watt high voltage pumps capable of transferring up to the equivalent of 40 Olympic size swimming pools a day from the Happy Valley clear water storage to the northern suburbs. Innovative design features including flywheels, a technology of the past, were adapted for installation in the modern buildings to assist with surge replacing the need for large surge vessels which are usually installed. Likewise, the Gilberton Pump Station had a high level of architectural design, delivering on commitments made to the community regarding building aesthetics and integration with the urban environment.”

“The project’s acoustic engineers met the challenge of making pump and valve stations as quiet as possible. The resulting levels of acoustic attenuation assisted with the high level of community satisfaction with the final result.”

“New predictive tools were also implemented which change how operators frame their operating systems and allow for the transfer system to be managed from a central location - this is a huge step forward in automation,” said Mark.

Over 3500 predominantly local, highly skilled individuals contributed to the successful completion of the NSISP project on time, and on budget. Of these, approximately 88 per cent of the total project budget went to local businesses or local branches in South Australia.

Mark highlighted the complexity of work which provided many skill development opportunities for local businesses, allowing them to expand their horizons and tackle challenges of a scale and nature they hadn’t experienced before.

Businesses that partnered with SA Water on NSISP included Guidera O’Connor, York Civil, Leed Engineering, SAGE Automation, Downer EDI JV, John Holland, Fulton Hogan BJ Jarrad JV.

Like NSISP, the desalination plant at Lonsdale was finished on time and within its budget of \$1.83 billion and has distributed approximately 46 gegalitres of desalinated drinking water into the newly connected network since mid-October 2011.

South Australia is not the nation’s largest state, but it is at the forefront of many energy and water-saving initiatives, starting from its home base. Assisting with reducing our reliance on the River Murray other areas which have been invested in include storm water harvesting, use of rainwater tanks, recycling, and focus on efficient and innovative technologies. This has made South Australian irrigators and residents some of the most water conscious and efficient in the nation. And, although no longer in drought, South Australia remains on WaterWise measures.

In terms of recycling treated wastewater from capital cities, Adelaide is already at the forefront in Australia. Depending on demand, typically 40 to 60% of suitable treated wastewater is reused during the peak month demand in summer.

These initiatives and projects mean that South Australia will be better placed to respond to drought and also presents benefits for managing growth and providing security for businesses wanting to invest for the future.

**For more information contact SA Water, 250 Victoria Square Adelaide SA 5000, phone 1300 650 950, website: [www.sawater.com.au](http://www.sawater.com.au)**



Below Kennedy Constructions were responsible for the stone walling required on the North South Interconnection System Project.



**Kennedy Constructions SA Pty Ltd has a 30 year history specialising in stonework and bricklaying renovations.** It was the ideal company to do the stone walling required on the North South Interconnection System Project. Thomas Healy, Shane Williams, Brendan Kennedy and Dirk Vennemma made up the professional team that worked on the project.

Much of Adelaide's water supply network is gravity fed, which means water moves from high points to low points allowing gravity to do much of the work. However, where the water needs to be moved across flat or undulating land, uphill, or across long distances, pumping stations have needed to be built to push it along. To move large volumes of water effectively SA Water have about 60 pumping stations strategically placed throughout the network to minimise the amount of energy required to move the water. Many pump stations are located in residential areas where they help maintain a reliable supply of good water quality, and maintain pressure, as they are primarily required to provide water to households. Given that the pump and valve stations constructed as part of the North South Interconnection System Project are in residential areas they were designed to contain noise, with the internal machinery housed within acoustically controlled structures.

The projects Kennedy Constructions worked on are the Clapham Pump Station, the Wattle Park Pump Station and the Seacliff Park Pressure Reducing Valve Station. The buildings were constructed with precast concrete panels for sound proofing reasons because they were sited across the road from residents. The buildings were also required to blend in with their surroundings so the choice of finish on the precast concrete panels was important. Kennedy Constructions' expertise in this area was invaluable. They chose a veneer stone which would not look out of place among the houses

of the area. They glued the veneer to the face of the precast panels. "We thought it was so important to select the correct mortar colours when we pointed the stonework and now the buildings are finished they blend in so well with the area," said Brendan Kennedy. "Kennedy Constructions is proud of their achievement, in making the buildings in the project, look like part of the landscape."

Kennedy Constructions also built some 7 metre high block walls inside the buildings. These were concrete core filled for sound proofing reasons. The team at Kennedy Constructions met the challenge of completing the job on time and on budget. "The projects were very well organised by Guidera O'Connor, Leed Engineering and SA Water," said Brendan Kennedy, "so although there were time constraints they were not an issue for us."

Another SA Water project Kennedy Constructions have worked on, is the pump station at Bolivar, part of SA Water's \$100 million Bolivar Environment Improvement Program.

Kennedy Constructions have also worked on many small and large residential, heritage and commercial projects. These projects include the stone walling at the Henley Beach foreshore for Blu Built Construction, the new blue stone building at MacLaren Vale for Angoves Winery, sandstone walling for Strathalbyn swimming pool, the Wolf Blass Residence, a stone and block residence at 15 Esplanade, Somerton Park and many large residential projects for Medallion Homes.

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Technoweld Pty Ltd provided inspection and welding consultancy services for the North South Interconnection System. Established in 1996, Technoweld has an experienced team of internationally and nationally qualified professionals who met the challenge of providing timely welding management services on a number of work fronts:

- Contractor's inspector for a 12k/m section of underground MSCL (mild steel concrete lined) pipe for SA Water NSISP – Central project, welding traceability review, NDT (non-destructive testing) percentage verification and visual inspections
- Contractor's inspector for a 7k/m section of underground MSCL (mild steel concrete lined) pipe for SA Water NSISP – Northern project, welding traceability review, NDT (non-destructive testing) percentage verification and visual inspections
- Contractor's inspector for 2 pump stations, client liaison on technical issues, welding traceability review, NDT management and visual inspections
- Vendor's welding management consultant for the welding of MSCL for SA Water NSISP – western project, includes WPS development, WQT witness and documentation, client specification review and application, ITP development, NDT traceability and visual inspections.

Technoweld has specialised in oil, gas, mining and defence project work. The type of quality requirements applicable to these industries allowed them a seamless transition into the water industry. Over the past 5 years the focus on the water industry has increased and Technoweld's capacity in this area has matched the trend. The company has been involved in key projects from the Adelaide Desalination Plant, Christies Beach Waste Water Treatment Plant, the GAP REUSE at West Beach, skid mounted and transportable desalination and demineralisation plants, MSCL transmission infrastructure and pump stations.

Technoweld services range from assisting fabricators interpret and apply specifications, improving processes for reduced rework and improved efficiency, development of welding procedure specifications, conducting welder



qualifications, undertaking visual inspection and compiling MDRs.

Technoweld has extensive experience in representing asset owners and lead contractors to ensure their vendors are achieving a specification's requirements and to provide the "on the ground vision" asset owners need to have confidence the project is hitting its quality targets.

Technoweld prides itself on being familiar with both national and international standards including AS/NZS 1554, AS/NZS 3992, AS/NZS 4037, AS1210, AS1228, AS4041, ASME IX, ASME B31.3, AWS D1.1, ASME IX, API 650.

The company prides itself on its specialist knowledge of the fabrication and welding of pressure vessels and high pressure pipe work for the oil, gas, chemical, and food industries and pipefitting experience with copper, P.V.C., A.B.S, copper nickel and a range of stainless, low alloy and carbon steels. Technoweld boasts over 20 years experience in fabrication and welding of various materials such as carbon steel, low temperature carbon steel, stainless steel, cr-mo steel, aluminium and dissimilar materials as well as in coating inspections arena, including zinc rich epoxy, in-organic zinc and galvanising.

Technoweld's projects in Australia include welding and coating inspections at several fabricators during the build of components such as pig launcher / receivers for both Gorgon and the APLNG Curtis Island projects, 4m diameter, 40m long Class 1H

low temperature mounded pressure vessels, high pressure pipe work for asset owners such as Santos, QGC and Epic, structural components for the Cape Lambert Processing Plant, quality monitoring and inspection of welding and coating for 2 demineralisation packages for the Gorgon Project and inspection of pipe piles including T, K, Y joints for channel markers for the Pluto Jetty Extension. Technoweld also audited fabricators for the Victorian Government during the construction of the Melbourne Rectangular Stadium.

Technoweld's overseas projects include the pre-production audit of a manufacturing facility in Qingdao, quality monitoring and inspection of welding cyclic loaded equipment in a manufacturing facility in Qingdao, welding inspection of power utilities component fabricator in Jiangmen in China and welding inspection of fuel storage tanks in PNG.

"Our core business focus is customer satisfaction and exceptional service," says Graham Fry, the Director of Technoweld. "Our aim is to forge longstanding relationships with our clients by exceeding their expectations and by providing solutions to their technical needs, whilst providing a service in a professional and ethical manner."

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**Below** Ventomat Australia Pty Ltd was chosen to supply air valves for the pipeline and pump stations for the North South Interconnection System Project.

**Below** Blu-Built Constructions undertook all civil and building works associated with the Northern PRV Building on the North South Interconnection Systems Project.



**Ventomat Australia Pty Ltd** was chosen to supply air valves for the pipeline and pump stations for the North South Interconnection System Project. The installation of air valves in the pipelines aims to maintain a steady pressure in the system to ensure a secure, reliable and consistent water supply. Ventomat Australia also supplied advice on the sizing and positioning of air valves and surge and water hammer analysis.

Ventomat air valves provide four functions: high volume air release; high volume air intake; pressurised air release and surge and water hammer protection. “The valves are virtually maintenance free, self-cleaning, made from superior materials and are proven over 15 years in the Australian market and over 30 years in world markets”, said a spokesman for the company.

The first Ventomat air valves were installed in Australia in 1997. Ventomat Australia Pty Ltd commenced operations in 2005 as the supplier of Vent-O-Mat Air valves. It is a subsidiary of Dynamic Fluid Control (Pty) Ltd of South Africa, one of the largest valve manufacturers in the Southern Hemisphere. The company specialises in the Vent-O-Mat Air Release and Vacuum Break Valve which comes with an integral “Anti-Shock” Mechanism for surge / water hammer protection. They also supply and manufacture RF Pinch Valves and Insamcor Knife Gate Valves for slurry/ tailings and sewerage. Ventomat Australia’s service extends to customers throughout Australia and the Asia/Pacific rim. Ventomat’s other projects include the replacement of air valves on the large diameter Warragamba



pipelines near Sydney, as well as replacement of air valves for Melbourne Water and Water Corporation in WA. Ventomat Australia has recently supplied air valves for the Gold Coast, Sydney and Melbourne desalination plants as well as for the Glenelg to Adelaide Pipeline in South Australia, the Sugarloaf pipeline in Victoria and the Lake Margaret Timber Pipeline in Tasmania and is a preferred supplier for BHP Billiton, Rio Tinto and Fortescue Metals Group.

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**Blu-Built Constructions** is a South Australian privately owned building and civil construction company which specialises in technically challenging and complex construction projects. The company was engaged to undertake a number of projects as part of the North South Interconnection System Project including:

1. Wattle Park Pump Station Civil Works
2. Wattle Park PSV Civil and Building Project
3. Hope Valley Terminal Storage Inlet Pipework
4. Wattle Park Southern Inlet Pipe Encasement Project
5. Northern PRV Civil and Building Project

Blu-Built Constructions undertook all civil works associated with the Wattle Park Pump Station which connects Adelaide’s desalination plant to the northern suburbs. Blu-Built’s experienced team met the challenge of the site’s exceptionally small footprint. Extensive planning both from a logistics and staging perspective and effective communication and coordination of works ensured multiple trades could work concurrently to achieve the project milestones.

Blu-Built Constructions undertook all civil and building works for the Wattle Park Pressure Sustaining Valve (PSV) Station. The works were a critical path activity for the overall North South Interconnection System Project requiring completion prior to the filling of the existing Wattle Park Reservoir and commissioning of the new pump station. The work included:

installation and commissioning of 900mm MSCL pipework, manifolds, valves, including tie-in works; installation and commissioning of internal mechanical pipework and fittings; construction of concrete foundations; supply and erection of precast panels, structural steel, roof cladding; supply and installation of acoustic ceilings and doors; architectural finishes; and construction of pavements and kerbing.

Blu-Built Constructions was also engaged to construct the new Northern Pressure Reducing Valve (PRV) Building which involved all aspects of construction including bulk and detailed excavation, underground and aboveground pipework, structural concrete works, services installation and commissioning, structural steelwork, precast concrete erection, acoustic linings and external finishes.

“Central to the success of Blu-Built Constructions is our commitment to deliver quality construction projects safely, on time, on budget, and, primarily to the absolute satisfaction of our clients,” says Blu-Built Constructions General Manager, Owen Richards. “We pride ourselves on our ability to provide ingenious, innovative and sustainable solutions to both simple and complex engineering problems and projects.”

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