Sydney Desalination Plant – Shoring Up the Future

Introduction

The new Sydney Desalination Plant is located on the Kurnell Peninsula, bounded by Botany Bay and the ocean. Commissioned by Sydney Water, it is being delivered by Blue Ocean, a joint venture between John Holland and Veolia. The 18 km pipeline that will distribute the water produced at the plant is being built by the Water Delivery Alliance. This group includes Sydney Water, Bovis Lend Lease, McConnell Dowell, Kellog Brown & Root, Worley Parsons and Environmental Resources Management.

What’s it All About?
The Sydney Desalination Plant will be capable of supplying up to 15% of Sydney’s water requirements. The plant will take seawater and produce fresh water via a process called the reverse osmosis system. This involves an initial screening and filtering process and then the seawater is pushed at a very high pressure through reverse osmosis membranes. There are 36,000 membranes in the Sydney Desalination Plant! The membranes remove salt and other particles, leaving only fresh water to pass through to the other side. The resulting fresh water is stored in tanks prior to distribution and treated in the same manner as water from natural catchment areas. The by-product of the process is a seawater concentrate (also known as brine) that is twice as salty as natural seawater and slightly higher in temperature. This brine is then released back into the ocean and the process has been designed to have minimal impact on the surrounding environment.

How Will it Help Sydney?
The population in most urban centres of Australia is increasing. Sydney is no different and its population is expected to increase by 30-40% over the next 30 years. The prolonged drought and the predicted changes to the global climate have resulted in diminished rainfall and a subsequent reduction in the level of water in our dams. This has meant that authorities need to look at alternative methods of securing the supply of water to the public, industry and agriculture. The Sydney Desalination Plant will initially supply 15% of Sydney’s water requirements by producing 250 million litres of water a day. Sydney Water has also looked to the future by ensuring that the plant can be easily scaled up to produce 500 million litres a day when and if this is required.

Nuts and Bolts of the Structural Side

The reverse osmosis building is the heart of the Sydney desalination project. The building is 235m long and 75m wide. There are also other associated assets, such as a prescreening facility, water storage tanks and others. The project requires over 60,000 cubic metres of concrete, 13,500 tonnes of reinforcement steel and 3000 tonnes of structural steel.

Beating Corrosion – How Did They Do It?

As discussed above, the reverse osmosis building is a very large structure and its coastal location and application make durability a critical aspect of its design. A steel portal frame building was assessed as the most practical economic design due to its large area and the wide spans required to house the necessary plant and equipment. However, the coastal nature of its location required that a corrosion protection system was specified and used to ensure durability, economical operation and minimal maintenance, all while keeping the initial cost as low as possible.

Galvanized steel was used for practically all of the structural and associated steelwork. The use of galvanized steel meant that the fabrication could be done offsite which increases the speed of fabrication and reduces the number of people required onsite. The flexibility of galvanized steel was also important because the project was fast-tracked and speed of fabrication and erection are inherent advantages of such a structural system that requires corrosion protection.

Gian Gucciardo is the Managing Director of GB Galvanizing. “The Galvanizing Association of Australia (GAA) had only recently finished a survey of galvanized steel on some of the port terminals in Botany Bay. Their data showed that galvanized steel light towers on the water’s edge had performed well without maintenance for over 27 years and there was still a significant level of protection remaining.”

Where extra protection was required due to the aggressiveness of specific microclimates, then the galvanized steel was over-coated with an epoxy mastic paint. Much of the fabrication and galvanizing was undertaken outside of Sydney. In fact, the major structural items in the reverse osmosis plant, about 1400 tonnes of steel, were fabricated by Alfasi Steel Constructions and galvanized by GB Galvanizing, both based in Melbourne.

Bill Matanas was the Project Engineer for Alfasi Steel Constructions. “Having GB Galvanizing virtually around the corner made the project a lot easier to handle,” he said. “The cooperation between the two organizations meant that this was one of the easiest projects for me to manage despite its large size and being interstate.”

Australian Made for Australian Conditions

An important aspect of the structural steel in the reverse osmosis plant is that it was sourced, fabricated and galvanized in Australia. The capability of the local steel industry meant that the project was able to proceed smoothly and the local access of all the stakeholders involved also played a significant part in the success of the project. Gian Gucciardo said “we’re proud to be supplying local infrastructure projects. It gives something tangible to the people who work for us and they can be proud and say, ‘we did that’. We pride ourselves on our service and we think that both Alfasi and ourselves showed what Australian industry can do when it’s given the opportunity.”

Both Alfasi and GB Galvanizing showed that local product and local industry are able to meet the demanding and exacting requirement of challenging and iconic infrastructure projects.

Client: Sydney Water
Project Management: Blue Water joint venture
Structural Engineering: SRK/McHausell (AECOM) joint venture
Steel Fabrication: Alfasi Steel Constructions KERMAC Welding and Engineering New World Engineering Silo Constructions S & L Steel
Coating: GB Galvanizing Service
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