



Associate of International Zinc Association

Asia Pacific Edition

GALVANIZED STEEL: PRACTICAL, DURABLE, RELIABLE AND PROVEN

# SYDNEY DESALINATION PLANT SHORING UP THE FUTURE

69  
galvanize  
December 2009



## In this issue

Sydney Desalination Plant

Powering Up The Green Way

Nuts and Bolts of the Structural Side

Beating Corrosion – How Did They Do It?

Australian Made for Australian Conditions!

Education Revolution – Australian Hot Dip Galvanized Steel Not Left in the Shade

Editorial  
Emmanuel Pimentel

Prepared by  
Galvanizers Association of Australia

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 was designed to protect the future of the region by ensuring the supply of water without impinging on other natural water sources. The location of the plant in a coastal area, and the nature of the process it is required to handle, means that corrosion protection is a significant feature of the design. Sydney Water needed to build a structure that was durable, but kept the future maintenance costs to a minimum.

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.

*Story continued on page 2*

**galvanizers**  
ASSOCIATION OF AUSTRALIA

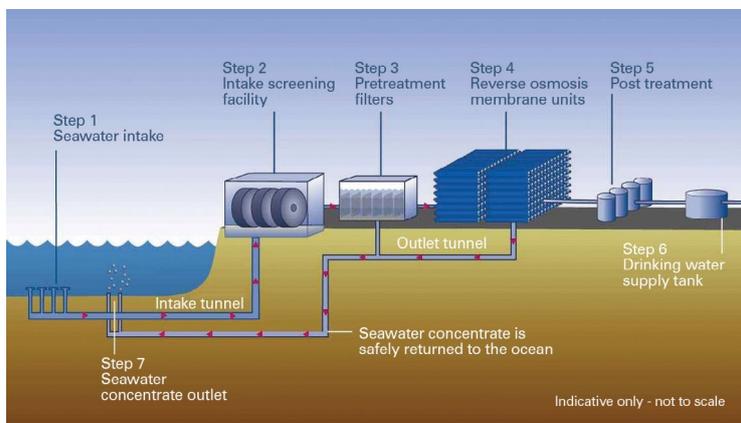
# SYDNEY DESALINATION PLANT

## The Sydney Desalination Plant

The new Sydney Desalination Plant is located on the Kurnell Peninsula, bounded by Botany Bay and the ocean in NSW.

The desalination plant has been commissioned by Sydney Water and is being delivered by Blue Water, 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, Kellogg Brown & Root, Worley Parsons and Environment Resources Management.

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.



Sydney Desalination Plant (courtesy of Sydney Water)

## Powering Up The Green Way

In keeping with the overall objective of the project to minimise its environmental footprint, the power required to run the plant is being offset by the construction of a 67 turbine wind farm at Bungedare, NSW. The wind farm is being built by Renewable Power Ventures and will have a capacity of 140 MW. This will increase the production of wind power in NSW by 700%. The aim is to ensure that the plant offsets 100% of its power with the development of renewable power resources.

## 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. For those from the "rectangular pitch states", that equates to approximately two football fields. There are also other associated assets, such as a prescreening facility, piping and supports, 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, the reverse osmosis building is a very large structure and its coastal location and application make durability a critical part 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 superior 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. This increases the speed of fabrication and considerably 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.

Coincidentally, the GAA had only recently finished a survey of galvanized steel on some of the port terminals in Botany Bay. The 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 within the plant, then the galvanized steel was over-coated with an epoxy mastic paint.



Structural steel showing extra corrosion protection at base of columns

The flexibility and ease of use of galvanized steel is demonstrated by the fact that although a substantial amount of steel was galvanized in NSW, a significant amount of the fabrication and galvanizing was undertaken outside of Sydney. In fact, the major structural items in the reverse osmosis plant, about 1600 tonnes of steel, were fabricated by Alfasi Steel Constructions and galvanized in Melbourne. The excellent cooperation and logistical coordination between Alfasi and the galvanizer resulted in the fabrication, galvanizing, transport and erection all being conducted in a timely and economical manner.

Bill Matanas was the Project Engineer for Alfasi Steel Constructions. "The cooperation between the two organisations meant that from a coatings viewpoint, this was one of the easiest projects for me to manage despite its large size and being interstate. We worked really well with the galvanizer."