



CEMENT INDUSTRY  
FEDERATION

## SUPPORTING BIODIVERSITY AT COCKBURN CEMENT



### INTRODUCTION

Cockburn Cement, a division of Adelaide Brighton, is the largest manufacturer of cement and quicklime in Western Australia. Its main manufacturing unit in Munster, 30km south of Perth, was established nearly 50 years ago.

The manufacture of cement and quicklime at Cockburn's Munster plant involves the use of large quantities of water for slurry manufacture and heat exchange processes, and dust control measures designed to minimise inconvenience to neighbours. This water is primarily drawn from a number of bores within the plant area.

Historically, the waste water from production processes and general run-off from the plant, together with storm water run-off, gathered in a settling pond, from where it would drain into

the water table. There was no re-use program for this water.

In 1996, construction of a new kiln at the site required the relocation of an existing drainage pond that was used for the disposal of process water. The preferred site for relocation of the pond was in a bushland area, and prompted the company to investigate the creation of an artificial wetland, where water could be recycled instead of being released to groundwater.

The final plan involved expenditure in excess of that required for construction of a conventional drainage pond, plus an ongoing commitment to develop and manage the wetland.

## DESIGN CRITERIA

Following extensive research, a plan for the construction and future development of the wetland was drawn up. The wetland had to meet the following criteria:

- Provide sufficient water at any one time for all milling, slurry and heat exchange requirements, and provide storage for excess water from the bores;
- Water kept clean and free of particles to minimise pump blockages;
- Nutrient load minimised to prevent algal blooms;
- Capacity to collect most of the run-off from the works, to minimise flooding of surrounding low-lying bush;
- Minimal disturbance to existing flora during construction;
- A haven provided for local flora and fauna (there has been extensive degradation of natural wetlands in the Kwinana Industrial Area);
- An educational resource created for local students and an area of interest to the community at large.

## WETLAND SYSTEM DESIGN

The wetland comprises a 1500 m<sup>3</sup> primary sump, a 3500 m<sup>3</sup> secondary sump, a crescent shaped billabong, a stretch of artificial river, and an 8000 m<sup>3</sup> lake with an island. The total area of the wetland and surrounding bushland is 12.8 hectares.

The primary sump is lined with concrete and the secondary sump, billabong, river and lake are all lined with plastic sheeting to prevent water seeping into the groundwater.



- The primary and secondary sumps are designed to allow the settlement of coarse and fine particles, and for the filtration of any oil contamination from run-off water.
- The billabong is densely planted with reeds and rushes, to reduce the flow rate of water as it leaves the secondary sump. The plants act as a biological filter, utilising their surplus nutrient uptake capacity to remove nitrates and phosphates from the water.

- Permeable rock levees built across the river further reduce the flow rate of the water on its way to the lake and large logs placed on the river floor provide a habitat for invertebrates and microflora.
- The lake is the main water storage facility, providing a strategic supply of 8000 m<sup>3</sup> of clean water available for use in the industrial area at any time.
- An island was created in the lake for ground-nesting birds, with a minimum water depth of 1.5 m all round to minimise the risk of access by predatory animals.

## B U S H L A N D

Initial planting consisted of 5000 native plants. Existing trees were supplemented with plantings of flooded gums, paperbarks and acacias. Morning iris and sea heath were planted as additional littoral vegetation and the floor of the billabong/river section was densely planted with sedges and reeds. In 1999, an additional planting of more than 3000 individual plants representing 65 different species was undertaken, with the aim of creating a high level of species diversity.

Extensive weed control has been undertaken, with the help of Australian Trust for Conservation volunteers, and the whole area has been progressively fenced as protection against feral animals, rabbits and foxes.

## O U T C O M E S

The constructed wetland was a national finalist in the 2000 Banksia Environmental Awards.

## W A T E R Q U A L I T Y

The run-off of alkaline materials from the industrial area ensures that the water in the wetland is alkaline. The pH in the wetland was initially around 10, but has been progressively reduced to an average level of 8.5. As the system matures it is anticipated that this fall will continue – the ambient groundwater level is of the order of 7.5. Phosphorus levels have dropped significantly, to about one third of the initial level, which is an indication of the effectiveness of the reed bed filter.

## F L O R A A N D F A U N A

A survey of aquatic flora and fauna in 1999 yielded very positive results, revealing a diverse food chain capable of supporting additional birdlife. Large populations of detritivores and algal grazers are present and animals such as larval and adult insects, which feed on the grazers, are also abundant. Vertebrate predators are represented by fish, frogs, and waterfowl. The wetland is now home to 69 bird species, 58 of which are native, with many known to be breeding. These results are very encouraging, given that the wetland was created only four years ago.



The wetland is used as a protected release facility by the local wildlife conservation group, Native Animal Rehabilitation Centre, to accommodate birds that come into their care. The group also has plans to introduce additional animals, possibly including threatened species such as the southern brown bandicoot.

#### PUBLIC EDUCATION AND ACCESS

The wetland is an educational resource for local schools and community groups and to date, over 2000 students have made use of the area.



#### FOR FURTHER INFORMATION CONTACT

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