



ROYAL
BOTANIC GARDENS
VICTORIA



The Recirculation wetland at Cranbourne Gardens (Stage 2)

There is a new water feature in the second stage of the Australian Garden with a special purpose. It's a working wetland – a recirculation wetland – tasked with keeping the water clear, cool and free of nutrient loads that otherwise might support algal blooms. It will provide water quality fit to be one of the feature elements of the Australian Garden, as we trace the story of water through the Australian landscape.

Water in the Australian Garden

The story of water is an important interpretive element in the Australian Garden as it is in the Australian landscape. Frequently its absence is more critical than its presence. Australia has long been subject to drought and much of the flora (and fauna) has adapted to coping with limited and unreliable access to water. In this regard, the Australian Garden represents Australian landscapes in a garden form.

In the Australian Garden, the story of water begins at the Visitor Centre and café, where the outlook is dominated by the Red Sand Garden. It is a landscape where even the soil mineralization and landscape form is determined by the absence of water, along with the plant cover and species. Water is ephemeral here – present in short bursts.

Moving into the Garden, water is also an implied ephemeral element of the Arid Garden and the Dry River Bed. Indeed, water is really only present in the design of the Rockpool Waterway.

Australia has many rivers and lakes but most of them are dry for most of the time. Pulses of water flow through them from time to time and ecosystems hang together, through all sorts of adaptive responses for the periods of plenty when water is abundant. The Rockpool Waterway subtly mimics this pulsing presence and absence of water. This is achieved by a water circulation system, which is on a timer that sees the water completely drain from the waterway to return some minutes later, much to the delight of visitors.

Despite being the driest inhabited continent, Australia does have rainforests, wetlands, snowfields, rivers and lakes – and these areas are all the more precious to us because of their limited distribution. They are also under increased pressure as a limited resource: long subject to the vagaries of drought and now, climate change.

These wetter landscapes (wetlands, lakes and rivers) also feature in the Australian Garden at Cranbourne Gardens and the water that fills these areas comes from groundwater – rainwater that falls in the local catchment. Rainwater is filtered through the sand substrate and is 'perched' on a clay layer becoming a groundwater source. This groundwater is the water that is available for the Gardens' water bodies. The regional groundwater catchment is oversubscribed and has been known to turn saline in dry years in those areas closer to the coast but it is reliably fresh at the head of the catchment, where Cranbourne Gardens is located.

Water features are an important element of many major public gardens and the Australian Garden is no exception: water can add an air of tranquility and can soften an otherwise harsh landscape. However, incorporating water in a garden brings with it particular problems that must be solved if the water features are to succeed. Among these are the annual summer algal blooms that can occur, caused by nutrient-rich groundwater – it is not an appearance we are seeking.

The Recirculation Wetland

To reduce algal activity of this nature a recirculation wetland was incorporated into the design of the Australian Garden.

Water will flow from the Ian Potter Lake to the wetland where it will gradually make its way from one end to the other. Typically, algal blooms flourish in warm, nutrient-rich, high light environments. However, the presence of aquatic plants in the recirculation wetland will draw off nutrients from the water, provide shade and cool the water as it makes its way through the wetland, preventing the occurrence of algal blooms and creating an environment that does not support the presence of algal blooms. The water will then return to the Ian Potter Lake, resulting in a clear and aesthetically pleasing water body.

The Recirculation Wetland is a shallow kidney-shaped water body sealed with a waterproof (Bentonite) membrane. Its construction was completed in May 2010 and its margin was planted by volunteer groups including schools. Schools involved in the wetland planting were Cranbourne Secondary College, Narre Warren Community Learning Centre, St Peters Catholic College, Woodleigh School Minimbah Campus and St John Vianney Catholic School. Some 4,000 plants indigenous to the Gardens were planted.

St Peters' students measured and recorded the water quality of the Recirculation Wetland soon after construction was completed and compared it with the nearby high quality Boardwalk Wetland that has been established since the 1970s. Their results are recorded below.

	New Recirculation Wetland	Boardwalk Wetland
Test	Reading	Reading
Turbidity	53 NTUs	0 NTUs
Air Temperature	13.2C	14C
Water Temperature	13.6C	17C
Ortho Phosphorous	0.ppm	0 ppm
pH	6.5	6.5
Nitrates	.0.6 ppm	0. 8 ppm
Dissolved Oxygen	9.0ppm	12ppm

Comparative results obtained from St Peters' excursion, 13 May 2010

The most significant difference identified by the testing was the turbidity or the clarity of the water. Because the wetland was newly constructed, the water had a lot of stirred-up mud (colloids) suspended in it and this was reflected in the turbidity readings. The Boardwalk Wetland water was clear with good light penetration to the bottom. By comparison, the Recirculation Wetland water was quite cloudy and light could only penetrate to a depth of about 150 mm.

Plant life was very limited in the new wetland when it was measured and that reduced the diversity of living creatures it could support. However, there were already quite a large number of water beetles and water mites present. The well-established wetland had fewer organisms but they were a much more diverse group including water mites, beetles, mayfly nymphs, snails and a baby frog.